The Impact of Trade on Economic Growth in ECOWAS Countries: Evidence from Panel Data

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The poor economic performance and growth of ECOWAS economies have become so challenging and this has necessitated research and discussions. Experts have argued that the relationship between trade and economic growth in the ECOWAS region is unclear and the question of whether trade promotes growth and development is controversial. In this paper, an attempt is made to analyse the impact of trade on economic growth both from a theoretical perspective and using econometric evidence from ECOWAS countries. In particular, an attempt is made to econometrically test the hypothesis of a positive relationship between trade and growth in ECOWAS countries during the 1990-2013 period. This is done using panel data regression analysis. Utilizing data for the 15 ECOWAS countries, a log-linear regression equation of per capita real GDP is fitted on exports, the exchange rate, investment, human capital, inflation and population growth. For completeness and to test the robustness of the econometric results, 4 estimators (pooled OLS, Fixed effects model, Random effects model, and dynamic panel regression model) were utilized. The dynamic panel data estimator is preferred as it is able to handle the problems arising from "endogeneity" or reverse causality. All the 4 estimated regression equations had high coefficients of determination and F-statistic. In all the equations, exports, exchange rate and investment were significant determinants of per capita real income growth. Exports were consistently positively related to growth, thus confirming the hypothesis of trade having a significant positive impact on economic growth in ECOWAS countries.

1.0   Introduction

The importance of economic growth cannot be overemphasized. Economic growth has often been used as a deciding factor for membership into group of influential countries. The literature on economic growth shows diverse channels through which growth can be achieved. A prominent channel is through international trade. This is especially true of developing African countries. The question of whether

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trade promotes growth and development is controversial. While the traditional view maintains that trade can and does act as an "engine of growth", there have been loud dissenting voices in the 20th century claiming that trade can only perpetuate the underdevelopment of poor countries. The mechanism through which international trade affects economic development may be briefly described thus: international trade leads to an increase in income, in the level of investment and in the state of technical knowledge in the country. The increase in investment and improvements in innovations and technological progress then lead to increased productivity and competitiveness, and trigger a further increase in trade and in income. This positive feedback continues and brings about a "virtuous circle" of increased trade, rising income, and economic growth. This beneficial effect of international trade on growth and economic development seems to be supported by the empirical evidence. In the 19th and 20th centuries, international trade was by and large been an engine of growth for the global economy. It also acted as an "elixir" of growth (Minford, Riley and Nowell, 1995) or economic development for particular national economies. In the 19th century, international trade contributed powerfully to the transformation of Canada, Australia, Sweden and Denmark from underdeveloped to developed countries. Since the end of World War II, international trade has acted as an engine of growth and development for the newly industrializing countries of Southeast Asia, the so-called "Gang of Four", viz., South Korea, Taiwan, Hong Kong and Singapore. However, it may be questioned whether this scenario applies to ECOWAS countries.

Therefore, the main purpose of this paper is to investigate empirically the impact of trade on economic growth in ECOWAS countries. ECOWAS was established by the Treaty of Lagos in 1975 and became operational in 1976 after members signed the agreed-upon Protocols. According to the Treaty of Lagos, a major reason for forming the Community was "the overriding need to accelerate, foster and encourage the economic and social development of their states in order to improve the living standards of their peoples" (Diejomaoh and Iyoha, 1980). The primary instrumentality for achieving this desirable objective of rapid economic development was the establishment of a customs union entailing internal free trade among members, a common external tariff, free labour mobility, free movement of services and capital between member states (Diejomaoh and Iyoha, 1980). Thus, in the view of the founding fathers of ECOWAS,

expansion of trade through the formation of a customs union would bring about the rapid growth and development of member states.

There are key factors that have hampered the trade performance of most African countries (ECOWAS members inclusive). For instance, the United Nations Economic Commission for Africa(2015) identified the fundamental factors limiting Africa's trade to include the continent's narrow production and export base dominated by low-value products such as raw materials and primary commodities, very high trade costs, tariff and non-tariff barriers to intra-African trade and Africa's limited access to international market. Furthermore, the poor performance of the region in world trade is often reflected in her marginal share in global exports.

According to the United Nations Conference on Trade and Development (2013), the ECOWAS region is the least industrialized region in terms of manufacturing to GDP. For instance, in the period from 2007 to 2011, the share of manufacturing in trade between regional economic communities in East African Community is 58.5%, followed by that of Southern African Customs Union 51.4%, the Common Market for Eastern and Southern Africa 44.8%, Intergovernmental authority on Development 39.1%, Arab Maghreb Union 35.2 percent, Community for Sahel-Saharan States 34.3% and ECOWAS had 25.7%. One of the reasons that explains the low share of manufacturing in GDP in the ECOWAS region is the low export intensities in manufactured goods in most of the member countries.

The overall aim of this study is to contribute to existing literature on trade and growth nexus by investigating the causal relationship between international trade and economic growth in the ECOWAS region. Apart from assessing the relationship between trade and economic growth in the ECOWAS region, the study will also make recommendations on how policy makers can use trade to propel growth in ECOWAS countries.
Trade, as proxied by exports and the exchange rate, is an economic phenomenon of increasing significance in contemporary economic growth and development, and therefore, it requires a thorough study in order to shed light on its dynamics and nature, and also to obtain a better understanding of the universal efforts by governments to promote it. The Sub-Saharan African and especially the ECOWAS region's long-term economic growth is a real challenge and the challenge revolves around ways to encourage economic growth in view of the continuing saving-investment gap in the region. Essentially, the findings of this study will

be significant to both academicians and policymakers. Specifically, the study will add to the extant literature on the impact of trade on economic growth. Moreover, economy policy makers in the ECOWAS sub-region would find the results helpful in designing and implementing pro-trade policies that work for a better institutional quality for growth and development in the region.

The intellectual searchlight of this study will be beamed on all 15 ECOWAS countries and will utilize data spanning a 24-year period, 1990-2013. The selection of ECOWAS as the region for consideration in this study is particularly important because despite the numerous studies on the trade-growth nexus for many advanced and developing countries, there is a significant dearth of literature focusing on ECOWAS countries. This shortage presents the opportunity to investigate the impact of trade on growth in the region as a whole, and to contribute to the extant literature on the region.

This paper has 6 sections. Section I presents an introduction and background information on the study while section II discusses the macroeconomic performance of ECOWAS countries during the last 24 years. Section III contains the literature review (which includes both the theoretical literature and the empirical literature) while section IV presents the theoretical framework, specification of the model and econometric technique used. Section V presents and analyses the econometric results. Since we have data for 15 countries over a 24 year period (1990-2013), panel data econometric techniques are utilized. In particular, we carry out econometric estimations using the Fixed effects model, the Random effects model and dynamic panel data analysis technique. Section VI contains a summary of findings and recommendations.

2.0   Literature Review

2.1   The Macroeconomic Performance of ECOWAS Countries:
         Some Stylized Facts

In discussing the macroeconomic performance of ECOWAS countries during the 1990-2013 period, attention will be focused on 4 key macroeconomic variables, namely, real GDP per capita (PCY), total exports, FDI, and international reserves. The focus on real GDP per capita is warranted as it is generally used as a proxy for level of economic development among the countries of the world. Data for these

variables are contained in Table 1. For convenience and easy understanding, we shall be using the average data for the entire 24-year period for each ECOWAS country.

Table 1: Trade-Economy Growth Nexus in ECOWAS Sub-Region, Averages (1990-2013)

Countries	PCY	INV	HK	FDI	INFL	XPORT	RES	EXRT	POPGR
Benin	492.78	764770259.3	7	67410857.61	6.2	777295646.1	589379380.6	505.43	3.16
Burkina - Faso	382.71	1113908657	7	53754300.94	3.41	808236702.9	561224364.8	505.43	2.83
Cape - Verde	944.51	854777424.2	6.66	59346010.99	4.53	624948410.7	442273456.6	370.1	2.52
Cote - D' Ivoire	947.72	1145247776	7	106833431.5	4.44	2230626249	712629965.3	402.91	2.46
Gambia	581.33	124751125.8	6	31177476.93	5.85	194134337.7	124258522.8	19.11	3.09
Ghana	705.11	3625690749	6.46	885316469.7	20.88	5338021760	1876674209	0.71	2.5
Guinea	420.2	653909906.9	6.67	139899642.8	22.29	1023267227	134793227.3	2855.7	2.98
Guinea - Bissau	355.81	67410702.48	5	17120442.78	17.35	30522615.59	77436194.1	445.66	2.24
Liberia	193.21	120081669.1	6	210186924.4	9.76	167941977.6	116252242.1	39.98	2.91
Mali	419.13	1052728551	6	181786654.1	3.19	1313557690	725930637.4	505.43	2.79
Niger	263.77	793933836.7	7	191775764.2	3.22	632079124.7	346469579.5	505.43	3.6
Nigeria	875.26	16495016629	6	3336585616	19.75	40470638729	20079544345	88.66	2.59
Senegal	738.67	1831276195	7	152116150.3	3.01	2086238455	927215710.3	505.43	2.76
Sierra leone	296.86	3741987664	4.67	218687538.8	2.05	257607760.4	118423201.7	156	2.55
Togo	396	338557874.6	7	51030396.94	4.64	734407751.1	315445995.2	505.43	2.56

PCY = per capita real income; EXPORTS = total exports; INV = real gross domestic capital formation; HK = human capital; POPGR= growth rate of population; EXRT = nominal exchange rate; and INFL= inflation rate; FDI=foreign direct investment; RES= international reserves.
Source: World Development Indicators (2015), Barro and Lee dataset (2010). IMF World Economic Outlook(2015) and IMF, International financial Statistics(2015).

An examination of the data in Table 1 shows that average per capita real income (PCY) of ECOWAS member countries ranged from a low of $193 for Liberia to a high of $947.7 for Cote d'Ivoire. The next highest amount of real per capita GDP was the $944.5 reported by Cape Verde while the 3rd highest amount of $875 was reported by Nigeria. It is observed that all ECOWAS countries reported an average per capita real GDP less than $1000, which justifies their classification as low-income countries by the World Bank.

The highest average amount of exports for the 1990-2013 period was $40.47 billion and was reported by Nigeria while the lowest value of exports, amounting to $30.5 million, was reported by Guinea Bissau. The 2nd highest amount of exports was $5.34 billion, reported by Ghana

while Cote d'Ivoire with an average of $2.23 billion had the 3rd highest amount of exports.

The annual average amount of FDI during the 1990-2013 period ranged from a low of $17.1 million for Guinea Bissau to a high of $3.3 billion for Nigeria. The 2nd highest inflow of FDI, amounting to $885 million, was reported by Ghana while Sierra Leone posted the 3rd highest inflow of FDI amounting to $219 million.

The average level of international reserves held by the various ECOWAS countries during the 1990-2013 period ranged from a low of $77.4 million reported by Guinea Bissau to a high of $20.1 billion posted by Nigeria. The 2nd highest amount of international reserves amounting to $1.88 billion was reported by Ghana, while the 3rd highest amount, totaling $927.2 million was posted by Senegal.

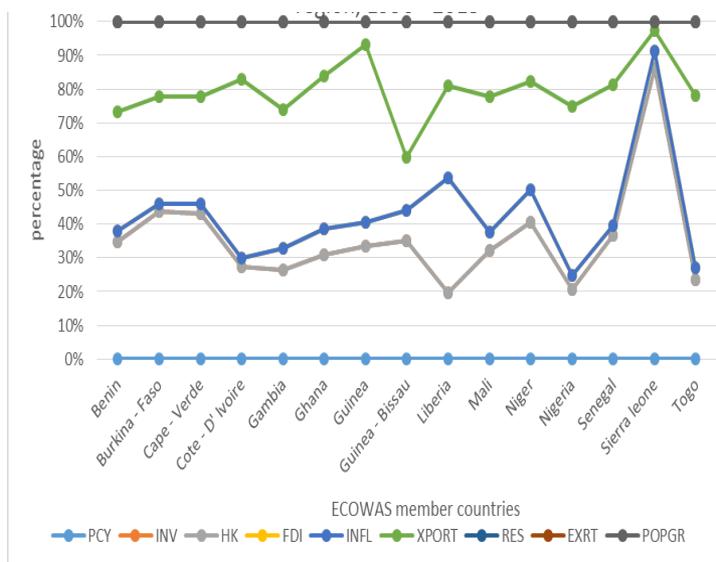Figures 1-3 offer a graphical view of the data on macroeconomic performance of ECOWAS countries during the 24-year period[2].

Figure 1: Trade-Economic growth relationship in ECOWAS (1990 – 2013)

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[2] The bar graph presents a 3-D 100% stacked column. It gives the percentages that each value contributes to a total over time. The line graph is a 100% stacked line. It shows the % contribution to a whole over time or categories. Technically, all 9 variables have been plotted but only those with significant percentages show up in the legend.
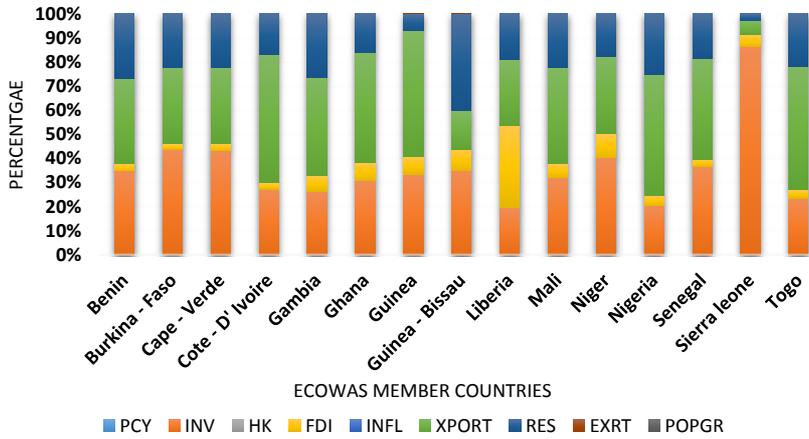
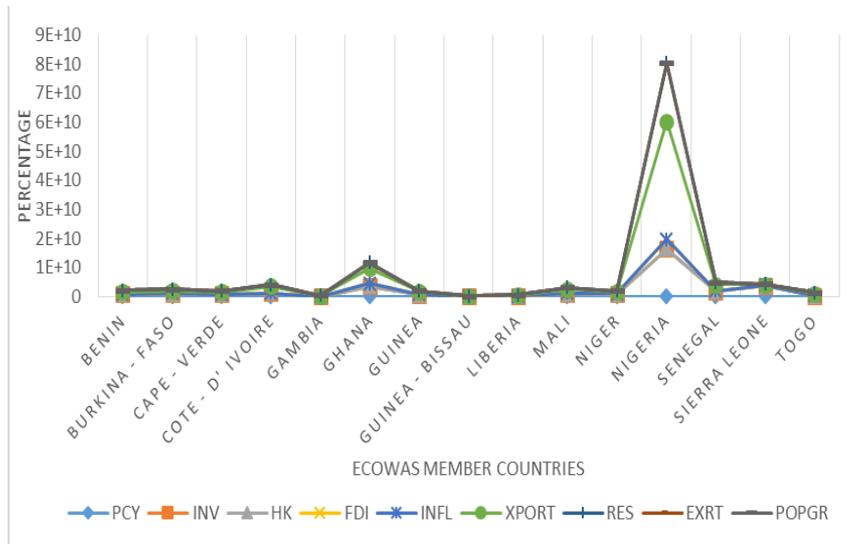Fig. 2: Trade-Economic growth relationships in ECOWAS Countries (1990 – 2013)

Fig. 3: Determinants of Trade and Economic Growth in ECOWAS Countries

2.2. Review of the Theoretical Literature

As a background to the theoretical investigation of the impact of trade on economic growth, we present a brief theoretical perspective on the relation between trade, comparative advantage and development. Theories of international trade postulate the hypothesis that trade plays an important role in improving economic growth, bringing about gains in welfare. To this end, trade can have a significant and positive role in boosting a country's economy. Nevertheless, disagreement arises when there are

trade regimes with varying degrees of liberalization that countries adopt (Stiglitz and Andrew, 2005). Basically, the question of whether trade promotes or does not promote growth and development is controversial. While the traditional view maintains that trade can and does act as an "engine of growth", there have been loud dissenting voices in the 20th century claiming that trade can only perpetuate the underdevelopment of poor countries. Therefore, there is no simple and straight forward relationship between trade and economic growth. Remarkably, divergent results were found from cross- country studies on the nexus between trade and economic growth, which indicate the complexity of the relationship. The hypothesis regarding the relationship between trade and economic growth is the Export Led Growth hypothesis.

The gains from international trade are benefits a country enjoys from trade over time (both in the short run and in the long run). Hence, the welfare gains from international trade play an important role in the improvement of economic growth. The static gains from international trade are considered as the short run benefits the country enjoys immediately it enters into trade with other countries while dynamic gains from international trade are benefits obtained by the country in the long-run, and these benefits are often obtained as trade openness increases.

2.2.1 Export-led growth

Primarily, the export-led growth (ELG) hypothesis postulates the attainment of rapid economic growth through adoption of outward oriented trade policies. The ELG hypothesis labels exports as an 'engine of growth', and that export expansion will stimulate sustainable growth and development. According to Ricardian trade theory, export promotion strategy allow countries to be involved in the production of goods that they can produce competitively, and trade for goods that others are able to produce at lower cost (Golub and Chang, 2000). Consequently, consumers will get products at a competitive price and markets are expanded when a country moves from autarky. However, adoption of export oriented economic development is a means, not an end per se, for achieving sustained and rapid economic growth.

Expansion of exports can lead to growth through stimulating technical change and investment, or by spilling demand over into other sectors. Expansion of primary product exports led to growth in many countries

during the 19th century. Such countries include Canada, Australia, New Zealand, Sweden and Denmark. The success of wheat exports in propelling Canadian growth gave rise to the so-called "Staple theory" of growth. In practice, different primary products will have different effects on economic growth because they differ in conditions of supply and demand. Primary products with high income and price elasticities of demand are likely to be more growth inducing than others. Supply response is also critical. In addition, export expansion can lead to growth by providing the foreign exchange for buying capital imports. In the 20th century, there have been no good examples of primary product export-led growth but there have been spectacular examples of industrial exports-led growth, specifically, the Asian tigers -South Korea, Taiwan, Hong Kong, and Singapore. The experience has been that the success of export led growth (whether of primary or industrial products) depends critically on the existence of favorable foreign demand and even more favorable domestic supply conditions.

2.2.2 Static and Dynamic Gains from Trade

The gains from countries participating in international trade can be classified in two major categories: static gains and dynamic gains. The static gains from international trade are related to the benefits that a country obtains immediately after opening its market to international trade. Moreover, static gains from international trade are related to the principle of comparative advantage and the Heckscher-Ohlin theorem (Anderson and Babula, 2008; Cruz, 2008). Accordingly, when countries liberalize their trade regimes, productivity and consumption increase to a level higher than it was under autarky. Subsequently, trade liberalization will lead countries to use the resources that they have in abundance according to their comparative advantage. However, this static gain is a one-time attainment that countries enjoy immediately after trade liberalization; and there is no guarantee that these gains will continue during the post-trade liberalization period (Lawrence and Weinstein, 1999). Similarly, the static gains from opening domestic market to international trade emanate from the possible improvements in competition and profitability of domestic firms (Lawrence and Weinstein, 1999). Thus, there are possibilities for a country to benefit from international trade after liberalizing trade through the stiff competition that domestic firms might face from foreign firms.

On the other hand, the dynamic gains from international trade are long-run in their nature. These are benefits that a country enjoys over time from increased openness. The benefits could be either positive or negative, and there is an ambiguous distinction between the two in trade theory (Lawrence and Weinstein, 1999). Bhagwati and Srinivasan, 2002) have also stated that the ability of trade to enhance economic growth can also lead to poverty reduction and confirms the Bhagwati hypothesis, of the early 1960s which asserts that economic growth is a principal driver of poverty reduction. The Bhagwati hypothesis‖ in relation to dynamic gains from trade states that enhanced trade not only leads to increased income but also contributes to the ultimate goal of economic growth, that is, an equitable distribution of the economic gains. In addition, Anderson and Babula (2008) have indicated that it is of little doubt that trade increases national income; however, this might not necessarily be tracked by rapid economic growth as there might be a negative growth albeit an increase in aggregate income. Largely, countries involvement in international trade has both advantageous and disadvantages despite its name as "an engine of growth". Thus, policy interventions that balance between the two sides, gains and losses, need to be emphasized to achieve rapid and sustained economic growth.

2.3 Review of the Empirical Literature

Previous empirical studies on the nexus of trade and economic growth have shown mixed results ranging from the argument that trade causes economic growth to absence of any causal relationship between the two variables or even the position that trade hurts an economy. The majority of variations in the results mainly arise from methods of analysis adopted; types of indicator variables employed, and regions of analysis.

3.3.1 Trade and Development: Empirical Evidence from ECOWAS Countries

Using exports as a proxy for trade and growth in income per capita as a measure of development, many researchers over the years have attempted to statistically test the existence of a significant relation between international trade and economic development. If obtained, such a significant statistical relationship would suggest the validity of Robertson's (1938) description of exports as an "engine" of growth. Many of the studies have been bivariate, comparing exports and growth but a few others have

been multivariate. Many of the studies have adopted a cross-country approach while some others have used time series data to study the relationship for selected countries. Most of the empirical results reported so far have supported the proposition that exports stimulate growth and development.

Among the important cross-country studies, we may mention those undertaken by Voivodas (1973), Massell, Pearson and Fitch (1972), Michaely (1977), Tyler (1981), Salvatore (1983), Balassa (1978), and Ram (1985). Using a sample of 11 Latin American countries, Massell *et al.*, (1972) found that exports earnings had a greater impact on output growth than other sources of foreign exchange earnings such as public external debt and Foreign Direct Investment. The Voivodas (1973) study concerned 22 LDCs while Michaely (1977) used correlation analysis to study 41 countries. Balassa (1978) on his part used the technique of rank correlation and pooled data for 11 countries covering 1960-73 to study this question. All these researchers found a strong relationship between exports and economic growth. Using data for 55 countries, Tyler (1981) also found strong evidence in favour of the proposition that exports act as a stimulus to growth. Since most of these studies used bivariate statistical and single equation regression techniques, they were naturally subject to the criticism of not allowing for feedback. Salvatore (1983) took care of this by specifying a simultaneous equations model of trade and development. He estimated it using a sample of 52 countries and also undertook dynamic policy simulations. His simulations revealed that exports in fact stimulate growth. He however interpreted the results as suggesting that trade is a handmaiden rather than an "engine" of growth. Finally, Ram (1985) investigated the relationship between exports and growth using a sample of 73 LDCs and data for 1960-1977. He found the coefficient of exports to be statistically significant--thus, once more, confirming the findings of the previous researchers that trade stimulates economic growth. Iyoha's (1998) study on ECOWAS countries, which employed pooled ordinary least squares regression analysis, also found evidence for a systematic positive link between trade and growth.

Osabuohien (2007) examined the impact of trade openness on economic performance of ECOWAS member countries with special emphasis on Ghana and Nigeria between the period 1975 through 2004, employing co-integration and Vector Error Correction techniques. He established a unique long-run relationship between economic performance, trade

openness, real government expenditure, labor force and real capital stock for Ghana and Nigeria.

Pandhi (2007) analyzed the theories behind the role that exports play in growth in the Democratic Republic of Congo, Guinea Bissau, Malawi and Nigeria between the period from 1981 to 2003 using ordinary least squares regression analysis. He found a positive relationship between exports and growth and mixed results for other independent variables like investment and population.

Benik and Yoonus (2012) examined whether the ECOWAS member countries have favorable economic characteristics to undertake deeper economic integration, that is, moving towards an economic union status from the period of 1963 to 2005. They found that an increase in trade which results from deeper economic integration in the ECOWAS region can compensate for fall in trade between ECOWAS and test of the world. Furthermore, they ascertained that an increase in trade in the ECOWAS region generates resources to increase aggregate demand to meet the fiscal requirements of development expenditures.

Yelwa and Diyoke (2013) examined the export-economic growth relationship amongst some selected ECOWAS countries. Their aim was to examine whether or not export-led growth is indeed potent enough to drive her economic growth as an alternative to foreign direct investment during the period from 1980 through 2011, using panel model analysis. They found a stable export-driven growth among these selected countries, and showed that export-led growth in the region is potentially able to drive growth, most especially aggregate net transfer and trade on exportable goods and services.

Lloyd, Ogundipe and Ojeaga (2014) investigated the impact of export diversification and composition on GDP growth and GDP per capita in ECOWAS region during the period 1975 through 2007 using co-integration and panel least square estimation technique. They found that export diversification and manufacturing value-added index had a positive and significant impact on per capita growth. They further ascertained that it is not how much that is exported that matters but what is exported as regions with less specialization and more diversified exports generally experienced higher economic growth rates. This study provided evidence for the important role of export diversification rather than just an export -growth relationship.

Among the more important time series studies, the following may be mentioned: Emery (1967), Servern (1968), Krueger (1978), Fajana (1979), and Ekpo and Egwaikhide (1994). Emery (1967) and Servern (1968) use bivariate regression analysis to investigate the export-growth nexus and found evidence in favour of exports acting as a stimulus for economic growth. Krueger (1978) uses a simple log-linear specification to analyze the impact of exports on growth for each of 10 countries using data for 1954-71. She found GNP to depend more on export earnings than total foreign exchange availability. Fajana's (1979) study and that of Ekpo and Egwaikhide (1994) use Nigerian data. Like the other studies, they found exports to be a key determinant of economic growth. . More recent time-series studies on Nigeria which have also found support for a positive link between trade and growth include Obadan and Okojie (2010), Iyoha and Adamu (2011), and Arodoye and Iyoha (2014). In their study, Obadan and Okojie used the ordinary least square regression technique and annual time-series data 1980 through 2007 to interrogate the link between trade and economic growth in Nigeria and found that trade openness (their principal proxy for international trade) has positive impact on Nigeria's economic growth.

3.0   Methodology and Model Specification

3.1   Specification of the Model -the impact of trade on economic growth

We begin with the basic Solow (exogenous) growth model which gives the growth rate of output or income as depending on the rate of growth of technical change, labor or population and capital stock Solow (1956).

Consider the standard neoclassical production function

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

Where A is the level of technology, K is the capital stock, L is the quantity of labor and Y is output. Assume that the production function is twice differentiable and subject to constant returns to scale, and that technical change is Hicks-neutral.

Differentiation of equation (1) with respect to time, dividing by Y and rearrangement of terms yields:

$$\acute{Y}/Y = \acute{A}/A + (F_K K/Y) \cdot (\acute{K}/K) + (F_L L/Y) \cdot (\acute{L}/L) \tag{2}$$

Where $\acute{Y}/Y$ is the continuous time rate of growth of output, $\acute{K}/K$ is the rate of growth of capital stock and $\acute{L}/L$ is the rate of growth of labor force; F_K and F_L are the (social) marginal products of capital and labor, respectively; and $\acute{A}/A$ is the Hicks-neutral rate of change of technological progress.

Thus, the basic Solow (exogenous) growth model gives the growth rate of output or income as depending on the rate of growth of technical change, labor or population, and capital stock. In empirical applications, this basic Solow model has been modified to obtain the augmented Solow growth model, where the rate of growth of income depends not only on technical change, labor and capital but also on policy variables like exchange rate and inflation. See Barro (1991), Easterly and Levine (2001), Mankiw *et al* (1992), and Ologu (2003). In this paper, the list of policy variables is expanded to include exports. Disaggregating the total stock of capital into two components, namely, physical capital and human capital, the augmented Solow theory of economic growth yields the following specification for the determinants of economic growth in ECOWAS countries:

$$PCY = f(XPORT, INV, \ HK, POPGR, EXRT, INFL) \tag{3}$$

$f_1 > 0$, $f_2 > 0$, and $f_3 > 0$; while $f_4 < 0$, $f_5 < 0$ and $f_6 < 0$

Where:

PCY = per capita real income;

EXPORTS = total exports (a proxy for trade);

INV = real gross domestic capital formation;

HK = human capital, proxied by number years in school;

POPGR= growth rate of population;

EXRT = nominal exchange rate;

INFL= inflation rate;

$f_1, f_2, f_3, f_4, f_5 \text{ and } f_6$ represent the a priori sign expectations of the respective variables as serially identified in the functional (f) representation in equation(3), and this will be further explained in our estimated model in equation(4).

From *a priori* reasoning, exports, real domestic capital formation and human capital are expected to be positively related to economic growth, while the sign of the coefficient of inflation is expected to be negative, implying an inverse relation with economic growth. These sign expectations come from economic theory. Exports will normally be positively related to economic growth because of the catalytic role of international trade in the growth of developing countries. Hence, the higher the level of exports is, the faster will be the rate of economic growth. The higher the rate of domestic investment is, the more rapid will be the rate of economic growth since investment increases the capital stock and boosts aggregate demand. Improvements in human capital promote growth through increasing the productivity of the work force; hence, the higher the quality of human capital is, the higher will be the rate of per capita income growth. Ceteris paribus, the higher the rate of population growth is, the lower will be the rate of per capita GDP growth will be. The literature is replete with studies showing the inverse relationship between inflation and economic growth. Rapid inflation militates against economic growth by reducing real savings and investment, and by increasing uncertainty. Finally, ceteris paribus, the higher the exchange rate is, the lower will be the rate of growth of per capita income since an overvalued exchange rate will tend to militate against rapid economic growth.

4.2   Methodology

Various econometric techniques, suitable for analyzing panel data, are now employed to estimate the coefficients of the per capita income equation. Taking logarithms of the variables and linearizing equation (3) gives the following relation which is to be estimated:

$$\text{LPCY} = \alpha_0 + \alpha_1 \text{LXPORTS} + \alpha_2 \text{LINV} + \alpha_3 \text{LHK} - \alpha_4 \text{LEXRT} + \alpha_5 \text{LPOPGR} + a_6 \text{LINFL} + u_1 \qquad (4)$$

Note: L stands for natural Logarithm and u_1 is a stochastic error term.

Table 2: Variables Description, Measurement, Apriori Sign Expectation and Data Source

Variables	Measurement	Apriori Sign Expectation	Data source(s)
Per Capital Income(PCY)	GDP per capita (constant 2010 US $), it is a proxy for the level of development		WDI
Total Export (EXPORT)	Total value of export of goods and service. It is a proxy for trade	*Positive*	WDI
Human Capital(HK)	Average years of secondary schooling, representing the numbers of years in school	*Positive*	Barro and Lee Dataset
Growth rate of population(POPGR)	Number of individuals by which population increases. It is measured in terms of annual percentage.	*Negative*	WDI
Nominal Exchange Rate(EXRT)	Official exchange rate (local Currency Unit per US$, period average)	*Negative*	IFS
Inflation Rate (INFL)	Annual percentages of average consumer prices are year- on - year changes	*Negative*	WEO
Real Gross Domestic Capital Formation(INV)	Gross capital formation (%percentage of GDP) – Fixed assets of the economy plus net changes in the level of inventories	*Positive*	WDI

WDI = World Development Indicators, WEO = IMF World Economic Outlook, IFS= IMF International Financial Statistics

4.0   Presentation and Interpretation of Empirical Results

This section begins by presenting and discussing the Summary Statistics and the pair-wise correlation matrix. Next, the regression results are presented and discussed. In order to obtain robust results and estimates, 4 different estimators are utilized. They are: the pooled ordinary least squares estimator, the Fixed effects Model, the Random effects Model and the dynamic panel data regression model.

Details of the summary statistics for the logarithms of all the variables are provided in Table 3 below. The Normality test uses the null hypothesis of normality against the alternative hypothesis of non-normality. If the probability value is less than the Jacque Bera chi-square at the 5% level of significance, the null hypothesis of normal distribution is rejected. All the variables are normally distributed. We utilize the mean- based coefficient of skewness and kurtosis to check the normality of all the variables used. Skewness measures the direction and degree of asymmetry. The Skewness coefficient indicates normal curves for all the variables with the values ranging between − 3 and +3.The positive Kurtosis indicates too few cases at the tail of the distribution.

Table 3: Descriptive statistics of variables in the analysis of Trade - Economic Growth Relationships, 1990 – 2013

Variable	Mean	Median	Minimum	Maximum
l_PCY	6.43344	6.12569	4.17146	10.9184
l_INV	20.4303	20.3468	16.5162	25.0694
l_HK	1.8343	1.79176	1.38629	1.94591
l_INFL	1.61115	1.65878	-4.09176	4.2882
l_XPORT	20.7882	20.4942	16.222	27.0648
l_EXRT	4.69908	6.10436	-3.42296	8.85164
l_POPGR	0.951644	0.990236	-1.6413	2.05871
Variable	**Std. Dev.**	**C.V.**	**Skewness**	**Ex. kurtosis**
l_PCY	1.22492	0.190398	1.90344	3.92199
l_INV	1.83106	0.0896247	0.225933	0.251129
l_HK	0.138369	0.0754341	-1.57578	2.60443
l_INFL	1.27423	0.790879	-0.592548	1.26043
l_XPORT	2.26506	0.108959	0.657645	0.483741
l_EXRT	2.48061	0.527892	-1.19219	0.610483
l_POPGR	0.39302	0.41299	-2.58705	13.2538
Variable	**5% Perc.**	**95% Perc.**	**IQ range**	**Missing obs.**
l_PCY	5.14678	9.989	0.947784	0
l_INV	17.3712	24.1039	1.95391	0
l_HK	1.60944	1.94591	0.154151	0
l_INFL	-0.581204	3.57705	1.6291	37
l_XPORT	17.0741	25.7505	2.36121	0
l_EXRT	-0.0635965	6.91113	2.65478	0
l_POPGR	0.414679	1.3783	0.262419	5

An examination of the pair-wise correlation coefficient matrix below shows that there is a strong positive correlation between exports and per capita income. The correlation coefficient is +0.714. Thus, there is a presumption that trade (proxied by exports) will impact positively on growth in income.

Table 4: Correlation Coefficients of variables in the analysis of Trade - Growth Nexus in ECOWAS sub-region

l_PCY	l_INV	l_HK	l_INFL	l_XPORT	
1	0.7198	-0.5024	-0.3369	0.714	l_PCY
	1	-0.1314	-0.1547	0.9266	l_INV
		1	0.0052	-0.162	l_HK
			1	-0.1486	l_INFL
				1	l_XPORT
			l_EXRT	l_POPGR	
			-0.3655	-0.2713	l_PCY
			-0.2181	-0.0801	l_INV
			0.4305	0.164	l_HK
			-0.1292	0.0714	l_INFL
			-0.2675	-0.0382	l_XPORT
			1	0.0441	l_EXRT
				1	l_POPGR
5% critical value (two-tailed) = 0.1034 for n = 360					

4.1   The growth equation using pooled OLS estimator

For completeness, 3 panel econometric techniques, viz., Fixed Effects
Model, Random Effects Model and Dynamic Panel regression model,
are used in addition to pooled OLS. The econometric estimates of all 4
techniques are given in Table 5, starting with the results of ordinary least
squares using pooled data. Since all the variables in the regression
equations have been logged, the regression coefficients are elasticities.
Also, note that 3 stars (***), 2 stars (**), and 1 star (*)   indicate that a
regression coefficient is significantly different from zero at the 1% level,
5% level, and 10% level respectively. Absence of stars shows that the
coefficient is not significantly different from zero even at the 10% level.

Table 5: The growth equation using pooled OLS estimator

	Coefficient	Std. Error	t-ratio	p-value	
Const	5.48071	0.653416	8.3878	<0.00001	***
l_POPGR	-0.461794	0.0858724	-5.3777	<0.00001	***
l_INV	0.262518	0.0490739	5.3494	<0.00001	***
l_HK	-3.20365	0.280654	-11.4149	<0.00001	***
l_XPORT	0.119571	0.0400637	2.9845	0.00307	***
l_EXRT	-0.0424719	0.0157764	-2.6921	0.00748	***
l_INFL	-0.233902	0.0275665	-8.485	<0.00001	***
Mean dependent var	6.467975		S.D. dependent var	1.219322	
Sum squared resid	115.2104		S.E. of regression	0.608647	
R-squared	0.755547		Adjusted R-squared	0.750831	
F(6, 311)	160.2045		P-value(F)	5.17E-92	
Log-likelihood	-289.7911		Akaike criterion	593.5822	
Schwarz criterion	619.9166		Hannan-Quinn	604.1003	
Rho	0.822001		Durbin-Watson	0.274845	

The equation explaining economic growth in ECOWAS countries
exhibits a pretty good fit with an R-squared greater than 75 percent,
which means that over 75 percent of the systematic variations in per
capita real income in ECOWAS countries are explained by the variables
we have used as regressors in the equation. More importantly, the F-
statistic of 160.2 is highly significant at the 1 percent confidence level.
Thus, the hypothesis of a significant log-linear relationship between
economic growth and all the regressors in the equation cannot be
rejected at the 1 percent level of significance. Going into details, the
empirical results obtained show that economic growth in ECOWAS

countries depends positively on exports and investment. The t-statistics for exports and aggregate investment, are 2.98 and 5.35, respectively. Thus, these variables are statistically significant at the 1 percent level.

The coefficient of exports is approximately 0.12. Given that this a double-log regression fit, clearly the elasticity of income with respect to exports is 0.12. Thus, a 10 percent increase in exports will trigger a 1.2 percent increase in per capita real income in ECOWAS countries. Clearly, the hypothesis of a positive relationship between trade (proxied by exports) and economic growth in ECOWAS countries is validated. The coefficient of investment is 0.26. Thus, the income elasticity of investment is 0.26, indicating that a 10 percent increase in aggregate investment will lead to a 2.6 percent increase in per capita real income in ECOWAS countries during the period of analysis. The coefficients of inflation rate, exchange rate and population growth rate are correctly signed and highly significant. Given that the absolute values of their t-ratios are 8.5, 2.7 and 5.4   respectively, they all pass the significance test at the 1 percent confidence level.

The coefficient of the inflation rate is -0.23; hence the income elasticity of the inflation rate is -0.23. This means that a 10 per cent rise in the inflation rate reduces per capita real income by 2.3 percent in ECOWAS countries. The coefficient of the exchange rate is -0.04; thus, the income elasticity with respect to the exchange rate is -0.04. The conclusion then is that a 10 percent depreciation of the exchange rate will increase per capita real income by approximately 0.4 percent. The coefficient of population growth rate is -0.46; thus, the elasticity of real GDP per capita with respect to population growth is -0.46. This implies that a 10 percent increase in the growth rate of population will decrease per capita real income by approximately 5 percent. Thus, as expected, rapid population growth is inimical to economic growth in ECOWAS countries. Contrary to expectation, human capital has a negative sign. This perverse effect of human capital variable may be due to the measure of human capital used. Presumably, a better proxy variable for human capital development could exhibit the expected positive relationship between per capita real income and human development in ECOWAS member countries.

In order to obtain richer results and establish the robustness of our results, 3 other estimators were used to estimate the growth equation.

The 3 estimators are: (i) the Fixed Effects model, (ii) the Random Effects Model, and the (iii) Dynamic Panel data Regression Model. The econometric results obtained by using these 3 estimators are reported in Table 6.

4.2   Growth equation using the Fixed Effects Model

This methodology is also sometimes referred to as "the one-way fixed effects model". The preference for it arises from the fact that it explicitly allows for cross sectional (os cross-country) heterogeneity. Specifically, in our case, it allows for different intercept coefficients for each country.

Table 6: Fixed-effects, using 318 observations

	Coefficient	Std. Error	t-ratio	p-value	
Const	-5.96992	0.666497	-8.9572	<0.00001	***
l_POPGR	0.0611712	0.0438767	1.3942	0.16431	
l_INV	0.114504	0.0281925	4.0615	0.00006	***
l_HK	0.0550538	0.220493	0.2497	0.803	
l_XPORT	0.492415	0.0350333	14.0556	<0.00001	***
l_EXRT	-0.0553565	0.0210872	-2.6251	0.00911	***
l_INFL	-0.0574263	0.0135325	-4.2436	0.00003	***
Mean dependent var	6.467975		S.D. dependent var	1.219322	
Sum squared resid	15.47023		S.E. of regression	0.228229	
R-squared	0.967175		Adjusted R-squared	0.964965	
F(20, 297)	437.5531		P-value(F)	4.40E-207	
Log-likelihood	29.45584		Akaike criterion	-16.91168	
Schwarz criterion	62.0914		Hannan-Quinn	14.64265	
Rho	0.730407		Durbin-Watson	0.530139	
Test for differing group intercepts -					
Null hypothesis: The groups have a common intercept					
Test statistic: F(14, 297) = 136.773					
with p-value = P(F(14, 297) > 136.773) = 2.34045e-120					

The results of the statistical test for differing group (country) intercepts are reported Table 6. It can be confirmed that the null hypothesis of common intercept is rejected. The F-statistics of 136.77 easily passes the significance test at the 1 % confidence level. Therefore, the Fixed Effects Model dominates the Random Effects Model.

Note: The constant term reported in the equation above, -5.969, is the average for all 15 ECOWAS countries. The individual or country-specific constant terms are reported in Table 7. They are seen to range between -7.808 (for Nigeria) and -4.039 (for Cape Verde). Thus, the autonomous level of the log of real GDP per capita is highest in Cape Verde and lowest in Nigeria. Other countries lie in between these values with Cote d'Ivoire and Senegal also reporting high levels of autonomous per capita real income during the decade, 2000-2009.

Table 7: Country -Specific Intercepts

Table 7: Country -Specific Intercepts		
Country Code	**Country Name**	**Country Intercept**
1	Benin	-5.9783
2	Burkina Faso	-6.1599
3	Cape Verde	-4.0399
4	Cote d'Ivoire	-6.4873
5	The Gambia	-5.0669
6	Ghana	-6.9809
7	Guinea	-6.0558
8	Guinea Bissau	-4.3741
9	Liberia	-5.9393
10	Mali	-6.3728
11	Niger	-6.5209
12	Nigeria	-7.8082
14	Sierra Leone	-5.482
15	Togo	-6.0553

4.3   Growth equation using the Random Effects Model

Table 8: Growth equation using the Random Effects Model

Dependent variable: l_PCY					
	Coefficient	Std. Error	t-ratio	p-value	
Constant	-4.94808	0.676906	-7.3099	<0.00001	***
l_POPGR	0.0302865	0.045628	0.6638	0.50733	
l_INV	0.12851	0.0293413	4.3798	0.00002	***
l_HK	-0.147641	0.22757	-0.6488	0.51697	
l_XPORT	0.445947	0.0342976	13.0023	<0.00001	***
l_EXRT	-0.0408501	0.0200134	-2.0411	0.04208	**
l_INFL	-0.0615809	0.0141895	-4.3399	0.00002	***
Mean dependent var	6.467975		S.D. dependent var	1.219322	
Sum squared resid	263.1022		S.E. of regression	0.918301	
Log-likelihood	-421.0905		Akaike criterion	856.1811	
Schwarz criterion	882.5154		Hannan-Quinn	866.6992	
'Within' variance = 0.0520883					
'Between' variance = 0.244915					
Breusch-Pagan test -					
Null hypothesis: Variance of the unit-specific error = 0					
Asymptotic test statistic: Chi-square(1) = 1184.5					
with p-value = 1.42327e-259					
Hausman test -					
Null hypothesis: GLS estimates are consistent					
Asymptotic test statistic: Chi-square(6) = 41.7367					
with p-value = 2.07253e-007					

4.4   Growth equation using the dynamic panel data regression estimator

The dynamic panel data estimator has been advanced as an effective method of addressing the problems of endogeneity and orthogonality between the error term and the regressors. The dynamic panel data estimator used in this paper is equivalent to the GMM SYS technique

which possesses the properties of consistency and asymptotic efficiency (Arellano and Bond, 1991).

Table 9: 1-Step dynamic panel using 292 observations

Dependent variable: l_PCY					
	Coefficient	Std. Error	z	p-value	
l_PCY(-1)	0.603693	0.07648	7.8931	<0.00001	***
Const	-0.0015275	0.00741	-0.2063	0.83658	
l_POPGR	0.0552103	0.06233	0.8858	0.37571	
l_INV	0.100123	0.02868	3.4914	0.00048	***
l_HK	-0.004355	0.14069	-0.031	0.97531	
l_XPORT	0.2072	0.07224	2.8684	0.00413	***
l_EXRT	-0.0937459	0.02178	-4.3035	0.00002	***
l_INFL	-0.0109788	0.01027	-1.0688	0.28518	
Sum squared resid	7.393137		S.E. of regression	0.161345	
Number of instruments = 221					
Test for AR(1) errors: z = -2.70836 [0.0068]					
Test for AR(2) errors: z = -1.45699 [0.1451]					
Sargan over-identification test: Chi-square(213) = 234.685 [0.1471]					

It is easily confirmed that for the 3 panel regression techniques (Fixed Effects Model, Random Effects Model and Dynamic Panel regression model), total exports, which is used as the leading proxy variable for trade, is positively related to per capita real income. Additionally, the coefficient of exports is invariably highly significant, passing the significance test at the 1 percent confidence level in all the equations. Therefore, the hypothesis of a significant positive relationship between trade and economic growth in ECOWAS countries is validated. It can also be ascertained that the exchange rate (which is one of the proxy variables for trade) is correctly signed and highly significant in the 3 alternative estimated equations. Thus, the hypothesis of a positive impact of trade on real GDP per capita in ECOWAS countries is again corroborated, confirmed and validated. In sum, the econometric evidence regarding a positive impact of trade on economic growth in ECOWAS countries is strong and robust. The findings are in consonance with the studies of Iyoha (1998), Osabuohien (2007), Pandhi (2007), Yelwa and Dijoke(2013) and Lloyd et al. (2014).

5.0   Summary of Findings, Recommendations and Conclusion

The empirical evidence on the impact of trade on economic growth in ECOWAS countries from this study can be summarized as follows:

1. Exports, the principal proxy variable for trade, have a positive relationship to economic growth in ECOWAS countries. The

regression coefficient of exports is positive and significantly different from zero at the 1 percent confidence level. In sum, exports are a key driver of growth in the ECOWAS sub-region.

2. The exchange rate (another proxy for foreign trade) was also found to be an important determinant of economic growth in ECOWAS countries.

Given the empirical findings that trade (proxied by exports) is a principal determinant of growth in Nigeria, it is recommended that policy makers should adopt and implement policies to increase and diversify exports. Policies to promote export are particularly warranted as most ECOWAS member countries currently depends heavily on the exportation of petroleum and gas products. Undue dependence on a single product is generally believed to be harmful to sustained growth. Therefore, diversification of exports, particularly emphasis on the processing of agricultural products and production of light manufactured goods is desirable and would be beneficial to sustained economic growth. It is also recommend that greater attention should be given to the development and processing of solid minerals for exports. There is need to encourage export diversification in the ECOWAS member countries so as to minimize the volatility in export earnings and promote the overall growth and development of the ECOWAS member countries by replacing most of the primary commodities with positive price trends product in the sub-region. The nominal exchange rate, another proxy for trade, was found to be an important driver of economic growth in ECOWAS countries. Therefore, an exchange rate policy, which is favorable to export expansion and consistent with the status of these countries as small open economies, is recommended.

Conclusion

In this paper, an attempt has been made to analyse the impact of trade on economic growth both from a theoretical perspective and using econometric evidence from ECOWAS countries. A review of the classical and neoclassical theories of trade showed that international trade can stimulate economic development. First, export expansion can provide a stimulus for the greater utilization of erstwhile idle human and capital resources. Secondly, it can also provide foreign exchange for financing capital goods needed in the industrial sector. Thirdly, export expansion can stimulate investment, especially in the export sector of the developing

country. Thus, provided exports are associated with significant externalities and/or productivity spill-overs, their contribution to output growth will be very high. In general, the effect of trade on economic development will depend on many factors, especially the nature of foreign demand, domestic supply conditions, the nature and characteristics of the primary product(s), the stability of the macroeconomic environment and the existence of appropriate domestic trade policy. Indeed, it needs to be emphasized that export expansion is not a sufficient condition for economic growth and development. Export expansion will lead to growth and development only when the domestic macroeconomic policy environment is stable and trade policies are appropriate.

Next, an attempt was made to econometrically test the hypothesis of a positive relationship between trade and growth in the ECOWAS countries during the 1990-2013 period. This was done using panel data (time series of cross-country data) regression analysis. Utilizing data for the 15 ECOWAS countries, a log-linear regression equation of per capita real GDP was fitted on exports, the exchange rate, investment, human capital, inflation and population growth. For completeness and to test the robustness of the econometric results, 4 estimators (pooled OLS, Fixed effects model, Random effects model, and Dynamic panel regression model) were utilized. All the 4 estimated regression equations had high coefficients of determination and F-statistic. In all the equations, exports, exchange rate and investment were significant determinants of per capita real income growth. Exports were consistently positively related to growth, thus confirming the hypothesis that trade has a positive impact on economic growth in the ECOWAS sub-region. Since export expansion stimulates growth, Robertson's declaration of exports as an "engine" of growth is affirmed and validated.

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DATA APPENDIX

Data is available on demand from authors