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# **Trade Liberalization and Export Competitiveness: Evidence from the EU-ECOWAS Trade**

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Topic:

Trade Liberalization and Export  
Competitiveness: Evidence from the EU-  
ECOWAS Trade

By

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## **Disclaimer**

The views expressed in this paper are those of the student and do not reflect the views of the University of Paris 1.

## **Abstract**

This study investigates the impact of EU trade liberalisation on the export competitiveness of ECOWAS countries. Trade liberalisation is captured by import tariffs in the EU market while export competitiveness is captured by the export value of ECOWAS countries. The study uses the gravity model, fixed and random effects as well as the Hausman test for a country pair panel data of 15 ECOWAS and EU 15 countries for the period beginning 1995 to 2014. The study finds a positive impact of trade liberalisation on export competitiveness and estimates the export value of ECOWAS countries to increase by 0.487% for every 1% reduction of import tariffs in the EU.

**Keywords:** export competitiveness, trade liberalisation, EPA, panel data, gravity model, fixed effects, random Effects, hausman test.

**JEL Classification :** C23, F13, F14, F15, F17, F63, O24, O55

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# **1 Introduction**

## **1.0 Background to the Study**

This study looks at the impact of the European Union (EU) import tariff on the export value of the Economic Community of West African States (ECOWAS). It investigates the extent to which import tariffs as imposed by the European Union (EU) affect the export value of the ECOWAS region of Africa and based on the findings, it explains how import tariffs have affected the export competitiveness of West African countries. Furthermore, the study examines the role of other determinants of exports in boosting the export value of exporting countries by considering both microeconomic and macroeconomic indicators as are relevant for the study.

Following the signing of an Economic Partnership Agreement (EPA) between the ECOWAS, the West African States and the West African Economic and Monetary Union (UEMOA) on one part and the EU and its member states on the other part, it was announced that the EU as part of her plans to promote development in Africa would extend to West African countries a tariff reduction to facilitate an increased penetration of their exports into the European market. Specifically, the agreement states that the EPA will “strengthen economic and trade relations between the parties on the basis of solidarity and mutual interest in accordance with the World Trade Organisation (WTO) obligations in a way that takes account of the significant differences in competitiveness between the two regions.” European Commission (2016). Thus, according to the agreement, the EPA, characterised by a “progressive, asymmetrical liberalisation of trade in goods and services in favour of West African States” would cause an increase in the production capacity and export of West African countries, a medium through which the structural transformation, diversification, and competitiveness of the region could be achieved.

To achieve the objectives of the EPA, it is agreed that the EU would extend to West African States tariff liberalisation in the forms of a reduction in custom duties of any kind as well as a stop to the imposition of any new charges and increase in duties on goods originating from the ECOWAS. The EPA hopes to “encourage an improvement in the supply capacity and competitiveness West Africa’s production sectors using these means.

The signing of the EPA did not come without controversy as many West African states were reluctant to sign due to fears and doubts as to whether it would be favourable to their individual countries or not. This is because the EPA requires a mutual relationship such that West African States would have to extend a similar form of trade liberalisation to EU products in their domestic market, a move that many critics and pessimists say would collapse industries in the ECOWAS region many of which are infant industries. CONCORD (2015), explain that “West Africa has to make considerable sacrifices, eliminating most of the customs duties levied on imports from the EU. The EU will enjoy a much more favourable treatment compared to other African countries with which West Africa trades.” It further explains that the Common Agriculture Policy of the EU would lead to dumping of agriculture products in West African markets, at prices for which west African agricultural producers cannot compete with.

This and many different stands on this trade liberalisation dominated EPA and its supposed benefits has led to inconclusiveness as to the actual benefits that West African countries and the ECOWAS region would gain from the EPA. The study thus employs a pair wise panel data approach to study the impact of trade liberalisation as postulated by the EPA on the export competitiveness of West African countries. It uses panel data for 15 West African countries and the 15 European Union countries (EU 15) for the years ranging from 1995 to 2014. The ECOWAS consists of 15 countries and for a balanced pair, EU 15 countries were selected. EU 15 countries were preferred against all other EU countries also because they are the European countries that trade the most with West African countries. The years for the study coincides with the period around which the ECOWAS was established to the period for which the latest data for all countries in West Africa and the EU are available. The years also coincides with the growing periods of most West African countries following recovery from Wars, Political instability, drought, faming, and structural adjustment programmes by the International Monetary Fund in the late 1980s and as such exports had resumed after many of the economies were slowed down.

Competitiveness is measured by the World Bank (2009) definition which is “a proxy for the productivity of an economy and depends on the value of a nation’s product and services, as measured by the prices they command in the international market and the efficiency with

which they are produced". For this reason, the study uses aggregate export prices of West African States to capture trade competitiveness. Trade liberalisation is captured by the EU-ECOWAS EPA definition which explains trade liberalisation as deductions of import charges of any kind.

The study finds a positive relationship between export values and trade liberalisation such that a 1% increase in trade liberalisation in the EU market would increase the export value of West African countries by 0.487%. It also finds that the reduction of trade tariffs on the EU market would in general increase the export competitiveness of the ECOWAS.

These findings are consistent with the findings of similar studies conducted for other countries and regions in the world including Cestepe, Yıldırma, and Bahtiyar (2014), Baldwin and Gu (2004) and Santos-Paulino (2002) all of whom found a positive impact of trade liberalisation on the export performance of countries.

### **1.1 Objectives of the Study**

The main objective of the study is to examine the effects of trade liberalisation on export competitiveness of West African countries from 1995 to 2014. Specifically, the study seeks to:

1. Analyse the trends in export value and tariffs as imposed on goods of West African origin over the study period.
2. Estimate the effects of tariffs together with key macroeconomic, microeconomic and policy variables on the export competitiveness of ECOWAS countries.
3. Suggest appropriate policy measures arising from the empirical findings to support further liberalisation of trade and export promotion.

### **1.2 Hypothesis**

The study tests the following hypotheses in line with the outlined objectives:

- $H_0$ : There is no positive relationship between trade liberalisation and export competitiveness.

$H_1$ : There is a positive relationship between trade liberalisation and export competitiveness.



The study adds to existing literature surrounding the subject matter of trade liberalisation and export competitiveness or promotion. The findings of this study is a good source of literature for both researchers and policy makers for the purpose of further studies and also for policy recommendation.

The rest of the study is organised as follows; Review of empirical works surrounding the subject matter, Data sources and Data description, and Descriptive Statistics which seeks to throw more light on the trend of export value competitiveness of West African countries as well as an evolution of trade liberalisation as extended to West African countries in the past by the EU and a lot more. These are followed with the methodology of the study including a discussion of the econometric estimation techniques, Results, discussion of the results, policy recommendation, problems of the study, prospects for future studies, and conclusion.

### **1.3 Review of Related Empirical Literature**

The impact of trade liberalisation on export value has been widely studied using different data sets and variables, econometric techniques and for different regions of the world. The findings of most of these studies show both consistent and verifiable results and results that are in tandem with economic theory. Other findings have been very controversial and have actually deviated from the predictions of economic reasoning and theory. This section gives a presentation of some empirical findings related to the subject of study.

Cestepe, Yıldırma, and Bahtiyar (2014) used fixed effects Least Squares and generalised method of moments estimation technique imbedded in a panel gravity model to investigate the effects of trade liberalization on the export of 13 Middle East and North African countries (MENA) to 30 Organization for Economic Cooperation and Development (OECD) trading partners. Their findings show that trade liberalisation is a useful policy to increase the exports of MENA countries. With dynamic panel data models based on fixed effects and generalised method of moments as well as heterogeneous panels with time series and cross section estimation technique, Santos-Paulino (2002), studied the impact of trade liberalisation on export performance of 22 developing countries and found that trade

liberalisation has a strong positive impact on export performance but then the impact differs from country to country. Baldwin and Gu (2004), find a significant positive relationship between trade liberalisation and export growth of the Canadian manufacturing sector. They find that as tariff barriers to trade reduces, more Canadian firms entered the export market. Also, that existing exporters increased their share of exports sold abroad. Kassim (2013) in his paper “The impact of trade liberalisation on export growth and import growth in Sub Saharan Africa (SSA)”, relied on panel data methodologies and investigated the subject matter for 28 SSAs for the period between 1981 and 2010. His findings reveal that Trade liberalisation increases among other variables the growth of exports but increases import faster. His findings include also the revelation that trade liberalisation significantly increases the price elasticity of demand for exports and imports.

Notwithstanding the findings above many of which correspond to economic theory and intuition as to why trade liberalisation should be encouraged and pursued, other studies have evidences that are contrary. This includes Ratnaïke (2012) who considers a panel data approach and a generalized method of moments methodology for 28 OECD countries for the years ranging from 1980 to 2010. He concludes that trade liberalisation is largely an insignificant determinants of export performance and that domestic competitiveness and world demand are more consistent drivers of export performance. Bergés (2007) in using long run time series data of market prices of total exports from 1905 to 2000 and free trade zone exports from 1976 to 2000 to investigate trade liberalisation and export performance of the Dominican economy finds that trade liberalization does not guarantee export growth unless it is accompanied with improved market access in the destination market.

The findings above suggest an inconclusiveness to the subject matter as it is not clear as to the impact of trade liberalisation on the export competitiveness of countries. This gap thus leaves much to be done to ensure closure on the subject matter especially for many developing countries including West African states who are aggressively looking for mediums through which they could achieve economic growth.

The sampled studies also indicate that very little has been done in terms of investigating the case of the subject matter for ECOWAS countries and the EU-ECOWAS EPA for that matter. Very little studies have been conducted using export value prices as many studies

have relied on export flow data instead. Again, most studies have relied on panel data methodologies but have conducted relatively open studies with no specific regards to the destination of exports for the selected countries in their studies.

## 2.0 Data and Data Sources

In response to the methodology gap identified in the review of related empirical literature, the study employs a country pair panel data set for the ECOWAS countries and EU 15 countries for the period starting 1995 to 2014. For these countries, available relevant data is collected and analysed.

**Table 1: List of ECOWAS and EU 15 countries employed in the study**

ECOWAS	EU 15
Benin	Austria
Burkina Faso	Belgium
La Côte d'Ivoire	Denmark
Cape Verde	Finland
Gambia, The	France
Ghana	Germany
Guinea	Greece
Guinea Bissau	Ireland
Liberia	Italy
Mali	Luxembourg
Niger	Netherlands
Nigeria	Portugal
Senegal	Spain
Sierra Leone	Sweden
Togo	United Kingdom

Source: Author's construct.

To estimate the relationship between trade liberalisation and trade competitiveness, the following data are used: Purchasing Power Parity (PPP) Gross Domestic Product (PPP GDP) of the exporting countries (ECOWAS countries), PPP GDP of the importing countries (EU 15 countries), Population density of the EU countries, Mobile cellular Subscription of ECOWAS countries, Simple distance between the capital cities of each

ECOWAS country and all EU 15 countries, Official exchange rate between each ECOWAS country and all EU 15 countries, Income per worker relative to the USA for all ECOWAS countries, Total Factor Productivity (TFP) relative to the USA for all the ECOWAS countries, Change in TFP, Aggregated imports at macro level for the EU 15 countries, Tariff simple average and Tariff weighted average as imposed on exports of ECOWAS origin in the EU and Political rights as they have been in the ECOWAS states. Except for Aggregated imports at macro level which is the explained variable and Tariff simple average and Tariff weighted average which are the explanatory variables of interest, the other data are added to control for any spurious relationship between the explanatory variables of interest and the explained variable since they determine partly the exports of countries.

Both Tariff simple average and Tariff weighted average which are the principal explanatory variables of interest are used to capture trade liberalisation and are defined as “the unweighted average of effectively applied rates for all products subject to tariffs calculated for all traded goods and the average of effectively applied rates weighted by the product import shares corresponding to each partner country” respectively. Both data are classified using the Harmonized System of trade at the six- or eight-digit level and they are both derived from the World Bank’s World Development Indicators (WDI) database.

Total value imports or the aggregate imports at macro level data which is the explained variable is defined as the value of all goods and other market services received from the rest of the world. They are sourced from the WDI and are measured at current U.S. dollars.

Total factor productivity and change in TFP are included in the data base for estimation following the advice of World Bank (2010) in “Analysing trade competitiveness: A diagnostic approach”. According to World Bank (2010) it is relevant to add such indicators from the micro environment of firms since they impact on manufacturing and exports. TFP in this study serves as a proxy for aggregate productivity of countries and they are derived from the United Nations Industrial Development Organisation (UNIDO, 2009) data base for productivity computed by Isakson (2007). Income per worker data is also derived from the UNIDO (2009) data base computed by Isakson (2007). It is a proxy for unit labour cost and it “gives an indication of cost pressures in a given sector or economy” as explained by

Des Vignes & Smith (2005). Therefore, it has a negative impact on productivity and prices of output.

PPP GDP data for ECOWAS and EU 15 countries are from the WDI and they are defined as the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. They are measured at international dollars using purchasing power parity rates. The higher the GDP of a country, the more she is able to buy of another country's exports and the more she is able to produce for exports all other factors being equal.

Infrastructural development is a major determinant of productivity and exports. It is argued that the better the infrastructural development of a country, the better exporter she becomes, *ceteris paribus*. Mobile cellular Subscription data is derived from the WDI and is used as a proxy for the infrastructural development of the ECOWAS countries. It is defined as subscriptions to a public mobile telephone service that provides to the PSTN using cellular technology.

The study also uses population density data for the EU 15 countries from the WDI. From basic demand theory, the larger the population of a settlement, the more they demand of commodities and vice versa, *ceteris paribus*. Population density as defined by the World Bank is the mid-year population divided by the land area in square meters.

Exchange rate theory of economics explains that exchange rate appreciation and depreciation affect the exports of a country. Specifically, a depreciation or appreciation of an exporting country's currency relative to that of a trading partner makes commodities from that exporting country relatively cheaper or expensive and this can influence the quantity of goods exported or imported. Official exchange rate data from the WDI captures this and it is explained as the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).

Owing to gravity model of trade flows, simple distance between countries is included for analyses of trade flows between countries. Distance is tantamount to transportation cost and as such the greater it is, the less trade there is likely to be between two countries, *ceteris*

paribus. Disdier & Head (2008), confirm this by stating that “bilateral trade is nearly inversely proportionate to distance”. Data on simple distance between countries is derived from The French Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) and computed by Mayer & Zignago (2011). It is measured in kilometres.

Lastly, the political, business and economic environments of both the ECOWAS and EU 15 are captured by political rights data from Freedom House’s Individual Country Ratings and Status, FIW 1973-2016. Using this data as a proxy for business environment suggests that a country with low political rights is also likely to have inefficient rules for business and vice versa which could affect exports and imports.

Two more data which were included in the initial data base for the study were dropped since they did not vary over time. These are Free Trade Area (FTA) dummy variable data from De Sousa (2012) and Political rights data for the EU 15 countries from Freedom House. Data on other factors that affects exports of countries such as innovation were largely unavailable and were not included in the study. Table 2 provides a summary of the data employed for the study.

**Table 2: Summary of data, source and measurement**

Variable	Measurement	Source	Sign
<i>PPP GDP</i>	International Dollars using PPP rates	WDI	+/-
<i>POP</i>	People per square km of land area	WDI	+/-
<i>MCS</i>	Per 100 people	WDI	+/-
<i>Dist.</i>	Kilometres (Km.) between countries	CEPII	
<i>Inc_pw</i>	Income per worker relative to the U.S.	UNIDO	+/-
<i>NER</i>	Local currency units relative to the U.S. Dollar	WDI	+/-
<i>TFP</i>	TFP relative to the U.S.	UNIDO	+/-
<i>ΔTFP</i>	Change in TFP relative to the U.S.	UNIDO	+/-
<i>T_simple</i>	Percentage (%) tariff on imports	WDI	+/-
<i>T_wieght</i>	Percentage (%) tariff on imports	WDI	+/-
<i>Prights</i>	On a scale of 1-7 with 1 being the highest	***	+/-
<i>Totval_imports</i>	Current U.S. Dollars	WDI	+/-

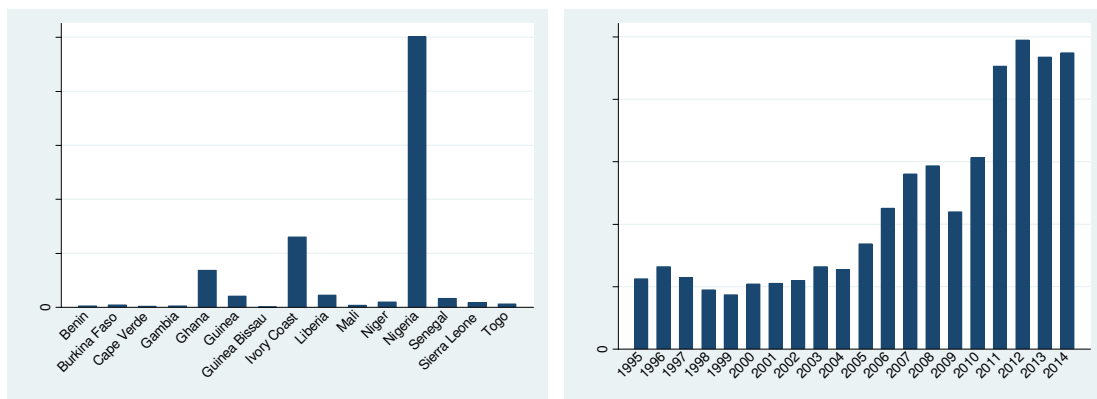
\*\*\* Source = Freedom House

Source: Author’s construct.

### 3.0 Descriptive Statistics

Figure 1 shows two panels, Panel A and Panel B. Panel A shows the variation of exports by ECOWAS country while Panel B shows the variation of export by year. With reference to Panel A, except for Ghana, the Ivory Coast and Nigeria, the export value of most West African countries are relatively lower and have been less than an average value of 200,000 U.S. Dollars across the period of the study. Nigeria, The Ivory Coast and Ghana have been better exporters with Nigeria being a Super export country exporting an average of a million U.S Dollars. Panel B shows that the average export of all West African countries to the EU 15 has been increasing by year since 2000 but with a dip between 2008 and 2010. The year 2012 recorded the highest average export value for the ECOWAS with an average value of about 250,000 US Dollars. The years 2013 and 2014 saw a slight fall in average exports for the ECOWAS but still higher than the years before 2012.

**Figure 1: Average value of ECOWAS exports by country and year**



**Panel A: Export variation by Country**

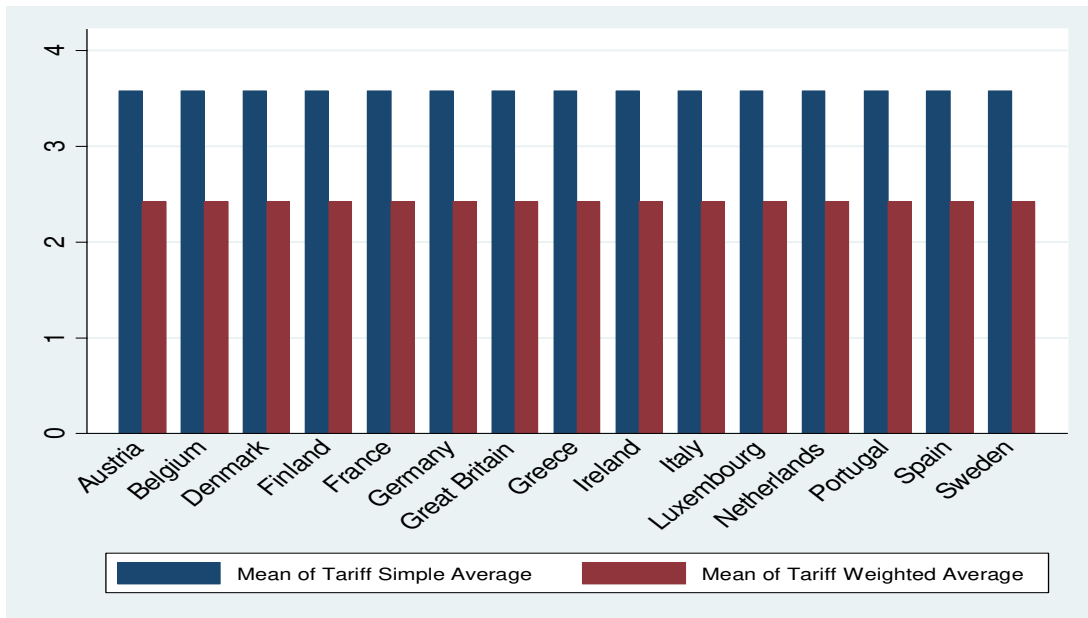
**Panel B: Export variation by year**

Source: Author's Calculation

Figure 2 shows tariff simple average and tariff weighted average as they are administered by the EU 15. The EU is a common market and therefore all EU countries including the EU 15 administer the same tariff rates to exports from respective countries, and economic blocks. Figure 2 shows therefore that all EU 15 countries have administered a tariff simple

rate average of 3.6% to ECOWAS countries for the period of study and in terms of tariff weighted average, a rate of 2.5%.

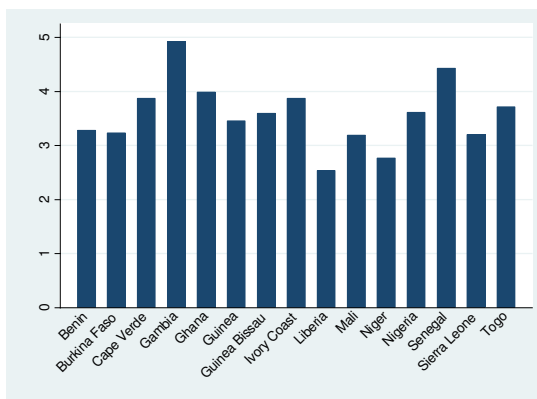
**Figure 2: Tariff simple and Tariff weighted averages on ECOWAS imports, by EU 15 (%)**



Source: Author's calculation

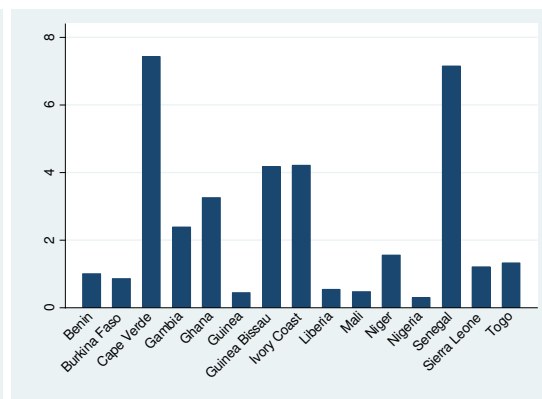
Regardless of the fact that the same tariff rates are applied on imports of ECOWAS origin by the EU, West African countries have different currencies and thus the tariffs paid, both simple average and weighted average are different for each ECOWAS country.

**Figure 3: Tariff simple average by exporter**



Source: Author's calculation

**Figure 4: Tariff weighted average by exporter**



Source: Author's calculation

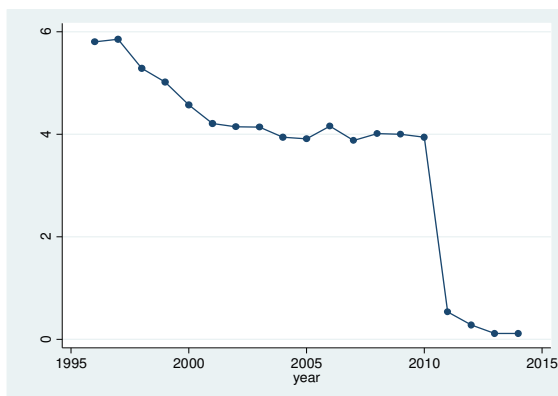


Figure 3 shows applied tariff simple average rate by exporting country. The Gambia has had the highest rate of 4.9% followed by Senegal and Ghana with 4.5% and 4% respectively. On average, Liberia has had the least tariff simple average rate of about 2.5%. The tariff simple rate for the other ECOWAS countries ranges between 3.9% which corresponds to the Ivory Coast and Cape Verde and 2.8% which corresponds to Niger.

Figure 4 shows a similar distribution but for tariff weighted average rates. The tariff weighted average is highest for Cape Verde at 7.2%. and lowest for Nigeria at 0.3%. The rest of the ECOWAS countries have rates between the highest and lowest rate range. The Gambia, Senegal and Ghana which had relatively higher rates for the tariff simple average have 2.2%, 7% and 3.2% respectively for tariff weighted average rates. It is higher for Senegal just like for the tariff simple average and relatively lower for Ghana and The Gambia.

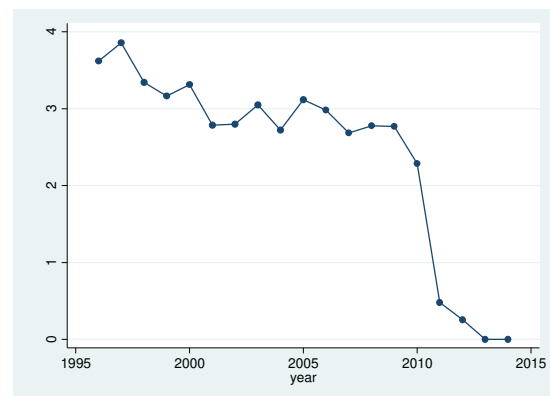
The trends of the tariff simple average rate and tariff weighted average rates across time are of great importance to the study as they are required to show their relationship or correlation with export value over time. For the purpose of visual impression and trend analysis, line graphs are employed to show how these two rates have evolved over the time period of the study. Figure 5 and figure 6 show the trends of mean tariff simple rates and mean tariff weighted rates respectively from 1995 to 2014 as applied to imported goods from West Africa states by the EU.

**Figure 5: Trend of tariff simple average**



Source: Author's calculation

**Figure 6: Trend of tariff weighted average**

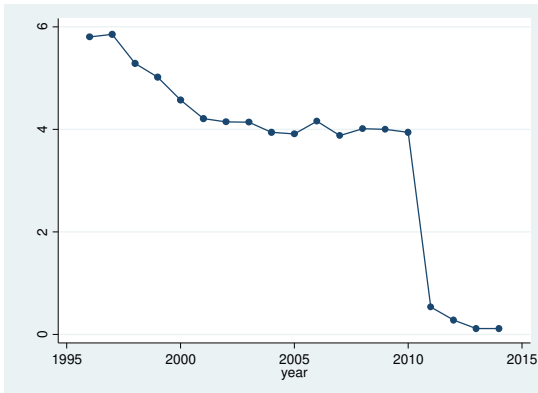


Source: Author's calculation

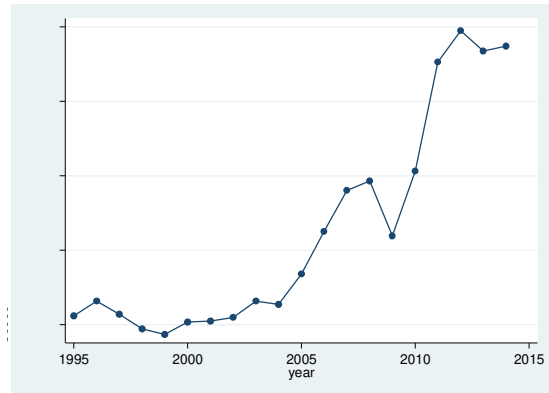
With references to figure 5 and figure 6, it is seen that both tariff simple average and tariff weighted average on the average have been decreasing with year. Tariff simple average decreased at a decreasing rate between 1995 and 2010 and decreased at an increasing rate between 2010 and 2014. This change is twice the change between 1995 and 2010. Tariff weighted average, just like the simple average decreased at a decreasing rate between 1995 and 2010 and at an increasing rate between 2010 and 2014. Overall, both tariff measures have decreased drastically over time with the current averages being a little above zero.

To find out the causation or at least the correlation between the tariff averages and the export value of the ECOWAS, the trend graphs of each tariff average is juxtaposed against the trend graph of mean export value across time. Figure 7 shows the trend of ECOWAS exports across the time period of study.

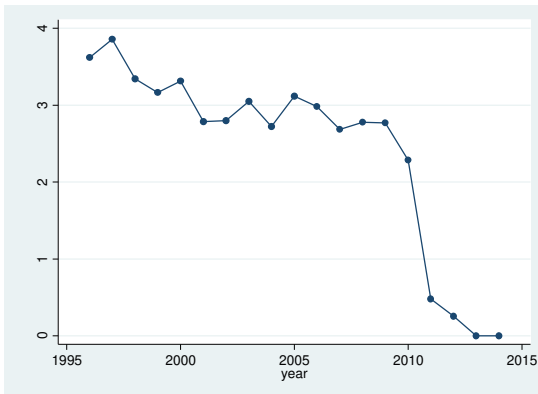
**Figure 5: Trend of tariff simple average**



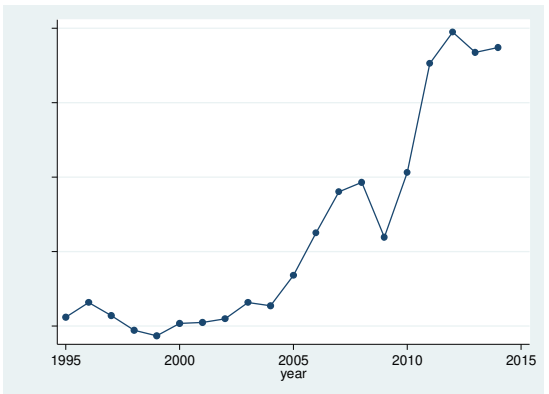
**Figure 7: Trend of Export Value of the ECOWAS**



**Figure 6: Trend of tariff weighted average**



**Figure 7: Trend of Export Value of the ECOWAS**



Source: Author's calculation

Source: Author's calculation

Figure 7 shows an upward trend of exports value of West African countries. Starting from 1995, the mean export value of West African countries has increased with year. Although an initial increase in 1996 was followed by decrease until 1999, export value of the ECOWAS increased at a decreasing rate until 2004 after which export value increased at an increasing rate until a shock in 2009. Export values increased again from 2010 but at a super increasing rate until about 2012 when it fell at a small rate until 2014.

A closer look at the mean export value trend of the ECOWAS from 1995 to 2010 and the mean tariff simple average as well as the mean tariff weighted average as imposed by the EU suggests a negative correlation between the export value of the ECOWAS and the tariffs imposed by the EU on goods of ECOWAS origin. This is the case since the range of years for which the tariffs increased coincide with the range of years for which exports values increased and vice versa. It is however not clear as to whether there is causation between export value and tariffs in this case. A more rigorous econometric approach is required to answer this and so this finding is only treated as an association for now.

#### **4.0 Methodology**

The study employs both ordinary least square (OLS) estimation technique and panel data methodologies to estimate the impact of import tariffs of the EU on the export competitiveness of ECOWAS countries. Specifically, country-pair fixed effects regressions, country-pair random-effects regressions, and between estimation regressions are used. This is to ensure robustness of the study and to ascertain the validity and reliability of the results.

##### **4.10 Econometric Specification of the Model**

The empirical estimation model is a gravity model and it follows the approach of Nguyen (2009) but with different variables as available and relevant for the study. Nguyen (2009) applied panel data from 1988-2002 for thirty-one countries to the gravity model and with it analysed its implications for the ASEAN Free Trade Area. The explained variable is the export values of ECOWAS countries while the explanatory variables of interest are tariff simple average rates and tariff weighted average rates. The adopted gravity model is as follows:

$$\begin{aligned}
X_{ijt} = & \beta_0 + \alpha_{ij} + \theta_t + \beta_1 Y_{it} + \beta_2 Y_{jt} + \beta_3 D_{ij} + \beta_4 N_{jt} + \beta_5 FX_{ijt} + \beta_6 MCS_{it} + \\
& \beta_7 PW_{it} + \beta_8 TFP_{it} + \beta_9 \Delta TFP_{it} + \beta_{10} S_{jt} + \beta_{11} W_{jt} + \beta_{12} Z_{it} + \beta_{13} Z_{jt} + \\
& \beta_{14} FTA_{(ijk)t} + \mu_{ijt}
\end{aligned} \tag{1}$$

Where;

$i, j$  denotes exporting countries which are the ECOWAS countries in this case and importing countries which are the EU 15 respectively,  $t$  denotes time while  $k$  denotes the number of free trade agreements. The explanatory variables are defined as follows:

$X_{ijt}$ : Export value from country  $i$  to country  $j$  at time  $t$ .

$Y_{it}, Y_{jt}$ : GDP of country  $i, j$  at time  $t$ .

$D_{ij}$ : Simple distance between capital cities of two countries.

$N_{jt}$ : Population density of a country  $j$  at time  $t$ .

$FX_{ijt}$ : Exchange rate between country  $i$  and country  $j$  at time  $t$ .

$MCS_{it}$ : Mobile cellular subscription of country  $i$  at time  $t$ .

$PW_{it}$ : Income per worker of country  $i$  at time  $t$ .

$TFP_{it}$ : Total factor productivity of country  $i$  at time  $t$ .

$\Delta TFP_{it}$ : Change in total factor productivity of country  $i$  at time  $t$ .

$S_{jt}$ : Tariff simple average of country  $j$  at time  $t$ .

$W_{jt}$ : Tariff weighted average of country  $j$  at time  $t$ .

$Z_{it}, Z_{jt}$ : Political rights of country  $i, j$  at time  $t$ .

$FTA_{(ijk)t}$ : dummy variable which is equal to 1 if both country  $i$  and  $j$  have a Free trade agreement  $k$  at time  $t$ , and 0 otherwise.

$\alpha_{ij}$ : Individual effects which imply direction of export effects from country  $i$  to country  $j$ .

$\theta_t$ : Time-specific effects.

$\mu_{ijt}$ : Idiosyncratic error term.

Nguyen (2009) includes  $\theta_t$  and  $\alpha_{ij}$  to allow for time and spatial dimension respectively.

The slope coefficients  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, \beta_{11}, \beta_{12}, \beta_{13}, \beta_{14}$  measure elasticities and  $\beta_0$  is the intercept parameter.

For the purpose of ensuring a non-linear relationship between variables, and to ensure that the distribution of the variables is normal, natural logs are applied to all continuous variables in equation (1) to transform the model to a log-log model.

$$\begin{aligned} \log X_{ijt} = & \beta_0 + \alpha_{ij} + \theta_t + \beta_1 \log Y_{it} + \beta_2 \log Y_{jt} + \beta_3 \log D_{ij} + \beta_4 \log N_{jt} + \\ & \beta_5 \log FX_{ijt} + \beta_6 \log MCS_{it} + \beta_7 \log PW_{it} + \beta_8 \log TFP_{it} + \beta_9 \log \Delta TFP_{it} + \\ & \beta_{10} \log S_{jt} + \beta_{11} \log W_{jt} + \beta_{12} \log Z_{it} + \beta_{13} \log Z_{jt} + \beta_{14} FTA_{(ijk)t} + \log \mu_{ijt} \end{aligned} \quad (2)$$

The signs of the coefficients of the explanatory variables are predicted to be as follows:

$$\beta_1 > 0, \beta_2 > 0, \beta_3 < 0, \beta_4 > 0, \beta_5 > 0, \beta_6 > 0, \beta_7 < 0, \beta_8 > 0, \beta_9 > 0, \beta_{10} < 0, \beta_{11} < 0, \beta_{12} > 0, \beta_{13} > 0, \beta_{14} < 0.$$

#### 4.20 Estimation Methods

The ordinary least squares estimator (OLS), Fixed effects estimator (FE), Random effect estimator (RE) and Between regression estimation (BE) are employed as estimation methods for the study. The rationale for using the OLS together with FE and RE estimators follows Wooldridge (2013) who explains that the use of the OLS estimator together with fixed effects and random effects estimators for panel data help to determine the biases caused by leaving the unobserved effect entirely or partially in the error term.

#### 4.21 OLS Estimation

The OLS estimator is applied to our log-log model in equation (2) under the assumption that  $\theta_t$  is equal to zero and that  $\alpha_{ij}$  is either fully or partially embedded in the idiosyncratic error term,  $\mu_{ijt}$ . The model for the OLS estimation from equation (2) thus becomes:

$$\begin{aligned} \log X_{ijt} = & \beta_0 + \beta_1 \log Y_{it} + \beta_2 \log Y_{jt} + \beta_3 \log D_{ij} + \beta_4 \log N_{jt} + \beta_5 \log FX_{ijt} + \\ & \beta_6 \log MCS_{it} + \beta_7 \log PW_{it} + \beta_8 \log TFP_{it} + \beta_9 \log \Delta TFP_{it} + \beta_{10} \log S_{jt} + \\ & \beta_{11} \log W_{jt} + \beta_{12} \log Z_{it} + \beta_{13} \log Z_{jt} + \beta_{14} FTA_{(ijk)t} + \log \mu_{ijt} \end{aligned} \quad (3)$$

Equation (3) is thus estimated by means of OLS method to find the impact of trade liberalisation (tariff reduction) on export values.  $FTA_{(ijk)t}$  and  $Z_{jt}$  are omitted due to collinearity.

The OLS estimation for panel data is flawed. In that, it ignores the serial correlation between the explanatory variables and the unobserved individual effect,  $\alpha_{ij}$ . Thus results are biased, and it results in incorrect standard errors and test statistics. The Random Effect Generalised least square (GLS) estimator is employed therefore to rectify this flaw.

#### 4.22 Fixed Effect Estimation

Fixed effect is said to be a better estimator since it does not ignore the variation of variables overtime. This estimator assumes the explanatory variables to be exogenous to the model and that the idiosyncratic error term,  $\mu_{ijt}$  is homoscedastic and serially uncorrelated with the explanatory variables across time. This estimation seeks to remove the individual unobserved effect,  $\alpha_{ij}$  since it may correlate with explanatory variables and by that tell the impact of the explanatory variable on the explained variable. The fixed effect is without an intercept and also assumes  $\theta$  to be equal to 1. The model for the fixed effect estimation is as follows:

$$\begin{aligned} \log X_{ijt} = & \beta_1 \log Y_{it} + \beta_2 \log Y_{jt} + \beta_3 \log D_{ij} + \beta_4 \log N_{jt} + \beta_5 \log FX_{ijt} + \\ & \beta_6 \log MCS_{it} + \beta_7 \log PW_{it} + \beta_8 \log TFP_{it} + \beta_9 \log \Delta TFP_{it} + \beta_{10} \log S_{jt} + \\ & \beta_{11} \log W_{jt} + \beta_{12} \log Z_{it} + \beta_{13} \log Z_{jt} + \beta_{14} FTA_{(ijk)t} + \log \mu_{ijt} \end{aligned} \quad (4)$$

#### 4.23 Random Effect GLS Estimation

The random effect GLS estimator estimates a random relation between the explained and explanatory variables. It corrects for the flaws of the OLS estimator since it assumes correlation between the unobserved individual effect and the explanatory variables. It further assumes that the unobserved individual effect is independent of all explanatory variables across time periods. Unlike the fixed effect estimator, the random effect GLS estimator includes an intercept variable to explain that the unobserved individual effect has a mean of zero. Resulting from these, the model for random effect estimation becomes:

$$\begin{aligned} \log X_{ijt} = & \beta_0 + \alpha_{ij} + \theta_t + \beta_1 \log Y_{it} + \beta_2 \log Y_{jt} + \beta_3 \log D_{ij} + \beta_4 \log N_{jt} + \\ & \beta_5 \log FX_{ijt} + \beta_6 \log MCS_{it} + \beta_7 \log PW_{it} + \beta_8 \log TFP_{it} + \beta_9 \log \Delta TFP_{it} + \\ & \beta_{10} \log S_{jt} + \beta_{11} \log W_{jt} + \beta_{12} \log Z_{it} + \beta_{13} \log Z_{jt} + \beta_{14} FTA_{(ijk)t} + \log \mu_{ijt} \end{aligned} \quad (5)$$

Equations (3) (4) and (5) are estimated for OLS, FE, RE, and BE respectively using the STATA econometric package and the results analysed and discussed.

#### 4.30 Hausman Test

To know the actual effect that is at play between the explained and the explanatory variables, the Hausman Test is employed. The Hausman test, developed by Hausman (1978) compares the weighted distance between the two estimators in such a way that if the distance between the fixed and random effects results is not statistically significant then there is random effect. If the weighted distance is significant, then the random effect assumption that the unobservable effect does not correlate with the explanatory variables is rejected and hence the presence of individual fixed effects.

The test shall test the null hypothesis that the difference between the FE and RE is zero and the alternative hypothesis that the difference between the two is not equal to zero.

### 5.0 Results

Table 3 shows the regression results for the OLS, fixed effect and random effect estimations. The slope coefficients of the models, their significance and the corresponding standard errors are reported. Also, the associated observations, the R-squared, F-test, and the Hausman test are reported in table 3.

**Table 3: Results of Econometric Estimations**

Export Value	OLS	FE	RE	BE
GDP of Exporter	1.353 (0.068)***	1.418 (1.225)	1.211 (0.120)***	1.327 (0.193)***
GDP of Importer	0.741 (0.071)***	-3.070 (1.998)	0.360*** (0.123)	0.550 (0.131)***
Distance	-4.315 (0.404)***	0 -	-3.208 (0.830)**	-4.278 (0.863)***
Population Density of importer	0.712 (0.093)***	34.690 (15.200)**	1.069 (0.173)***	0.794 (0.184)***
Exchange rate	-0.066 (0.031)**	0.363 (0.607)	-0.094 (0.055)*	-0.082 (0.070)
MCS	0.166 (0.049)***	-0.048 (0.691)	0.002 (0.038)	0.732 (0.182)***
Income per worker of exporter	0.174 (0.883)	0.095 (3.420)	-0.033 (1.270)	-0.155 (2.044)
TFP of exporter	2.034 (1.521)	2.388 (3.629)	2.461 (2.052)	1.999 (3.684)
Change in TFP of exporter	-2.608 (1.693)	-1.289 (1.562)	-1.884 (1.228)	-4.386 (7.122)
Tariff simple average of importer	1.973 (0.511)***	0.459 (0.581)	1.246 (0.461)***	-0.912 (1.320)
Tariff weighted average of importer	-0.050 (0.084)	-0.487 (0.173)***	-0.253 (0.112)**	-0.231 (0.199)
Political rights of exporter	0.249 (0.151)	-0.611 (0.508)	0.037 (0.252)	0.552 (0.329)*
Constant	-8.677 (4.526)*	-101.833 (46.335)**	-4.540 (8.526)	1.152 (10.438)
Observations	748	748	748	748



R-squared	0.635	0.0324	0.6035	0.6309
F-test (12, 735)	106.75			
Hausman test	25.16			

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Notes: Standard errors are reported in parenthesis

\*\*\* Denotes 1% significant level

\*\* Denotes 5% significant level

\* Denotes 10% significant level

From table 3, the joint significance of the explanatory variables is confirmed by the F-test. With the joint significance of the explanatory variables, the null hypothesis that there is no positive relationship between trade liberalisation and export competitiveness is rejected. The various R-squared shows the variation in  $X_{ijt}$  that is explained by the time variation of explanatory variables. The R-squared for the OLS estimation confirms that a greater proportion of about 63% change in  $X_{ijt}$  is explained by the explanatory variables. Likewise, the other estimations. As such the extent to which the model fits the data is high. A total of 748 observations are used for the regressions.

The coefficients of the explanatory variables of interest which are tariff simple average and tariff weighted average for the OLS estimation are 1.973 and -0.050 respectively. These coefficients are decreased by the fixed effects within estimation to 0.460 and -0.487 respectfully when the unobservable effects are eliminated. The random effect estimation produces different coefficients from both the OLS and Fixed effects regressions. These coefficients for tariff simple average and tariff weighted average are 1.246 and -0.253 respectively and they are lower for the tariff simple average when compared to the OLS but higher when compared to that of the Fixed effects random estimation. That of tariff weighted average, is higher when compared to fixed effect within estimation but lower when compared to OLS. The between estimation which is a regression on group means gives coefficients of -0.911 and -0.230 for tariff simple average and tariff weighted average respectfully.

The coefficients of tariff simple average and tariff weighted average exhibit some significance for all four estimation techniques: OLS, FE, RE, and BE. Under OLS, tariff simple average is significant at 1% significance level. Tariff weighted average is significant under fixed effect within estimation at 1% significance level. The results for the random effects regression reveal a 1% significance of tariff simple average and a 5% significance of the tariff weighted average.

The Hausman test provides a test statistic of 22.16 and a corresponding chi square critical value of 19.675 at an alpha level of 0.05. Since the test statistic is greater than the chi square critical value, the null hypothesis that there is no difference between the FE and RE is rejected and the alternative hypothesis that there is a difference between the two is accepted. As such there is individual fixed effects.

## **5.1 Discussion of Results**

Following the Hausman test results that individual fixed effect is at place, the fixed effect estimation is chosen for analyses. The between estimation is also used for analyses for the entire ECOWAS since it uses group means for regression. The fixed effect estimation produces coefficients of 0.460 and -0.487 for tariff simple average and tariff weighted average respectfully, the latter which is significant. The null hypothesis that there is no relationship between trade liberalisation and export competitiveness is thus rejected and the alternative hypothesis that there is a positive relationship between trade liberalisation and export competitiveness accepted. Resulting from this estimation, when trade liberalisation via tariff weighted average increases by 1%, export value of West African countries increases by 0.487% all other factors being equal and vice versa. There exists a negative relationship between tariff weighted average and export value such that there is a negative relationship between trade liberalisation and export competitiveness. This impact is higher than the impact of tariff weighted average on export value if random effects were at play which is 0.253% if trade liberalisation increased by 1%.

The result is consistent with Cestepe, Yıldırma, and Bahtiyar (2014) who made similar findings that trade liberalization is an effective policy to increase exports using fixed effect

estimation and country pair panel data and a gravity model for 13 exporting MENA countries and 30 OECD importing countries. It is also consistent with Baldwin and Gu (2004) and Santos-Paulino (2002) both of which find a positive relationship between trade liberalisation and exports.

The between estimation provides a general result for the entire West African region since it uses group means for regression. The between estimation provides negative coefficients for both tariff simple average and tariff weighted average and thus suggests a negative relation between trade liberalisation and export competitiveness for the ECOWAS region. The results by the FE and BE suggests therefore that trade liberalisation would increase the export competitiveness of individual West African countries and the export competitiveness of the entire ECOWAS region as whole all other factors being equal.

## **5.2 Policy Recommendation**

The findings of the study reveal a positive impact of trade liberalisation on export competitiveness. The findings reveal the importance of trade liberalisation to the development of ECOWAS countries through increased export values when import tariffs of export destination countries are reduced. It is therefore recommended that West African countries take advantage of the EPA between the ECOWAS countries and the EU since their export values would increase all other factors being equal. It is recommended to other country developing partners of African countries to make similar offers to West African countries and the entire African continent since an increase in export value all other factors being equal will lead to increased growth and development.

To take advantage of trade liberalisation on their exports, it is important that West African countries put in place policies that will boost their productivity and consequently exports. Such policies as those related to research and innovation, education, infrastructure development, good business environment and a lot more should be priority in their quest to pursue development. This will help to attract Foreign direct investment as well as improve export flows and standard and quality of output all to the benefits of the individual countries and the ECOWAS as it will help to offset trade deficits.

### **5.3 Limitation of the study**

The study was limited by the unavailability of data for several relevant variables that could impact on the exports competitiveness of West African countries including data on innovation and education. These data were largely missing and unavailable for several countries and several years. It is the authors view that the inclusion of these and some more relevant data as deemed relevant for the study will boost the robustness of the results.

### **5.4 Prospect for further studies**

The realisation of a positive relationship between export competitiveness and trade liberalisation may not be enough evidence that EPA as suggested by the EU would have a positive impact on the development of the ECOWAS. This is because the EPA proposes a reduction of tariff on the West African market for EU countries and this could have a different impact all together than the study has found. The inclusion of import data and revenue from tariff and other data would throw more light on the overall impact of the EPA.

### **5.5 Conclusion**

The study sought to investigate the impact of trade liberalisation of the EU market on the export value of West African countries to the EU. It employed a gravity model and a panel data approach using data for all West African countries and the EU 15 for the years 1995 to 2014. Fixed effects estimation which is the identified effect at play finds that there is a significant positive relationship between the exports of West African countries and tariff weighted average. The study thus recommends that West African countries take advantage of the reduction in tariffs in the EU market to increase their export values. It further recommends that more of such liberalisation in terms of trade should be offered to African countries to boost their chances of achieving growth and development through trade.

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