European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.6, No.16, 2014

Impact of Sub-Regional Integration on Regionalization and Volume of Agricultural Trade within the ECOWAS Sub-Region

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Abstract
Economic Community of West African State (ECOWAS) regional trade agreement established long time ago was assessed to evaluate the level of agricultural products trade within the region. Specifically, the study was to: describe the volume and direction of trade; estimate the degree of ECOWAS regionalization; and assess the effects of ECOWAS regional characteristics on intra-ECOWAS trade of agricultural products. This was achieved by using analytical tools such as descriptive statistics, trade intensity index and gravity model. The results of intra-ECOWAS import and export of all agricultural products stood at 4.56 billion and 8.58 billion US dollars, which accounted for 6.38% and 15.46% of the total commodities, respectively. The trade intensity index results in terms of import indicated 41.9% values less than one while 57.1% had values greater than one for the period 2001 to 2011. In the case of export trade intensity index, the results was said to be fair with 49.5% had trade intensity index values less than one while about 49% paired countries had trade intensity index greater than one. Gravity equation regressions results indicated GDPs, distance, infrastructure, contiguity, landlocked and usage of common official language as significant explanatory variables in the import trade in the region. The results suggested that the trade pattern in the region follows the economic size or resource endowment and obeys Linder's theory. The study therefore recommends that emphasis be made in eliminating non-tariff barriers and re-formulation of trade policy that will harness more of resource endowment in the region.
Keywords: ECOWAS; Agricultural products; regionalization; trade agreement.

1. Introduction

ECOWAS was set up to achieve a number of major objectives such as elimination of customs duties, abolition of restrictive policies and regulations on trade and establishment of a common external tariff in the region. The major question addressed in this study is to what extent have these goals been achieved by the region in promoting trade liberalization and integration? Agricultural products trade within and outside the ECOWAS region is said to be impeded with so many factors. Ogunkola (1998) and Babatunde (2006) described trade expansion in the ECOWAS sub-region as typically a slow process which needs to be improved by an appropriate and coherent integration strategy.

Another problem is that ECOWAS, as an old regional body with an estimated population of 280 million people in 2010 and land area of about 5,112,913km^2 (ECOWAS, 2011),has agriculture as the dominant economic sector. The trade in animal products is still penalized and in most cases accompanied with unjustifiably high tax within the region (Pannhausen and United, 2010). They further stated that some of the impeding trade policies in the region include those relating to the institutional and policy framework such as tariff barrier to trade, overlapping membership and lack of coordination and harmonization. Others are those relating to transportation and information such as poor infrastructure and lack of market information. In West Africa for example transport cost average about 14% of the value of export compared to the 8.6% United Nations benchmark for all developing countries (USAID, 2010). This could be attributed to inadequate roads and rail infrastructure. The problem is compounded by delays at border checkpoints which are too numerous. For example, ECOWAS (2011) noted that there were a total of 69 checkpoints on the trade route between Lagos (Nigeria) and Abidjan (Cote d' Ivoire) a distance of only 992km, 52 check points between Lome (Togo) and Ouagadougou (Burkina-Faso) a distance of 989km trade route and 20 checkpoints between Ouagadougou (Burkina-Faso) and Abidjan (Ivory Coast) a distance of just 529km.The effects of all these could be extortion and harassment of traders within the region by the security, customs and immigration agents at these points.

The regional market information system in West African states is in dilapidated conditions (MISTOWA, 2005; Pannhausen and United, 2010). The database is poorly maintained and updated. Despite efforts by USAID-funded support to the regional Market Information System and Traders Organization of West Africa (MISTOWA) to increase agricultural trade and food security by improving and linking the existing regional efforts to generate, spread and make commercial use of market information. Unfortunately, this project terminated in 2007 (Pannhausen and United 2010). The question now is what is the required minimum state of information system development to enable ECOWAS contributes to the international agricultural trade in the West African region?

What about trade arrangement between ECOWAS and other regional trade blocs? The more necessary since, as it has been well known, following Viner's (1950) original work, trade creation brings about wellbeing while trade diversion reduces it. Besides, trade creation and trade diversion have different implications in terms of wellbeing and development depending on whether they are brought about by trade between individual countries or preferential agreements in the framework of a free trade zone.

During the structural adjustment programme (SAP) era (1986-1993), policies of most ECOWAS member nations were directed at altering and re-aligning aggregate domestic expenditure, specialization, and production patterns to minimize dependence on imports; enhance non-oil export base and ensure a steady and balanced economic growth (Pannhausen and United 2010). In spite of all these efforts, the degree of trade regionalization and impact of regional characteristics in the context of other trade blocs on intra-ECOWAS trade in all agricultural products and food are not known. This research effort intends to provide this information.The specific objectives of the study include to: (i) describe the volume and direction of trade among ECOWAS; (ii) estimate the degree of ECOWAS regionalization of trade between 2001 and 2011; and (iii) assess the effects of ECOWAS and its regional characteristics on intra-ECOWAS trade of agricultural products. The null hypothesis guiding the study is that ECOWAS regional trade agreement and it characteristics do not influence trade of agricultural products within the region.

2. Theoretical Framework and Empirical Methodologies

International agricultural trade is generally aimed at exchanging agricultural goods between or among countries that have agreement and understanding of each other to improve their economy. Agricultural trade is important to the poor in developing countries because most of the world's poor live in rural areas where agriculture is a key source of income and consumption (USAID, 2010). Agricultural trade provides a source of growth and agricultural growth stimulates growth in other sectors (Coote, Ann and Alan, 2000). It also enables countries to obtain the benefits of specialization, such as increases in output of goods and services; obtain those commodities and services which they do not produce or do not produce in sufficient quantities (Arene, 2008).

In investigating the rapid trade integration that took place in the past decade between China and the rest of the world, Bussiere and Schnatz (2006) used gravity model which adequately captures the evolution of trade flows overtime and across countries to develop and quantify a new benchmark for trade intensity. Results showed that China was well integrated with the United States, Canada, Australia and several Latin American countries. Among the European countries, Germany, France, the Netherlands, Belgium and Spain seemed to be the countries most closely linked to China in terms of international trade, while Luxembourg and Portugal showed little trade integration with China.

Similarly, Batra (2004) analysed India's global trade potentials using gravity model. The augmented gravity model was first used to analyse the world trade flows and the coefficients thus obtained were then used to predict trade potential for India. The gravity model was estimated using the OLS techniques with cross-sectional data for the year 2000. The dependent variables in all the tests were merchandise trade (exports plus imports in US dollars), in log form, between pairs of countries. The results indicated that all three of the traditional "gravity" effects (Gross Domestic Products, population and distance) were intuitively reasonable, with statistically significant t-statistic. It further revealed that the magnitude of India's trade potential was highest with Asia-pacific region followed by Western Europe and North America. Countries like China, United Kingdom, Italy and France showed maximum potential for expansion of trade with India. Among specific country groupings or trade arrangements, India's trade potential was found to be highest with Pakistan in South Asian Association for Regional Cooperation (SAARC) and with Philippines and Cambodia in the ASEAN.

A theoretical basis recently developed by Baier and Bergstrand (2002) underlies the gravity model. This model originates from the Newtonian Physics notion. Newton's gravity law in mechanics states that two bodies attract each other proportionately to the product of each body's mass (in kilogammes) divided by the square of the distance between their respective centres of gravity (in metres).

Latter on an astronomer and sociologist transferred this law to the social sciences and attempted to apply it to spatial interactions, such as trips among cities, using the specification thus:

$$I_{ij} = G\left(pop_i pop_j\right) / D_{ij}^{\alpha} \qquad (1),$$

where I_{ij} is trips between city i and city j; $pop_{i(j)}$ is population of city i(j); D_{ij} is distance between city i and city j; G is a coefficient.

The gravity for trade is analogous to this law. The analogy is as follows: "the trade flow between two countries is proportional to the product of each country's 'economic mass', generally measured by GDP, each to the power of quantities to be determined, divided by the distance between the countries' respective 'economic centres of gravity', generally their capitals, raised to the power of another quantity to be determined."(Christie, 2002).

This formulation can be generalised to $M_{ij} = KY_i^{\beta} Y_j^{y} D_{ij}^{\delta}$ (2)

where, M_{ij} is the flow of imports into country i from country j, Y_i and Y_j are country i's and j's GDPs and D_{ij} is the geographical distance between the countries' capitals. The linear form of the model is as follows:

$$Log\left(M_{ij}\right)=\alpha+\beta\log\left(Y_j\right)+\gamma\log\left(Y_j\right)+\delta\log\left(D_{ij}\right) \quad (3)$$

Even though when estimated, this baseline model gives relatively good result, most estimates of gravity models add a certain number of dummy variables to equation (3) to test for specific effects. The gravity model has been applied to a wide variety of goods and factors of production moving across regional and national boundaries under different circumstances since the early 1940s (Oguledo and Macphee, 1994).

Carrere (2006) and Baier and Bergstrand (2002) employed a model where the trade companies of country j sell their products on the market of country i at the price of P_{ij}; = p_i q_{ij}; and obtained the following balanced trade flow for every product produced by the trade company in country j selling on market i:

$$M_{ji}=\left[\frac{\gamma}{\varphi(1-\delta)}\right]\frac{Y_j}{P_j}Y_i\left[\frac{P_j\theta_{ij}}{P_j}\right]^{1-\delta}\left[s_j\left(1+t_i\right)\left(1+t_{ij}\right)^{-\delta}\right] \quad (4)$$

Where:

M_{ji} is the cost-insurance-freight value of the flow of goods imported by country i from country j.

δ is the substitution elasticity between goods (Dixit-Stiglitz).

φ is the fixed cost that each firm faces.

$Y_{j(i)}$ is the GDP of country i(j).

P_j is the level of the price in country j of the representative product.

P_{ij} is the price of the product from country j in country i.

θ_{ji} is a function of the barriers at the border between i and j.

P_i is a measure of how far country i is, such that:

$$P_i=\left[\sum_{K=1}^{N}n_k\left[P_k\theta_{ik}(1+t_{ik})\right]^{1-\delta}\right]^{1/1-\delta} \quad (5)$$

where n_j is the number of the varieties of goods manufactured in country j, t_{ij} is the ad valorem tariff rate imposed by country i on the good produced in country j, s_j is the share of goods in the national product of country j, and t_i is the share of the tariff revenue in the total revenue.

Equation 4 is accepted as the theoretical foundation of the gravity equation in relation to transport costs and tariffs. As Anderson and Van Wincoop (2003) have shown, the solution to equations4 and 5, assuming that $t_{ij} = t_{ji}$ and $\theta_{ij} = \theta_{ji}$, is:

$$p_j^*=\left(\frac{s_jY_j}{n_jY_w}\right)^{1/1-\delta}p_j^{-1} \quad (6)$$

By substituting p^*_j in Equation 4 and assuming that $t_j = 0$ (since for most countries the tariff revenue is a trivial share of the GDP), we have:

$$M_{ij}=\left[\frac{\gamma}{\varphi(1-\delta)}\right]\frac{1}{Y_w}s_jY_iY_j\theta_{ij}^{1-\delta}(1+t_{ij})^{-\delta}\left[P_iP_j\right]^{\delta-1} \quad (7)$$

where; Y_w is the world goods product.

Equation 7 is close to the gravity model found in empirical literature. The equation suggests that the specification proper would include:

- The logarithm of the product of the GDP of countries i and j;
- The per capital GDP as a proxy for the capital endowment ratio; this determines the endogenous share of the national product (i.e.,s_j);
- A proxy for the term θ_{ij}; and
- The product of the term of multilateral resistance betweens two countries.

Following Limao and Venables (2001), θ_{ij} can be modeled as follows:

$$\Theta_{ij} = (D_{ij})^{\delta1}\,(I_i)^{\delta2}\,(I_j)^{\delta3}\,[\,e^{\,\delta4Lij\,+\,\delta5Ej\,+\,\delta6Ei}\,] \quad (8)$$

where D_{ij} is the distance between the two countries i and j; L_{ij} = 1 if countries i and j border each other and 0 if they do no; $E_{i(j)}$ = I if the country $_{i(j)}$ is an island and 0 if not; and $I_{i(j)}$ is the state of the infrastructure of country $_{i(j)}$. Regarding the modeling of $[P_i\ P_j]$, Rose and Van Wincoop (2001) and Feenstra (2003) suggested using terms related to the fixed effects of countries as a proxy.

The gravity model can be used for an evaluation of the actual impact of regional agreements on bilateral trade. After all, the gravity model entails a "normal" level of bilateral trade and, by introducing dummy variables related to regional agreements, captures the "atypical" levels of trade resulting from regional agreements.

Therefore, to isolate the effects of trade creation and diversion of exports and imports, Soloaga and Winters (2001) introduced three dummy variables. These are: D_{TC} = 1 if both partners belong to the same integration zone and 0 if they do not (thus capturing intra-bloc trade); D_m = I if the importer is a member of the zone and the exporter is from the rest of the world and 0 if otherwise (thus capturing the bloc's imports from the rest of the world); and D_x = I if exporter j belongs to the zone and importer i to the rest of the world (thus capturing the bloc's exports to the rest of the world).

From the foregoing, then, a reduced form of the gravity equation is expressed in its logarithmic form as:

$$\ln M_{ij} = \beta_o + \beta_1 ln Y_i + \beta_2 ln N_i + \beta_4 ln N_j + \beta_5 \ln D_{ij} + \beta_6 \ln L_{ij} + \beta_7 ln E_i + \beta_8 ln E_j + \beta_9 ln I_i + \beta_{10} ln I_j + \beta_{11} D_{TC} + \beta_{12} + \beta_{13} D_X + \mu_{ij} + v_{ij} \quad (9)$$

where $|\gamma|\varphi(1-\delta)|1/Y_w$ is contained in the constant term, μ_{ij} is the error term that is representative of the specific bilateral effect, and v_{ij} is the habitual symmetrical error term.

The expected signs as stated by Soloaga and Winters (2001) are:

$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 = (1-\delta)\delta_1 < 0, \beta_6 = (1-\delta)\delta_4 > 0, \beta_7 = (1-\delta)\delta_5 < 0, \beta_8 = (1-\delta)\delta_6 < 0, \beta_9 = (1-\delta)\delta_2 > 0, \beta_{10} = (1-\delta)\delta_3 > 0, \beta_{11} > 0, \beta_{12} > 0 \; or < 0, \beta_{13} > 0 \; or < 0$

3. Methodology

3.1 The Study Area

The study covered the Economic Community of West African States (ECOWAS). ECOWAS is the largest trade bloc in Africa. It was established on the 28th of May, 1975 in Lagos. Initially it comprised of sixteen West African countries. However, in 2000 Mauritania withdrew its membership from the ECOWAS thus reducing the number to fifteen member countries. Members of the trade bloc include: Benin Republic, Burkina Faso, Cape Verde, The Gambia, Ghana, Guinea, Guinea Bissau, Cote d'Ivoire, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. Agriculture (agrarian economy) accounts for at least 25% of the GDP in all these countries and there is a combined estimated population of 280 million people in 2010 with land area of about 5,112,913km^2 (ECOWAS, 2011).

3.2 Sampling Procedure

All ECOWAS member countries were sampled for purpose of analysing intra-ECOWAS agricultural trade on both imports and exports. But in analysing the effect of ECOWAS regional trade agreement, Mauritania was added to the 15 member countries. Secondly, the choice of selecting West African countries was to have countries with similar characteristics since it has been asserted that countries with similar characteristics trade more with each other (Batra, 2004; Rahman *et al*., 2006).

The panel data, on the various agricultural commodities were used comprised commodities on United Nation Harmonized System of classification (HS) codes 1-24. The choice of panel data was informed by the fact that it increases the efficiency of the estimators and significantly reduces the potential problem caused by the omission of variables (Serrano and Pinilla, 2010).

Secondly, panels can monitor unobservable trading partner-pairs' individual effects. The data were collected for the period of 11years (2001-2011) giving 210 bilateral observations (that is 15 importing countries by 14 partner countries) for intra-ECOWAS trade while the inter-regional bilateral trade observations were 225 (that is 15 importing countries by 15 partner countries). Two bilateral values were missing leaving a net total of 223 bilateral observations. Agricultural commodities are defined as the group comprising commodities from Harmonized System (HS) codes 1-24. The sub categories of agricultural commodities were defined as follows: Section I (HS Codes 1-5) - live animals and animal products; Section II (HS Codes 6-14) - the vegetable products; Section III (HS Code 15) - animal and vegetable fats and oils and other cleavage products; and Section IV (HS Codes 16-24) - the prepared food stuff, beverages and tobacco. Gravity equation of trade in all agricultural commodities was estimated using conventional explanatory variables (GDP, and distance) and augmented explanatory variables (income levels, similar language, contiguity, membership of free trade agreements, and other regional characteristics).

3.3 Data Collection

Panel data on values of bilateral merchandise exports and imports of all the categories of agricultural commodities (HS Codes 1-24) at 2-digits were obtained from Trademap (ITC-International Trade Centre) for the years 2001-2011. The choice of this period was to examine the impact of ECOWAS trade after the birth of the present ECOWAS regional body following the withdrawal of Mauritania from the trade agreement in 2000. The data on GDP, per capita GDP, ratios between the nominal exchange rate and the official exchange rate of the countries concerned were obtained from the World Economic Outlook of the International Monetary Fund (IMF). Geographical distance between two partner countries, population, countries' contiguity, landlocked, infrastructure index and plausible use of common language were gathered from the database (Centre d'Etudes

Prospectives et d'Informations Internationales(CEPII)) of the French Research Centre in International Economics.

3.4 Data Analysis

Objectives (i) was achieved by the use of descriptive statistics such as percentages, graphs, bar-charts, etc. Objective (ii) was achieved using the trade intensity index (TII) pioneered by Brown (1947) and developed and popularized by Kojima (1964) as applied by Drysdale and Garnaut (1982). The model was later modified and used by Anderson and Norheim (1994) and Mothana (2005). TII is expressed in two forms: the export intensity index (XII) and the import intensity index (MII) which were specified as follows:

$$XIIi = \frac{xij/Xiw}{Mjw/(Mw-Miw)} \quad (10)$$

$$MIIi = \frac{mij/Miw}{Xjw/(Xw-Xiw)} \quad (11)$$

where; XIIi = Country i's export intensity index
MIIi = Country i's import intensity index
xij = Country i's exports to country j
Xiw = Country i's total exports to the world
Mjw = Country j's total imports from the world
Mw = World total imports
Miw = Country i's total imports from the world
mij = Country i's imports from country j
Xjw = Country j's total exports to the world
Xw = World total exports
i = importing country while j = the partner country

The intra-regional trade index assumes that trade regionalization occurs when there is a high concentration of trade flows biased to a certain geographical region. Thus the index indicates the intensity of trade within a sub-region. For instance, a value greater than one shows that a region's trade is not only biased to, but gives more importance to a particular region than it does to the world market. The index however, does not provide any policy implication on how to improve intra-regional trade until when the amount traded were fitted as a dependent variable in a regression (Onogwu and Arene, 2013).

Objective (iii) was achieved by undertaking the gravity analysis for the imports sampled. The dummy variables relating to possible regional agreements were:

- $ECOWAS_1$, is equal to 1 if both countries are members of ECOWAS, and equal to 0 if one of them is from the rest of West Africa (ROWA).
- $ECOWAS_2$, is equal to 1 if the importing country is a member of ECOWAS, and the exporting country is from the ROWA and equal to 0 if the exporting country is a member of ECOWAS and importing country is from ROWA.

In order to take into account the unofficial and unrecorded trade in the model, percentages of tax on goods imported was used as a proxy variable to explain the existence and the extent of the informal border trade phenomenon. Indeed, according to economic literature, one can identify four main factors that may be the cause of informal border trade (Pohit and Taneja, 2003). These are: the high rate of customs duties (taxes) and non-tariff barriers; distortions arising from domestic economic policies; the inefficiency of public institutions, notably the customs department; and existence of efficient frameworks that support informal trade as well as historical and ethnic links that constitute a kind of payment guarantee for the players in the sector. Thus the functional form of the gravity model estimated in this study is as follows:

$$lnM_{ijt} = \beta_0 + \beta_1 lnGDP_{it} + \beta_2 lnGDP_{jt} + \beta_3 lnGDPC_{it} + \beta_4 lnGDPC_{jt} + \beta_5 lnI_{it} + \beta_6 lnI_{jt} + \beta_7 lnD_{ijt} + \beta_8 lnLind_{ijt} + \beta_9 lnTCR_{ijt} + \beta_{10} lnTAX_{it} + \beta_{11} CONT_{ijt} + \beta_{12} LANG_{ij} + \beta_{13} E_{ij} + \beta_{14} ECOWAS_1 + \beta_{15} ECOWAS_2 + \mu_{ijt} + v_{ijt} \quad (12)$$

In the above model (equation 12), the specifications are:

- M_{ijt} indicates the amount of trade imports of country i from country j at time t. Although Elbadawi (1995) and Rahman *et al* (2006) pointed out that in principle, bilateral trade flows (exports or imports) would be influenced by the same factors, in this study imports were chosen rather than exports. The choice can basically be explained by the fact that imports are better measured in the country of arrival because countries tend to monitor their imports more than their exports given that taxes are levied on the imports. Since the gravity model refers to the trade volume, the study deflated the values of the current imports measured in US dollars by using the US Consumer Price Index (CPI).
- GDP_{it} and GDP_{jt} represent the GDP in constant values (US dollar) of countries i and j, respectively. Given that the GDP is a variable that is indicative of the size of the economy, one expects $\beta_1 \geq 0$ and

$\beta_2 \geq 0$ to confirm that the bigger the economy, the more significant trade becomes.

- $GDPC_{it}$ and $GDPC_{jt}$ represent the Per Capital GDP in US dollars of countries i and j, respectively. Given that the Per Capital GDP is a variable that is indicative of the consumers' income level determining the purchasing power of the consumers in the respective countries, it is expected that $\beta_3 \geq 0$ *and* $\beta_4 \geq 0$, to confirm that the higher the income of consumers the more goods they can purchase.
- $I_{i(j)t}$ is a variable that indicates the infrastructure index, which is constructed from three variables: the number of kilometers of roads and of railways and the number of telephone lines per capita. Following Limao and Venables (2001) and Carrere (2004), every variable, measured in density, is standardized to have the same average to be equal to 1`. The index thus corresponds to the arithmetic mean of standardized variables. Considering that more developed infrastructure is likely to foster the movement of bilateral trade, it is also expected that $\beta_5 \geq 0$ and $\beta_6 \geq 0$
- D_{ij} measures geographical distance between country i and country j in kilometres. The greater the distance between the two countries, the more transport costs tend to rise, consequently reducing the volume of trade; hence, it is expected that $\beta_7 < 0$
- $LIND_{ijt}$ is a variable added to test Linder vs Hecksher-Olin theory that countries with similar characteristics trade more than dissimilar ones. The absolute difference values of the GDP per capita of country i and j was used. B_8 is expected to be negative when it obeys Linder's theory and positive if otherwise.
- TCR_{ijt} is the real bilateral exchange rate between country i and country j at time t measured by the following formula: $TCR_{ijt} = (TCN_{i/\$}/TCN_{j/\$}$ x (CPI_j/CPI_i), where TCN is the nominal exchange rate vis-à-vis the dollar and CPI is the price index, notably the GDP deflator. The negative impact of the real bilateral exchange rate will be reflected in $\beta_9 < 0$.
- $TAX_{i(j)t}$ is a variable introduced into the model to indicate the incentives for conducting unregistered trade. Its coefficient will thus reflect the impact of unrecorded trade on official bilateral trade. It was represented in the model by the percentage of tax paid on commodities imported. In such a state of affairs, the coefficient $\beta_{10} < 0$. It is also expected to have a negative sign.
- $CONT_{ij}$ is the dummy variable relating to whether the two trading countries border each other. It takes the value 1 if the two are neighbouring countries and 0 otherwise. For neighbouring countries, trade is expected to be intensive; this assumes that $\beta_{11} \geq 0$ and positive.
- $LANG_{ij}$ is a variable added to assess contribution of usage of common language between the partner countries in trade. It is expected that $\beta_{12} \geq 0$ and positive.
- E_{ij} is a dummy variable equal to 1 if the country i(j) is an Island and 0 if not. It is expected that $\beta_{13} \geq 0$.
- $ECOWAS_1$ is a dummy variable indicating membership of ECOWAS; it is equal to 1 if both countries are members and 0 if one of them is from the rest of West Africa (ROWA). Similarly, $ECOWAS_2$ takes the value 1 if the importing country is a member of ECOWAS and the exporting country is from the rest of West Africa (ROWA). It takes the value 0 if the exporting country is a member of ECOWAS and the importing country is from ROWA. The signs of coefficients relating to the ECOWAS variables will be useful to verify if there is trade creation or diversion within the integration region. After all, it is known that there is trade creation when intra-regional trade increases without a reduction in imports from the rest of the region, which means that $\beta_{14} \geq 0$ and $\beta_{15} \geq 0$. When the tendency to import from the rest of the region reduces while the overall tendency to trade with members of the community increases, there is diversion of trade; in this case $\beta_{14} \leq 0$ and $\beta_{15} \leq 0$.
- μ_{ij} is the error term that is representative of the specific bilateral effect, and v_{ij} is the habitual symmetrical error term.

Except for the dummy variables, all the other variables are expressed in natural logarithm. The estimated coefficients of these variables are directly interpreted as elasticities. On the other hand, the elasticity of the qualitative variables was given as the exponential of the estimated coefficients, that is $\exp(\beta)$-1 (Batra, 2004; Rahman *et al* 2006). Moreover, the estimation of equation 12 with the data about all the importing countries enabled us to obtain the coefficients estimated on the ECOWAS variables in order to appreciate whether the regional integration had an impact on intra-ECOWAS trade.

3.5 Hypothesis Testing

The test of significance for the null hypothesis of the study was conducted as shown below:

(i) Null Hypothesis**:** H_0: $\beta_1 = \beta_2 = \beta_n = 0$ (that regional characteristics and trade agreement do not significantly affect the trade of agricultural products in the region)

(ii) Alternative Hypothesis**:** H_1: $\beta_1 = \beta_2 = \beta_n \neq 0$ (that regional characteristics and trade agreement do significantly affect the trade of agricultural products in the region)**.**

The F-statistic obtained from the model with the probability level (P-value) of significance was used to test the

joint significance of the independent variables at 5% level. If the probability of the F-statistics is less than 0.05, the decision was that the null hypothesis be rejected otherwise accepted.

4. Results and Discussion

4.1 Volume and Direction of Trade in Agricultural Products

Annual trade values of imports for the paired countries on agricultural products were computed and the results presented in Table 1. All agricultural commodities imports within the region for the period of 2001 to 2011 values stood at 4.56 billion US dollars, which accounted for 6.38% of the total commodities import in the region. The trade trends show a tremendous increase from 3.93% in 2002 to 12.99% in 2008. After reaching this peak, it dropped to 9.52% in 2009 and later rose up to 12.44% in 2010 (see Figure 1). The result indicates that the amount imported within the region varies with time. The result showed that Cote d'lvoire alone accounted for more than half (52.39%) of the total commodities imported within the region. Other countries like Mali, Senegal, Burkina Faso, Ghana and Nigeria accounted for 9.78%, 8.45%, 6.14%, 5.42% and 4.20%, respectively.

On the other hand, to know the amount of agricultural commodities traded within the ECOWAS region in term of export for the period of 2001 to 2011, merchandise bilateral export trade values between the ECOWAS country pairs were summed accordingly for agricultural products. The results indicated that all agricultural products trade values was 8.58 billion US dollars, accounted for about 15.46% of the total commodities export in the region. The agricultural products exports were on the increased from 2001 with about 4.45% to 13.92% in 2009 and then dropped to 12.93% in 2011 (see Figure 1). This suggests an increased in supply of agricultural products within the region for the period under review.

In estimating the total values of agricultural products exported by each country within the region, it was observed that the largest amount supplied to other countries in the region within this period came from Cote d'lvoire then followed by Senegal and Mali which accounted for 34.46%, 15.61% and 9.78% respectively. Other countries' share of exports within the region stood at 8.92%, 8.12% 7.15%, 5.21%, 5.16%, 4.06% 1.10% for Niger, Benin, Burkina Faso, Togo, Ghana, Nigeria and Guinea, respectively. Comparing agricultural products exports to all commodities exports in the region, Nigeria which is the leading country (35.87%) in all commodities exports dropped to 4.06% (ranked 9th) in terms of agricultural products export during the period under review. This implies that more of the Nigeria exports in the region come from other sector of the economy than agriculture.

Table1:Intra-ECOWAS Imports and Exports in Million US Dollars for the Period 2001-2011

	Import				Export			
	All Comm.		Agric Comm.		All Comm.		Agric Comm.	
Year	Total	%	Total	%	Total	%	Total	%
2001	2073	2.90	260	5.70	2281	4.11	382	4.45
2002	1522	2.13	178	3.92	1915	3.45	422	4.91
2003	3502	4.90	345	7.56	3328	5.99	583	6.79
2004	3319	4.65	357	7.83	3069	5.53	636	7.41
2005	4898	6.86	382	8.38	4136	7.45	682	7.95
2006	4473	6.26	407	8.94	7089	12.77	603	7.03
2007	6006	8.41	546	11.99	4222	7.60	848	9.88
2008	31567	44.21	594	13.02	10781	19.41	985	11.48
2009	3878	5.43	434	9.52	7248	13.05	1194	13.92
2010	6247	8.75	567	12.45	7036	12.67	1137	13.24
2011	3915	5.48	486	10.69	4424	7.97	1110	12.94
Total	71400	100	4556	**100**	55529	100	8582	100
%			6.38				15.45	

Source: Authors' Computations from ITC (Trademap) Data, 2012

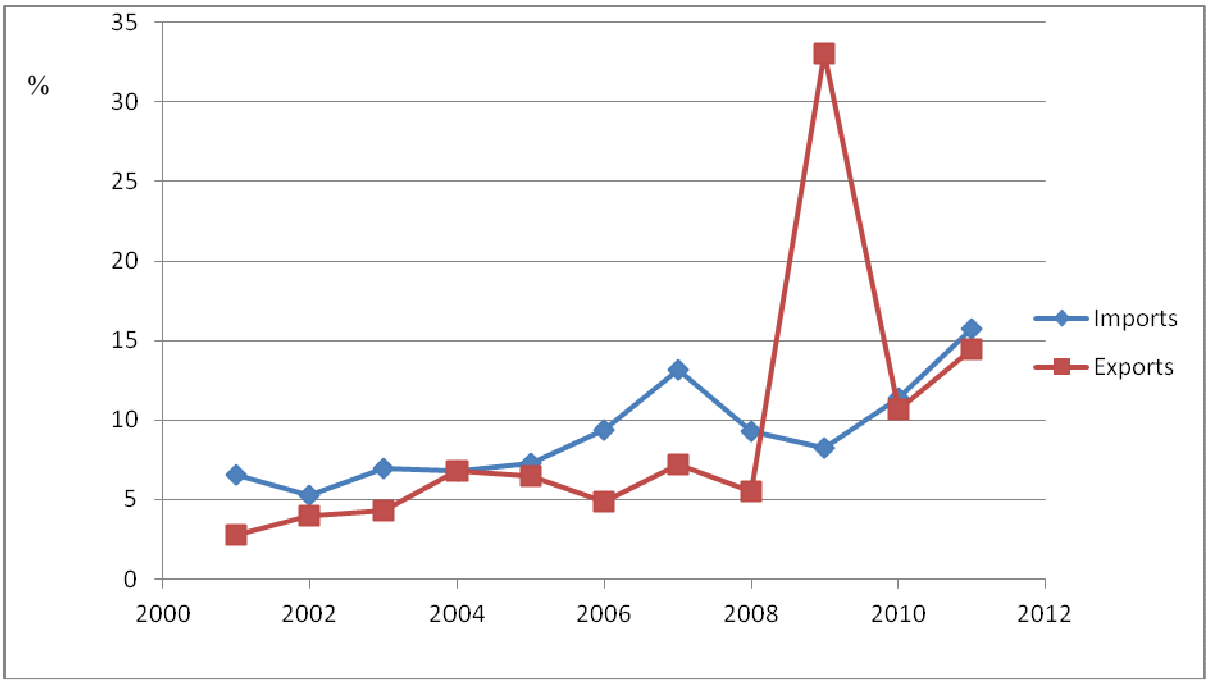

Fig. 1: A Chart Showing Trends of ECOWAS' All Agricultural Products Imports and Exports for the Period 2001-2011 (Author's Design, 2012)

4.2 Trade Intensity Index of Intra-ECOWAS all Agricultural Imports and Exports

The study examined how weak or strong the ties of trade are between paired countries of the ECOWAS region. When the share of imports of a given country i from another country j is small, one cannot conclude immediately that the trade relationship between country i and j is weak until the share imported from country j compared to that amount imported from other part of the World is measured to be small. This regionalization in terms of trade either in imports or exports was measured using trade intensity index. The results in Tables 4 and 5 show trade intensity among ECOWAS countries. The 15 ECOWAS countries were paired to examine which countries have strong or weak relationship in terms of all agricultural imports and exports trade. It was observed that out of 210 country pairs, trade values between Liberia and Sierra Leone, Sierra Leone and Liberia were not available. The results indicated that out of the remaining 208 country pairs, 88 have their index value less than one representing 41.9% while 120 country pairs have trade intensity index value greater than one, representing 57.1%. Since more of the country pairs have trade intensity index values greater than one, it implies that there was more regionalization in terms of all agricultural imports trade within the region (Table 2).

On the other hand, the study estimated level of regionalization in terms of export of all agricultural products during the period under review. The regionalization level in terms of exports of all agricultural products in the region is said to be less with 104 paired countries representing 49.5% having trade intensity index values less than one while about 49% paired countries had trade intensity index greater than one (Table 2). Liberia exports to Nigeria equals the amount of Liberia's exports to rest of the world.

Table 2: Summary of Intra -ECOWAS Trade Intensity Index of all Agricultural and Sub sections Products Imports, 2001-2011

Product Category	Level of Country Paired Regionalisation								Inference
	NA	%	< 1	%	1	%	>1	%	
IMPORTS									
All Agic. Products	2	1	88	41.9	0	0.0	120	57.1	More regionalised
EXPORTS									
All Agic. Products	2	1	104	49.5	1	0.5	103	49	Fairly regionalised

Source**:** Author's Computations (2012)

4.3 The Gravity Equation Results

Gravity equation regression was estimated for agricultural products. The bilateral import values were used as the dependant variable while the values on regional characteristics such as GDP, per capital GDP, distance, infrastructures, exchange rate, tax, landlocked, contiguity and common language were added to the equation as independent variables. Other independent variables added were $ECOWAS_1$ and $ECOWAS_2$ which were used to examine the effect of regional agreements on trade in agricultural products while the absolute values of the difference between the per capita GDP to test the Linder vs Heckscher-Ohlin trade theories.

Regression analysis was carried out using OLS after testing several estimators which did not give better results.

To check for multicollinearity, simple correlation was run and the results indicated that population variable had high values. In an attempt to solve this problem, another software Stata Version 9, was used and this same variable was dropped automatically by the package. Thus, this variable was dropped from the equations. The problem of zero values recorded for some observations was handled by employing three methods suggested in literature. These were the use of the tobit model, elimination of zero data and the addition of a minimum constant value all through to the actual dependent variable data collected. The results of the regression model added minimum constant value indicated it had better predictive power than that without the minimum constant added. Thus, it was used for the interpretation of the results. The results of the gravity equation are presented under the following sub-headings:

4.3.1 Effects of ECOWAS regional characteristics and trade agreement on trade in all agricultural products

Table 3 presents the gravity equation estimates of the ECOWAS' regional characteristics and trade agreement on trade in all agricultural products. The model fitted the data well and explained over 70% of the variations in trade of agricultural products. On the constant variable, the value was high and significant. This implies that other variables such as time variant (random effect), country fixed effect and non-specified variables also explain variations in imports of agricultural products from other regions of the world. The F-value was statistically significant at 1% level showing how well the model explained the relationship between the dependent and independent variables.

Gross Domestic Products (GDP_{ij})

The GDP of the importing country and that of exporting country were used as proxies for market size in both countries. The coefficient of the GDP in importing country was high and statistically significant at 1% level of significance, with the expected positive sign. The positive and statistically significant coefficient of the importing country's GDP for the augmented gravity model is consistent with the theory behind the conventional gravity model, suggesting that the size of the economies should enhance the amount of trade between trading partners. The result implies that a percent increased in GDP of the importing country increase imports of agricultural products by 1.13%. The coefficients of the GDP in the origin countries which indicate the potentials and supply capabilities were positive and statistically significant at 1% level of significance. The result suggests that holding other variables constant, a percent increased in GDP of the exporting countries increase the supply of all agricultural products and food by 0.83% . It could be noted that the potentials for supply of agricultural products was less than that of demand (1.13%). This may be as a result of home market or absorption effects resulting to less products being available for exportation.

Gross Domestic Product Per Capita ($GDPC_{ij}$)

The estimated coefficient for the GDP per capita for importing countries which was the proxy for the consumer's income (purchasing power), had negative sign and statistically insignificant. The negative sign implied that as the income of consumer nation improved more enterprises could be set up internally which enabled it to produce for its citizens. This reduced rate of importation of agricultural products. The result implies that the absorption effect was not as the result of the consumer's income but that of the economic size or population size.

In terms of the GDP per capita for the exporting countries, the coefficient estimated was positive and statistically insignificant. The non significance of the GDP per capita (income) of exporting countries probably could be as a result of low level of productivity per head witnessed in the developing country (Ogunkola, 1988; Hatab *et al.,* 2010). The high value of coefficient 0.37% means increase in supply of agricultural products with 1% increased in per capita GDP. Thus, one can deduced from the result in table 3, that trade within the ECOWAS region was not determined by per capita GDP (income) level of the importers and the exporters.

Distance (D_{ij})

Another component of gravity model that explain trade variations between paired countries is distance. It is a proxy of transportation cost, which variably means increase in distance increases transport cost which has the effect of reducing amount traded. The results in Table 3 show distance represented by the symbol Dij which had negative sign as expected and statistically significant at 1% level of significance. The high level of reduction in quantity traded on agricultural products (0.99%) for a given one percent increased in distance could be explained by the fact that agricultural products are more bulky and mostly produced in the interior parts of the exporting countries. Panhausen and United (2010) opined that fragmentation nature of agricultural products is an underlying problem for the transport sector in trade of agricultural products.

Tax_i

The variable for tax payable in the importing countries turned to be surprisingly positive and not significant for all agricultural products. This implies that tax was not an important explanatory variable for the importing countries in respect of trade in all agricultural products.

Real Exchange Rate (TCR_{ij})
Real exchange rate (TCRij) was added to the gravity equation to determine the effects of importing countries' variations in exchange rate in response to level of agricultural products imported. The coefficient estimated had negative sign as expected and statistically significant at10% level. The results implied that a percent depreciation in importers' currency reduced rate of imports by 0.14%. Therefore, exchange rate variable was an instrument in influencing rate of trade in the region. This result disagreed with the findings of Hatab *et al.* (2010) who found exchange rate to be positive and significant in Egyptian's trade of agricultural products.

Test of Linder vs Heckscher-Ohlin Theories ($Lind_{ij}$)
The absolute values of the difference between per capita GDP (income) of importing and exporting countries ($Lind_{ij}$) was added to the gravity equation on trade to test for Linder vs Heckscher-Ohlin theories. The coefficient of this variable as seen in Table 3 is negative and not statistically significant with respect to trade in agricultural products. The non-significance of the coefficients evidenced more that income differences of both the producers and the consumers had no influence in trade of agricultural products and food in the ECOWAS region. This implies that the trade pattern follows that of Linder's theory of trade, which states that nations with similar demands would develop similar industries. These nations would then trade with each other in similar, but differentiated goods.

Infrastructure (I_{ij})
The coefficient of the infrastructure variable in importing countries turned to be negative and not statistically significant in trade of agricultural products while coefficient of infrastructure variable for exporting countries had positive sign as expected but not statistically significant. This implies that infrastructure variables in both importing and exporting countries did not explain variations in imports of agricultural products in the ECOWAS region.

Landlocked (Eij)
This variable was added to assess the effect of no availability of sea ports or water transportation means that connects the paired countries. The coefficient in Table 3 was negative as expected and statistically significant at 1% level. It implied that non availability of sea or river to connect paired countries reduced trade in agricultural products by 0.64% (exp -1.012) than countries with water means of transportation.

Contiguity ($Cont_{ij}$)
Another variable that explained variations in imports of agricultural products and food was contiguity; that is countries sharing common border. The coefficient for contiguity was high and statistically significant at 1% level of significance. This result suggests that sharing common border enhanced trade of agricultural products. As shown in Table 3, holding other variables constant, sharing common border increased trade of agricultural products by 3.21 (exp 1.437) times than observed in countries that do not share common border with each other. Therefore, contiguity is a good instrument in explaining variations in trade of agricultural products in the region.

Common Official Language ($Lang_{ij}$)
Use of common official language of communication was found to be a significant (1% level) parameter in influencing trade in the region (Table 3). The coefficient 4.63 (exp 1.728)) for agricultural products was higher and this result implies that keeping constant other variables, use of common language increased trade in all agricultural products and food by 4.63 (exp 1.728) times than in the case of countries that do not use common official language in the region. This was possible on the principle that negotiation of price and passage of other vital information instrumented by sharing common language enhanced more trade of agricultural products in the region.

Test of the significance of the regional characteristics and trade agreement on trade in all agricultural products
Null Hypothesis: H_0: $\beta_1 = \beta_2 = \beta_n = 0$ (that regional characteristics and trade agreement do not significantly affect the trade of all agricultural products in the region). **Alternative Hypothesis:** H_1: $\beta_1 = \beta_2 = \beta_n \neq 0$ (that regional characteristics and trade agreement do significantly affect the trade of all agricultural products)**.** The F–statistics which indicates the overall contribution of all the independent variables in the model in explaining variations in the dependent variable had a value of 15.74. It is highly significant at 1% (p = 0 .0001). The model thus provided adequate fit with respect to the relationships investigated.
Decisions: Since the model is significant at 1%, it means that not all variable coefficients (β's) are zero. Therefore, the null hypothesis was rejected; hence, ECOWAS regional characteristics and trade agreement do significantly affect the trade of agricultural products in the region.

Table 3: Gravity regression results of ECOWAS' regional characteristics and trade agreement on trade in all agricultural products

Variable	Coefficient (β)	Std error	t-value	exp (β)-1
GDPi	1.130	0.185	6.113***	
GDPj	0.829	0.167	4.951***	
GDPCi	-0.435	0.391	-1.113	
GDPCj	0.371	0.398	0.931	
Dij	-0.985	0.287	-3.431***	
TAXi	0.213	0.4 53	0.469	
TCRij	- 0.140	0.077	- 1.817*	
Ii	-0.249	0.297	-0.840	
Ij	0.406	0.2 53	1.606	
Eij	-1.012	0.431	-2.349***	-0.637
Lindij	-0.186	0.175	-1.062	
Contij	1.437	0.550	2.614***	3.208
Langij	1.728	0.406	4.258***	4.629
ECOWAS 1	-1.280	2.720	-0.470	-0.722
ECOWAS 2	-0.956	2.805	-0.341	-0.616
Constant	10.684	5.510	1.939**	
R2	0.730			
F-Statistic	15.742***			
Number of observations	2453			
Relative bilateral trade	223			

Dependent variable M_{ij}; All variables except dummies are in natural logarithmic form
*, **, *** indicate significance at the 10%, 5%, and 1% levels respectively

Source: Author's estimation using SPSS 16 (2012)

4.3.2 Effect of ECOWAS' regional trade agreement on trade creation and trade diversion of agricultural products

The regression results of the augmented gravity models showing the effects of regional characteristics and the regional trade agreement dummy variables are presented in Tables 3. Therefore, the results of variables of interest ($ECOWAS_1$ and $ECOWAS_2$) are discussed in this section. $ECOWAS_1$ was added to test the effect of ECOWAS regional trade agreement in intra-ECOWAS trade of agricultural and all commodities products while $ECOWAS_2$ was added to assess ECOWAS regional trade agreement on trade with ROWA, whether it brings about trade creation or trade diversion in terms of ECOWAS agricultural products imports.

The results of the coefficient of dummy variable $ECOWAS_1$ was observed to be negative and statistically not significant. The coefficient was very high for agricultural products which stood at -0.722. The result implied that ECOWAS regional trade agreement reduced intra-regional trade. This simply meant that there was laxity on the side of ECOWAS as a bloc in creating import trade among its member countries.

The second dummy variable, $ECOWAS_2$ coefficients had negative sign and not statistically significant. The results suggest a decreased in ECOWAS imports from non-member country by 62%. In the case of all commodities, the reduction in imports was 89%. It therefore meant that there was import trade diversion but to the advantage of ECOWAS region.

The chart in figure 2, exhibits clearly the effects of ECOWAS regional trade agreement on trade of agricultural products. It was observed that reduction in trade due to intra-ECOWAS effect was higher in agricultural products. This reduction was to the disadvantage of ECOWAS region because this may inversely reduce welfare gains that may have come from trade within the region. It was also observed that import diversion seems to be more in trade with member countries than non member country. For ECOWAS to have been trade creating in terms of import, it was expected that more would have been importing from non-member country without reducing imports from member countries.

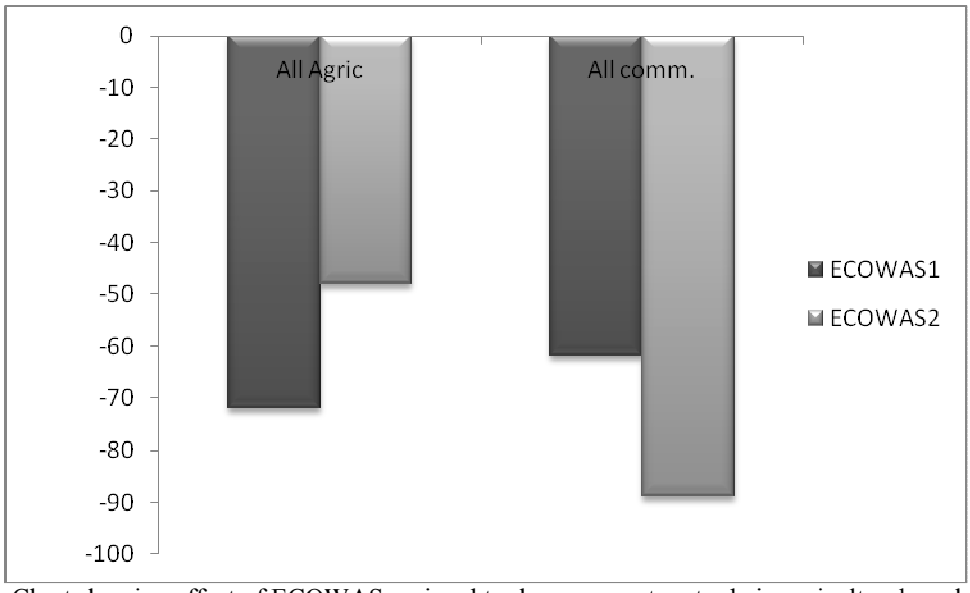

Fig. 2: A Chart showing effect of ECOWAS regional trade agreement on trade in agricultural products (Author's design, 2012)

5. Conclusion and Policy Recommendations

5.1 Conclusion

Looking at the importance of international agricultural trade in the ECOWAS economy, the study attempted to analyse ECOWAS pattern of trade empirically and to identify the factors influencing ECOWAS imports from the major exporting markets. More specifically, the study employed trade intensity index and the gravity model which were considered one of the most efficient models in explaining bilateral trade to ECOWAS' imports covering the period 2001-2011. Intra-regional trade intensity index showed fair regionalization among ECOWAS countries even though the intensity concentrated among few members. According to the results in this study, ECOWAS imports of agricultural products was consistent with gravity theory that trade between countries depends on the mass (economic size) and inversely proportional to the distance between them. The per capita GDP in both countries (import and export) turned out to be insignificant factors in determining ECOWAS imports of agricultural products. This implies that ECOWAS trade pattern follows a GDP pattern, concentrating on the demand and import of quantity-based products and depending on overall market size, rather than a per capita GDP pattern centers on the import of quality based high value added products which are sensitive to the level of income. Finally, ECOWAS regional trade agreement with the aims of promoting trade seems to have achieved little or no significant impact in intra-ECOWAS trade especially in the import of agricultural products.

5.2 Recommendations

Based on the findings of this study, the following recommendations are formulated:

1. The results of the study showed that sharing common border among the ECOWAS countries brought about change in amount traded in all agricultural products and food and other sectional agricultural products. Therefore, non-tariff barriers in the union member countries must be effectively eliminated. This will enhance more cross border trade especially in the areas of agricultural products.
2. One of the components of gravity model is distance. This variable was tested to be consistent with the gravity theory and the results indicated to be negative and statistically significant in all results of the sectors analysed. It implies that effort should be made by member countries to reduce transport costs through provision of transport facilities.
3. Economic size and market potentials were the key instruments in explaining changes in trade of agricultural products in the region as observed in this study. Thus, harnessing more of the resource endowment and reformulation of trade policy in line with EPAs among member countries will promote trade in the region (Onogwu and Arene, 2013a)..
4. The macroeconomic environment in every member country must be cleaned up. Improving the living standard of the consumers and the producers will variably increase their per capita income which will go a long way in promoting trade within the region.
5. Findings in this study showed that ECOWAS regional trade agreement led to trade diversion, this calls for trade policy reforms that will promote both intra and inter-regional trade in the region. The on-going Economic Partnership Agreement (EPAs) negotiations between ECOWAS and the EU

need to be concluded and implemented since it has potential for welfare gains (Onogwu and Arene, 2013b).

5.3 Contribution to knowledge

The general review of the trade among ECOWAS countries and between ECOWAS and other regions on import and export of agricultural products and food created awareness to member countries of ECOWAS for policy reformation. The study added ideas on extent of trade creation and trade diversion through augmented gravity equation which investors can explore the available potentials in agricultural trade especially within the ECOWAS region. Also, each country's bilateral trade strength and performance at glance was assessed with most of trade determinants identified, thus added to literature which can be reference points to policy makers in policy formulation and implementation. The study addressed the fundamental question of what pattern of trade exist for agricultural products and food in ECOWAS region as postulated by Linder vs Heckscher-Ohlin trade theories.

Acknowledgement: This article is derived from the first author's Ph.D thesis. The other authors are the thesis supervisors. The authors are grateful to members of the departmental Post-Graduate Board for their useful criticisms on an earlier draft.

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Table 4: Trade Intensity Index of Intra-ECOWAS All Agricultural Products Imports for the Period 2001-2011

j i	Benin	B/Faso	C/Verde	Cote d I	Gambia	Ghana	Guinea	G/ Bissau	Liberia	Mali	Niger	Nigeria	Senegal	S/Leone	Togo
Benin		58.1	0.0	24.8	0.0	1.3	0.3	0.1	0.0	77.9	456.3	6.1	9.5	0.3	185.9
B/Faso	0.7		0.0	2.6	0.0	5.3	0.0	0.0	2.8	110.4	253.2	2.5	0.3	0.0	217.2
C/Verde	2.4	0.0		35.4	0.9	0.0	0.2	14.4	0.2	0.0	0.3	1.8	1.4	0.0	0.0
Cote d I	1.9	49.3	0.3		0.4	0.8	3.4	0.0	2.8	38.2	23.1	0.6	16.2	1.1	10.9
Gambia	0.2	0.0	9.1	0.3		7.8	23.3	65.1	0.0	36.8	0.0	0.2	7.2	7.5	2.5
Ghana	1.2	14.2	0.0	8.9	0.4		0.8	0.0	0.6	3.8	6.7	1.2	5.6	1.2	28.1
Guinea	0.5	0.0	1.7	167.1	42.5	2.1		2.3	29.0	53.3	0.0	16.9	14.2	89.1	34.9
G/Bissau	0.0	0.0	1.9	6.2	18.9	8.8	2.3		0.0	1.9	0.0	0.8	1.6	0.0	313.3
Liberia	2.4	0.0	0.0	10.4	32.1	8.8	0.0	0.0		0.2	0.0	0.9	0.1	-	9.5
Mali	0.3	40.4	0.1	2.9	5.3	0.3	0.3	0.4	3.0		28.3	1.3	0.8	7.3	1.1
Niger	1.2	6.5	0.1	3.4	0.4	17.6	0.0	0.0	0.0	1.9		0.3	0.0	0.0	3.1
Nigeria	7.1	0.3	0.0	1.5	1.1	3.3	1.9	0.0	4.7	0.3	63.6		0.5	3.5	36.7
Senegal	5.3	59.1	1.8	37.3	10.7	0.5	7.4	57.8	32.6	73.4	21.9	0.2		34.8	28.3
S/Leone	3.4	1.2	0.0	0.7	11.5	1.2	2.8	0.0	-	0.0	0.9	0.1	0.8		0.2
Togo	353.8	451.3	0.0	22.1	0.9	33.3	0.5	0.0	8.5	73.1	138.3	11.8	43.1	1.8	
Average	27.2	48.6	1.1	23.1	8.9	6.5	3.1	10.0	6.5	33.7	70.9	3.2	7.2	11.3	62.3

Source: Author's Computation Using Data Extracted from ITC Database (Trade Map), 2012.

Table 5: Trade Intensity Index of Intra-ECOWAS All Agricultural Products Exports for the Period 2001-2011

j i	Benin	B/Faso	C/Verde	Cote d I	Gambia	Ghana	Guinea	G/ Bissau	Liberia	Mali	Niger	Nigeria	Senegal	S/Leone	Togo
Benin		123.3	0.0	3.5	0.5	1.4	0.0	0.0	2.7	40.8	57.0	15.0	10.2	3.8	518.2
B/Faso	62.3		0.0	86.0	0.2	14.1	0.0	0.0	0.0	235.8	31.8	0.3	71.5	1.3	373.9
C/Verde	0.0	0.0		0.1	0.5	0.0	0.0	0.1	0.0	0.0	0.0	0.0	14.2	0.0	1.0
Cote d I	30.9	102.4	0.0		0.0	5.8	1.4	0.0	12.0	225.3	36.5	0.3	37.4	1.4	25.0
Gambia	0.0	0.1	1.6	4.8		1.1	4.3	0.0	45.8	0.1	0.0	7.2	188.4	12.7	6.9
Ghana	16.9	260.2	0.0	12.1	37.8		0.3	0.0	21.0	37.4	121.7	6.9	6.2	1.3	103.9
Guinea	1.2	2.5	20.1	8.7	99.4	0.0		0.0	0.1	113.3	0.1	2.8	118.0	1.6	10.5
G/Bissau	0.0	0.0	20.0	1.0	893.0	0.5	30.0		0.0	0.0	0.0	0.0	341.4	0.0	2.1
Liberia	0.0	3.1	0.2	3.2	0.1	0.7	24.0	0.0		3.3	0.0	5.3	36.5	-	11.7
Mali	96.9	154.6	0.0	46.6	53.7	0.6	191.9	0.0	0.0		5.8	0.3	257.2	0.0	41.7
Niger	107.1	314.9	0.0	21.6	0.0	5.2	0.0	0.0	0.0	110.8		3.8	26.2	4.9	228.0
Nigeria	116.3	0.4	0.0	1.5	0.0	2.4	0.0	0.0	1.0	1.5	151.3		1.6	0.0	3.9
Senegal	10.2	14.2	1.7	16.4	1.7	4.2	57.3	0.8	0.1	405.4	0.8	0.2		0.9	45.6
S/Leone	0.4	0.0	0.0	1.5	0.6	1.3	87.5	0.0	-	8.1	0.0	3.9	38.7		4.6
Togo	159.7	394.0	0.0	32.0	0.1	11.1	0.0	0.0	10.2	31.1	35.1	94.3	67.8	0.0	
Average	43.0	97.8	3.1	17.1	77.7	3.5	28.3	0.1	6.6	86.6	31.4	10.0	86.8	2.0	98.4

Source: Author's Computation Using Data Extracted from ITC Database (Trade Map), 2012.

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