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Do Regional Characteristics and Sub-regional Integration Matter in Intra-ECOWAS Trade on Livestock Products?

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Abstract: The purpose of this paper is to empirically analyze the trade potentials in the West African region. It starts with review of livestock products import and export within and outside the region and the bilateral strength of livestock trade regionalism was also tested using trade intensity index. Also the effects of WAEMU sub-regional integration and ECOWAS regional characteristics on intra-ECOWAS trade were assessed using the gravity model. This was achieved by employing panel data for the period of 11years (2001-2011). The results suggest high import than export of livestock products within and between regions. The level of trade regionalization was relatively high in WAEMU sub-region than ECOWAS region. The traditional gravity variables were consistent with the gravity theory. Also the alternative hypothesis that trade blocs, economic and geographical variables did significantly influence trade in the sub-region was accepted at 1% probability level. The study therefore, recommends that more efforts be made to remove non-tariff barriers in order to promote intra-ECOWAS trade on livestock products since trade diversion was noticed.

Keywords: Regional characteristics; Sub-regional integration; Intra-ECOWAS trade; Livestock products; Gravity model of trade.

Introduction

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 & Alan, 2000).

International agricultural trade 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). He further stated that some of the benefits of international agricultural trade include increases in foreign exchange earnings especially for the weak currency developing countries and increase competition among producing nations thereby improving efficiency in production that brings about reduction in selling prices of products. Furthermore, international trade fosters friendship and cooperation between countries. For example the European Economic Community (EEC) countries are more united and enjoy a greater degree of cooperation because of the common market they share. Likewise ECOWAS countries have more political and economic cooperation as a result of the common market in which they participate (Olukosi, Isitor & Ode, 2007).

Keane et al. (2010) stated that intra-regional trade in Sub-Sahara Africa appears to be low and there are different views as to why this is the case; in addition to how and why increased intra-regional trade on the continent may be beneficial. They further stated that besides economic variables, such as differences in factor endowments and complementarities in trade structure, to policy variables such as tariffs and non tariff barriers, there are other factors such as trade agreement, openness and foreign direct investment. The trade in animal products is still penalized and in most cases accompanied with unjustifiably high tax within the region (Pannhausen& United, 2010).

With a growth rate of animal products demand in the Sahel and West Africa (SWA) estimated at 4% per year, demand is expected to increase by more than 250% by 2025 (Mulumba *et al.* 2008). They further stated that production growth rate of these products, estimated at less than 2%, remains significant despite the fact that it is still less than the growth rate of demand as well as the population, for example, per capita consumption is quite low in West Africa, it is

estimated at 5.2 times and 6.5 times less than Europe for meat and milk respectively. But even if this consumption does not increase, overall demand will continue to grow because of the increase in population. Therefore, there is need to address a strong potential demand in the region. Regional production as regards the regional demand varies according to products: 100% for the meat of small ruminants and eggs, 98% for beef and pork, 80% for poultry meat and 74% for milk and dairy products (Mulumba et al. 2008). The importance of trade varies according to different zones and raises the following issues: Can regional demand be met at reasonable prices by increasing local production? If so, why the potential demand is not yet satisfied by regional production? Are current livestock policies in line with food security goals and with potential production? These issues deserve special attention

Furthermore, the costs of supplying livestock products are only partly determined by natural conditions like climate and soil but of greater importance could be per capita income, resources endowments, level of development, the transportation costs, size of a country's population and some geographical features. Therefore, identification and evaluation of the unrealized level of trade potentials within the West African sub-region as concerns livestock sector is a serious challenge. Therefore, the specific objectives of the study are to:

(i) review the livestock intra and inter-trade in West African region for the period 2001-2011;
(ii) estimate level of regionalization in terms of livestock trade within the region for the period under review
(iii) assess the effects of regional characteristics, and regional and sub-regional trade blocs (ECOWAS & WAEMU), respectively, in promoting intra-trade in livestock sector in the region.

The null hypothesis that was tested is that ECOWAS regional characteristics and the two trade blocs did not influence trade in livestock products within the West African region.

Materials and methods:

Data Collection:

Panel data on values of bilateral merchandise exports and imports of all livestock products using harmonised system of classification 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 and per capita GDP of the countries concerned were obtained from the World Economic Outlook of the International Monetary Fund (IMF). Geographical distance between two partner-countries was gathered from the database (Centre d'Etudes Prospective set d'Informations Internationales (CEPII)) of the French Research Centre in International Economics. Data for foreign direct investment stock was obtained from the UNCTAD world investment report 2008 online[1] while that of trade policy index was obtained from the heritage foundation website[2].

Data Analysis

Objective (i) was achieved by the use of descriptive statistics such as percentages and bar-charts. 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 Norhein (1994) and Mothana (2005). TII is expressed in two forms: the export intensity index (XII) and the import intensity index (MII) which was specified as follows:

$$XIIi = \frac{\text{xij/Xiw}}{\text{Mjw/(Mw-Miw)}} \quad (1)$$

$$MIIi = \frac{\text{mij/Miw}}{\text{Xjw/(Xw-Xiw)}} \quad (2)$$

where; XIIi = Country i's export intensity index

[1]http//www.stats.unctad.org/FDI/reportfolders.aspx'scs refer=&cschosen.org

[2]http//www.heritage.org/research/features/index/downloads/academicuserguide.pdf

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'stotal 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& Arene, 2013).

Objective (iii) was achieved by undertaking the gravity analysis for the imports sampled. Thus the functional form of the gravity model estimated in this study is as follows:

$$lnY_{ijt}=\beta_0+\beta_1 lnGDP_{it}+\beta_2 lnGDP_{jt}+\beta_3 lnD_{ij}+\beta_4 lnTCR_{ijt}+\beta_5 LIND_{ijt}+\beta_6 OP_{it}+\beta_7 FTP_{it}+\beta_8 FDI_{it}+\beta_9 FDI_{jt}+\beta_{10} CONT_{ij}+\beta_{11} LANG_{ij}+\beta_{12} E_{ij}+\beta_{13} ECOWAS+\beta_{14} WAEMU+\mu_{ijt}+\upsilon_{ijt} \quad (3)$$

In the above model (equation 3), the specifications are:

- Y_{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.
- D_{ij} measures geographical great circle 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 $\beta_3 < 0$
- 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 $\beta_4 < 0$.
- $LIND_{ijt}$ is a variable added to test Linder vs Hecksher-Ohlin 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. β_5 is expected to be negative when it obeys Linder's theory and positive if otherwise.
- OPit is the IMPORT/GDP ratio indicating the degree of openness of the economy in importing country. The expected sign of β_6 is positive, indicates increase in trade with increase in openness of the economy.
- FTP_{it} is the measure of the degree of tariff and non tariff barriers that trading partners experience. Trade policy in this study is proxied by a trade policy index indicating trade freedom. The expected sign of the variable β_7 is positive.
- FDI_{ijt} is included in the study as stock, since FDI stock measures its productive capacity. It is believed that transformation of the composition

of exports measures with FDI, the signs of β_8 and β_9 variables are expected to be positive.

- $CONT_{ij}$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 $ß_{10} \geq 0$ 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 $ß_{11} \geq 0$ 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 $ß_{12} \geq 0$.
- ECOWAS, WAEMU is a dummy variable indicating membership of ECOWAS or WAEMU; it is equal to 1 if both countries are members and 0 if one of them is from the rest of West Africa (ROWA). This measures the strength of the intra-trade agreement within the region. Positive sign indicates intra-trade creation while negative sign indicates intra-trade diversion.
- 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 index values and 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(coefficient)-1 (Batra, 2004; Rahman *et al.* 2006). Moreover, the estimation of equation 3 with the data about all the importing countries enabled us to obtain the coefficients estimated to appreciate whether the regional integration had an impact on intra-regional trade.

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 trade blocs and other economic variables did not influence trade in livestock within the region)

(ii) **Alternative Hypothesis:** H_1: $\beta_1 = \beta_2 = \beta_n \neq 0$ (that trade blocs and other economic variables did significantly influence trade in livestock within 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.

Results and discussion

Intra-ECOWAS imports and exports of livestock products

Annual trade values of imports and exports for the paired countries on all the livestock products were computed as presented in Table 1. In the livestock exports, the results showed a fluctuated trend. Livestock products export trade values ranged from 6.18% in 2006 to 16.49% in 2009. This suggests an increase in supply of livestock products within the region for the period under review. On the import side, it was observe that the values range from 1.90% in 2002 to 15.10% in 2007. This also suggests increase in import of livestock products within the region.

Table 1: Percentage intra-ECOWAS livestock products import and export for the period 2001-2011

	Import	**Export**
Year	%Livestock	% Livestock
2001	5.11	6.60
2002	1.90	9.03
2003	7.97	7.03
2004	4.99	6.90
2005	6.78	7.24
2006	12.13	6.18
2007	15.10	8.95
2008	13.79	10.81
2009	11.53	16.49
2010	10.70	12.40
2011	9.99	8.44
Total	100	100

Source: Authors' computation using data extracted from ITC database (Trade map), 2012

Intra-regional imports of livestock products by countries

This sub-section presents the summary of imports and exports trade values of all livestock products for each country in the region for the period under review. The percentages of each country values for imports and exports were computed and the percentages presented in Table 2. Examining the livestock sector of agricultural products imports in the region, it could be seen that some countries imported far more than the others. This could be as a result of differences in resource endowment, gross domestic income, population or per capita income and social policy embarked upon by the Government of the country. The results in Table 2 indicate that Cote d'lvoire imported more than half (56.8%) of the total livestock products in the region. The percentages of other countries' imports of livestock products were 9.52%, 6.96%, 6.82%, 6.21% and 5.27% for Nigeria, Mali, Senegal, Togo and Benin, respectively. Other countries with a

proportion of less than 2% imports of livestock products included Cape Verde, Gambia, Guinea, Guinea Bissau, Liberia, Niger and Sierra Leone.

Considering the exports in livestock products within the region, Mali led, closely followed by Niger and Senegal with value percentages of 27.89%, 24.69% and 12.83% respectively. This could not be unconnected with the favourable abundant grazing resource endowment and available techniques in harnessing their animal products to compete with other countries within the region. Other countries with export values more than 5% of livestock products include Benin (9.89%), Cote d'lvoire (5.59%) and Ghana (5.22%). Generally, Sierra Leone, Liberia, Guinea Bissau, Gambia and Cape Verde had all their export value percentages for all commodities, all agricultural products and livestock products less than 1%.

Table 2: Percentage intra-ECOWAS livestock products import and export by countries for the period 2001-2011

	Import	**Export**
Country	% Livestock	% Livestock
Benin	5.27	9.89
B/Faso	2.97	3.11
C/Verde	0.11	0.01
Cote d' I	56.80	5.59
Gambia	0.29	0.50
Ghana	2.38	5.22
Guinea	0.11	2.79
G/Bissau	0.09	0.00
Liberia	0.38	0.08
Mali	6.96	27.89
Niger	1.56	24.69
Nigeria	9.52	2.78
Senegal	6.82	12.83
S/Leone	0.52	0.08
Togo	6.21	4.54

Source: Authors' computation using data extracted from ITC database (Trade map), 2012

Inter-regional livestock products imports and exports for the period 2001-2011

To assess the amount of all livestock products imported and exported into and out of the ECOWAS region, bilateral trade values were collected as classified by the United Nation Harmonized System. The values were summed and percentages computed for each year as presented in Table 3. It was observed that livestock import values ranged from 4.78% in 2001 to 16.21% in 2007. The trend shows a steady increase from 2001 until it reached a peak in 2007 with percentage value of 16.21% and then dropped to 9.37% in 2009. Importation of livestock products rose again in 2010 from 10.30% to 13.93% in 2011. This fluctuation could be as a result of changes in import policies embarked upon by some countries.

In assessing the livestock sector of agricultural products, it was shown in Table 3 that the highest amount of livestock products were exported in 2010 with the exports value percentage of 14.04% while the least exports recorded was 1.91% in 2002. The very low value of livestock products export suggests that the ECOWAS region did not produce enough animals and animal products or they simply could not compete with those of the other regions.

Table 3: percentage inter-regional livestock products ECOWAS' import and export for selected trade blocs for the period 2001-2011

	Import	**Export**
Year	%Livestock	% Livestock
2001	4.78	6.92
2002	4.97	1.91
2003	6.96	8.56
2004	6.04	11.93
2005	6.25	10.30
2006	10.80	7.72
2007	16.21	10.21
2008	10.41	8.03
2009	9.37	8.19
2010	10.30	14.04
2011	13.93	12.22
Total	100	100

Source: Authors' computation using data extracted from ITC database (Trade map), 2012

Inter-regional livestock products imports and exports based on trade blocs

In assessing the livestock products imports by ECOWAS, it was deduced from Table 4 that OECD led in supplies of the products with percentage values of 48.61%. This was followed by EU27 and APEC with corresponding trade percentage of 24.90 and 14.62, respectively.

In terms of ECOWAS' exports of all livestock products, OECD nations led in imports of ECOWAS products. Other regional blocs such as EAC, AC, CACM and SACU had percentage values of less than 1% for livestock products imported from ECOWAS region during the period under review. In comparing the imports and exports proportions of the livestock sector based on the trade blocs, the results were depicted in figure 1.

Table 4: Percentage inter-regional livestock productsECOWAS' import and export for selected trade blocs for the period 2001-2011

	Import	**Export**
Trade blocs	%Livestock	% livestock
SADC	1.72	0.18
EAC	0.02	0.14
OECD	48.61	47.82
NAFTA	3.48	1.83
MERCOSUR	4.81	0.07
AC	0.55	0.02
APEC	14.62	7.14
EU27	24.90	42.60
SACU	1.26	0.09
CACM	0.02	0.11
Total	100	100

Source: Authors' computation using data extracted from ITC database (Trade map), 2012

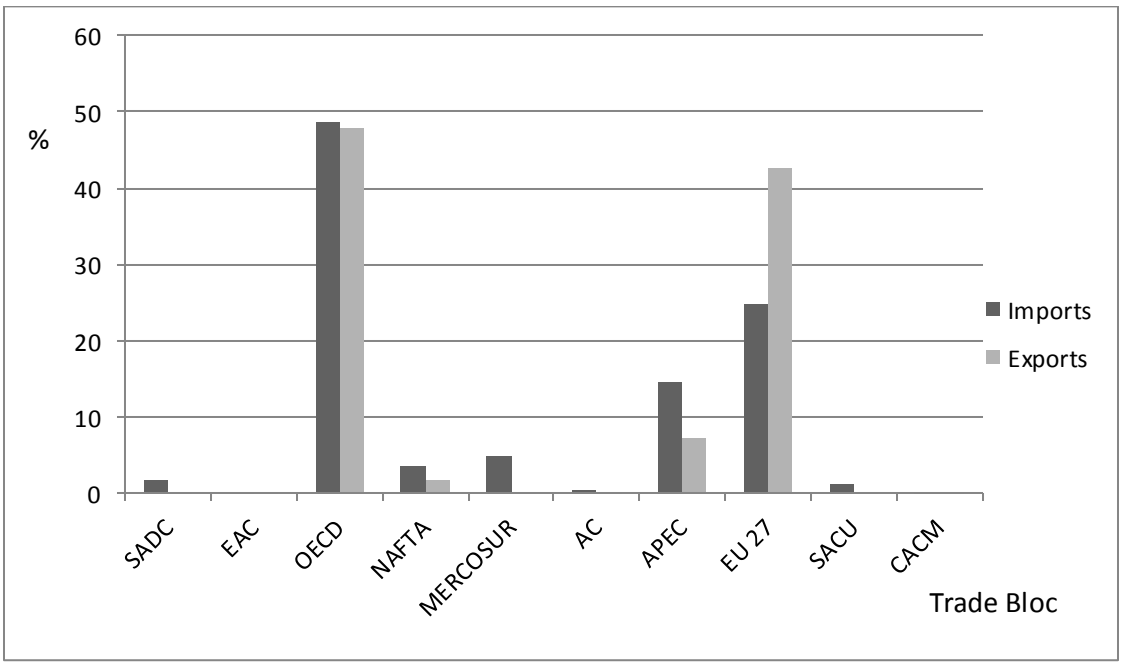

Figure 1: A Chart showing ECOWAS' livestock products import and export by trade blocs for the period 2001-2011 (Authors' design, 2012)

Trade intensity index of intra-ECOWAS livestock products imports and exports

The study examined how weak or strong the ties of trade were between paired countries of the ECOWAS region during the period under review. 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 is compared with the amount imported from other parts of the World. This regionalization in terms of trade either in imports or exports was measured using trade intensity index. The regionalization of the ECOWAS' paired-countries was examined for livestock products' imports and exports. The results of the trade intensity index analyses are presented in tables 5 and 6.

The results show that of all the countries paired in the region, 106 bilateral import trade intensity index values were less than I, representing 50.5% while 102 had trade intensity index values greater than I, representing 48.6% (Table 5). This implied that there was less regionalization among countries in import of livestock products in the region. The results in Table 5 depict strong ties between Benin and Cote d'lvoire, Ghana, Nigeria, Sierra Leone and of course, the strongest relationship being with Togo. Burkina Faso was regionalized with Benin, Cote d'lvoire, Mali, Niger, Senegal and Nigeria but more regionalized with Togo and Ghana having import trade intensity index values of 721.2 and 347.2 respectively. Other countries that were more regionalized among ECOWAS countries in imports of livestock products were Togo, Mali, Coted'lvoire, Ghana, Nigeria and Niger. They recorded strong relationships with more than two-third of their country-pairs. As observed in Table 5, Cote d'lvoire had strong ties with Ghana, Guinea Bissau and Senegal while Mali had tied relationship with Cote d'lvoire, Guinea, Ghana, Senegal, Togo, Guinea Bissau and Gambia. Countries that recorded weak relationship in terms of imports of livestock products within the region were Cape Verde, Liberia, Guinea and Benin Republic. They established strong relationship with less than half the number of the country-pairs.

In estimating trade index in terms of export value, the country-pairs results of intra-ECOWAS trade intensity index of livestock products are

presented in Table 6. On a general distribution, it was depicted that most country-pairs had trade intensity index greater than one. It was observed that out of 210 country-pairs, 121 country pairs representing 57.6% had trade intensity index values greater than one while only 85 (40.4%) of the country-pairs had trade intensity index values less than one. Two country pairs namely Liberia-Nigeria and Cote d'lvoire-Guinea Bissau had trade intensity index values of one (Table 16). This implies that the amount of livestock products exported to Nigeria and Guinea Bissau from Liberia and Cote d'lvoire, respectively, equalled the amount exported to these countries from the rest of the world. The regionalism in terms of livestock products was an indication of resource endowment which warranted more production of these products since most of the countries lie within the Guinea and Sahel savannah regions. On each country-pairs with the remaining ECOWAS countries, it was observed that apart from Cape Verde, Guinea Bissau, Liberia and Sierra Leone, all the other countries had strong relationship with more than half of their country-pairs in the region. Therefore, the intra-ECOWAS export trade of livestock products could be said to be highly regionalized within the period under review.

Table 5: Trade Intensity Index of Intra-ECOWAS Livestock 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		8.5	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	31.3	3.7	0.1	2.8	55.9
B/Faso	0.0		0.0	6.9	0.0	32.4	0.0	0.0	0.2	6.4	170.5	5.4	0.0	0.0	51.6
C/Verde	0.0	0.0		40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	2.9	0.0	0.0
Cote d I	5.8	128.8	0.0		3.2	6.1	5.4	0.0	26.3	180.9	28.9	0.1	4.1	7.9	28.6
Gambia	0.6	0.0	41.9	0.9		31.0	10.3	78.1	0.0	23.0	0.0	0.2	0.3	60.4	0.0
Ghana	6.3	347.2	0.0	224.3	2.8		18.9	0.0	2.2	135.7	44.2	4.4	273.3	2.0	344.4
Guinea	0.8	0.0	0.0	338.3	95.1	4.7		0.0	0.0	299.3	0.0	37.0	5.5	178.4	119.4
G/Bissau	0.0	0.0	0.0	52.2	100.2	93.8	22.8		0.0	31.4	0.0	2.0	24.2	0.0	491.7
Liberia	0.0	0.0	0.0	52.3	0.0	45.2	0.0	0.0		4.5	0.0	6.8	0.7	-	22.7
Mali	0.2	12.7	0.0	0.5	0.0	0.1	0.0	1.4	6.0		11.2	0.6	0.0	0.0	0.6
Niger	0.0	5.3	0.2	0.1	0.0	0.2	0.0	0.0	0.0	0.0		0.4	0.0	0.0	0.7
Nigeria	8.4	2.6	0.0	0.2	2.1	2.5	0.7	0.0	1.2	0.0	18.2		0.1	4.2	0.7
Senegal	0.9	21.7	1.3	35.8	9.0	0.0	0.1	113.7	4.5	78.5	3.5	0.2		2.5	16.4
S/Leone	47.2	0.0	0.0	2.5	81.9	15.7	0.0	0.0	-	0.0	0.0	1.5	18.2		0.0
Togo	351.3	721.2	0.0	0.6	6.7	9.9	6.4	0.0	12.6	37.3	145.6	21.4	0.0	6.4	
Average	30.1	89.1	3.1	53.9	21.5	17.3	4.6	13.8	3.8	56.9	32.4	6.1	23.5	18.9	80.9

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

Table 6: Trade Intensity Index of Intra-ECOWAS Livestock 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	3.14	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.o
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: Authors' Computation Using Data Extracted from ITC Database (Trade Map), 2012.

Effects of the two regional trade blocs (ECOWAS & WAEMU) in promoting trade in livestock sector in the sub-region

The gravity equation estimates of the regional characteristics and trade agreement on trade in livestock products are presented in Table 7. The model fitted the data well and explained about 73% of the variations in trade of livestock products with adjusted coefficient of determination of 60%. The F-value (16.93) was statistically significant at 1% level, suggesting how well the model explained the relationship between the dependent and independent variables.

The GDPs of both the importing and exporting countries were used as proxies for market size in both countries. The coefficients of the GDP in importing and exporting countries were high and statistically significant at 1% level, with the expected positive sign. The positive and statistically significant coefficients of the importing and exporting countries' GDP 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 implied that a percent increase in GDP of the importing and exporting countries increased imports and exports of livestock products by 0.98% and 0.69%, respectively.

The estimated coefficient (-0.7711) of the distance variable (D_{ij}), had a negative sign as expected and was significant at 1% level. The negative coefficient of this variable indicated that the distance between paired countries affected regional imports negatively. A percent difference in distance will reduce imports by 0.77%, holding other variables constant. Therefore distance significantly affects trade in livestock products in the region. The result was in conformity with findings of Grant and Lambert (2005) on regionalism in World agricultural trade, found distance to be negative and highly significant in influencing trade of bovine cattle and other livestock products.

Real exchange rate (TCR_{ij}) was added to gravity equation to estimate the effects of currencies exchange between the importing countries and exporting

countries. The coefficient estimated had the expected negative sign but statistically not significant.

The absolute values of the difference between per capita GDP (income) of importing and exporting countries ($LIND_{ij}$) was added to the gravity equation to test for Linder vs Heckscher-Ohlin theories. The coefficient of this variable as seen in Table 7 is negative but not statistically significant on trade in livestock products. This implies that the trade pattern follows that of Linder's theory of trade but had no influence in livestock trade.

The economy openness (OP_{it}) variable was observed to be an influential variable in explaining variations in imports of livestock products in the region. Though the coefficient (0.0004) was less but highly significant at 1% level.

The variable for foreign trade policy (FTP_i) was not significant. Also the variable for foreign Direct Investment (FDI_i) in importing country was not significant in explaining variations in import of livestock products in the region. On the other hand, the coefficient of Foreign Direct investment (FDI_j) in the exporting country was observed to be less (0.0002) even though significant at 5% level.

One of the geographical variables that explained variations in trade of livestock products was contiguity ($CONT_{ij}$) that is countries sharing common border. The coefficient for contiguity was high, positive as expected and statistically significant at 10% level. This result suggests that sharing common border enhanced trade of livestock products in the region. As shown in Table 7, holding other variables constant, sharing common border increased trade in livestock products by 1.26 (exp 0.8178) times than observed in countries that do not shared common border. Therefore, contiguity explained variations in trade of livestock products to a very high level in the region.

In terms of using common official language ($LANG_{ij}$), it was observed (Table 7) that the coefficient was positive as expected but not significant. Therefore, usage of common language does not explain any variations in trade of livestock products in the region.

The variable (E_{ij}) was added to assess whether an Island countries trade more than the landlocked countries. This was based on the principle that countries connected by a body of water can transport goods easily at cheaper rate than those without these means. The results in Table 7 indicated that countries that are non Island trade less by 1.06% than those that are Island in the region. Therefore, the variable E_{ij} is an explanatory variable in influencing level of livestock products trade in the region. The result agreed with the findings of Agbodji (2005) that an Island significantly explained variations in trade within the West African region.

The variable ECOWAS was added to test the effect of ECOWAS regional trade agreement in intra-ECOWAS trade on livestock products. The result indicated that this variable did impact significantly at 1% level on intra-ECOWAS trade. The negative sign indicated intra-trade diversion. On the other hand, the variable WAEMU was added to assess WAEMU regional trade agreement on WAEMU intra-trade within the sub-region. The result also indicated that this variable did impact significantly on intra-regional trade in livestock products and brought about trade creation in the sub-region

To test for the significance of the regional characteristics and trade agreements on trade in livestock products: Null Hypothesis**:** H_0: $ß_1 = ß_2 = ß_n = 0$ (that regional characteristics and trade agreement did not significantly affect trade in livestock products in the region); Alternative Hypothesis**:** H_1: $ß_1 = ß_2 = ß_n \neq 0$ (that regional characteristics and trade agreement did significantly affect trade in livestock products)**.** Since the F–test examines the overall contribution of all the independent variables in the model. The F-statistics of 16.93 was obtained at a very small probability value of 1% level (p = 0 .0001) which is less than 5%. This implies that the model with all the independent variables were adequate despite the fact that some variables were insignificant.

Decisions: Since the model is significant at 1%, it means that not all variable coefficients (ß's) are zero. Therefore, the null hypothesis is rejected; hence, regional characteristics and trade agreement did significantly affect the trade in livestock products in the sub-region.

Table 7: Gravity regression results of regional characteristics and trade agreement on trade in livestock products

Variable	Coefficient (ß)	Std error	t-value	exp (ß)-1
GDP_{it}	0.9806	0.1329	7.3755***	
GDP_{jt}	0.6877	0.1279	5.3768***	
D_{ij}	-0.7711	0.2616	-2.9474***	
TCR_{ijt}	-0.0641	0.0672	-0.9546	
$LIND_{ijt}$	0.0444	0.1469	0.3021	
OP_{it}	0.0004	6.21E-05	6.0170***	
FTP_{i}	-0.0351	0.0471	-0.7449	
FDI_{it}	8.42E-06	0.0001	0.0769	
FDI_{jt}	-0.0002	0.0001	-1.9819**	
$CONT_{ijt}$	0.8178	0.4942	1.6547*	1.2655
$LANG_{ij}$	0.1833	0.4047	0.4529	0.2012
E_{ij}	-1.0568	0.3638	-2.9046***	-0.6524
ECOWAS	-1.9547	0.7088	-2.7577***	-0.8584
WAEMU	0.8492	0.4857	1.7486*	1.3378
Constant	10.0243	2.9544	3.3929***	
R-squared	0.7326			
Adjusted R-squared	0.6012			
F-Statstic	16.9338***			
Number of observations	2453			
Relative bilateral trade	223			

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

Source: Authors' estimation using E-Views Version 7.1

Conclusion and Recommendations

Livestock trade in the region was observed to be on an increase. Exports within the region were seen to be less than imports during the period under review. Trade relationship was observed to be relatively high among countries within the region. The traditional gravity result was consistent with the gravity

theory and other economic and geographical characteristics impact significantly in livestock trade within the region.

The study therefore recommends that effort be made to remove non-tariff barriers such as high cost of transaction (proxied by distance) and enhancing good relationship among countries especially those that shared border with each other. Ensuring open economy policy and increase in foreign direct investment in exporting countries (producers) will promote trade in livestock sector in the region. Finally, since the economic size (proxied by GDP) explained reasonable variations in livestock trade in the region, effort should be made at all levels of government to improve the economy and welfare of citizens in the countries.

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