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Analysis of Bilateral Trade in UEMOA: The Implications of Trade Effects

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Abstract

This paper evaluates the implications of trade effects in bilateral trade analyses drawing evidence from UEMOA. Consequently, it provides three main innovations: (i) it augments the gravity model (GM hereafter) to include Kelejian *et al* (2012) type of trade effects among others; (ii) it employs a more generalized GM proposed by Salisu *et al*. (2012) that accounts for all possible dimensions of trade effects; and (iii) it examines the implications of ignoring these effects in bilateral trade models. Like the previous literature, it shows that economic size, geographical and political factors are the major drivers of bilateral trade in UEMOA. In addition, following from the augmented GM, it finds that UEMOA has been trade creating. Contrarily, the results of a more generalized GM reveal that UEMOA has been trade diverting. Based on the diagnostic tests, the latter evidence seems more reliable than the former. Therefore, ignoring these dimensions of trade effects in bilateral trade analysis when in fact they exist may yield biased and inconsistent results.

Key words: Trade, Gravity model, UEMOA, Trade creation, Panel data

JEL Classification: F15, F33, C23.

1.0 Introduction

There is no gain saying that regional trade agreements (RTAs) have become widespread in every part of the world especially after the lack of consensus from the Doha Round of the GATT/WTO agreement in the area of non-tariff barriers. Africa has not been spared of this proliferation as the continent now has over 30 RTAs, most of which are free trade agreements and economic integration agreements with each country belonging to at least one of such. The growth of these RTAs may be connected to the increasing evidence of successful regional trade around the world coupled with other associated benefits such as partial or full removal of tariff and non-tariff barriers between member states and the creation of a

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common external tariff, among others (Salisu *et al*., 2012). Most importantly, RTAs have been linked to resolving a specific developmental challenge of Africa which is conflict prevention and resolution. Therefore, the decision to form these RTAs is indeed a right one. In fact, there is a consensus that regional and sub-regional integration efforts offer a promising avenue for addressing the political, economic and social challenges facing African countries in this new age of globalization. In terms of trade, Longo and Sekkat (2004) opine that increased linkages among African countries, through an expansion of intra-regional trade, can be a crucial device for creating the necessary growth spillovers and fostering regional takeoff.

In West Africa, the drive to achieve a successful regional integration has led to the formation of some RTAs. Prominent among these RTAs are the Economic Community for West African States (ECOWAS) which was created in 1975 and currently has 15 West African countries as members and the West African Monetary and Economic Union (WAMEU) also referred to as *Union économique et monétaire ouest-africaine* (UEMOA) in French which was set up in 1994 as a replacement for the West African Economic Community (CEAO) which had hitherto been established in 1972. Currently, UEMOA is made up of eight francophone West African countries. The third and much younger RTA is the West African Monetary Zone (WAMZ) which was set up in 2000 and is an anglophone dominated proposed monetary union with six countries in the region as members.

Of these RTAs, UEMOA appears to be the more coordinated and effective in terms of internal integration and external representation owing to the colonial ties and monetary integration between member countries. For instance, the RTA has maintained a lower level of inflation and a better fiscal discipline (as indicated by its Budget deficit to GDP ratio) relative to WAMZ and ECOWAS as a whole. The inflation rate stood at 3.30 percent in 2011 compared to 12.40 percent and 10.30 percent in WAMZ and ECOWAS respectively while the budget deficit to GDP ratio was 3.20 percent in the same period compared to 3.60 percent and 3.70 percent in ECOWAS and WAMZ respectively.[2] The need to further drive home the macroeconomic performance of UEMOA necessarily requires an empirical investigation into the success of the RTA in terms of intra-and inter-regional trade relations.

Indeed, a region benefits from the establishment of RTAs if it results into a significant increase in intra-regional trade without making the rest of the world worse off, in which case there is trade creation. On the other hand, if members of a RTA divert trade from more efficient trading partners to less efficient countries because the latter is a member of the same RTA, such members will be worse off. Therefore, RTAs will generate overall welfare gains when the trade creation effects of such agreements dominate the trade diversion effect. However, debates around this issue remain inconclusive as some authors believe trade creation effects often dominate the trade diversion effects (see Viner, 1950; Jugarnath *et al*., 2007; Magee 2008) while others believe RTAs do not only reduce welfare but also undermine multilateral trade system and slow global trade liberalization (See Krugman, 1989; Jugarnath *et al*, 2007; Jayathilaka and Keembiyahetti, 2009).

Despite the importance of understanding the effects of RTAs, it may not be possible to do so in advance. Hence, a number of studies have examined the impact of RTAs for the various existing economic and

[2] Data were obtained from the West African Monetary Agency's website.

currency unions in both developed and developing countries. Prominent among these studies include (in the last one decade) but not limited to, Anderson and van Wincoop (2003), Baltagi *et al.* (2003), Baier and Bergstrand (2004, 2007, 2009), Feenstra (2004), Longo and Sekkat (2004), Carrrere (2006), Jugurnath *et al.* (2007), Abbott *et al.* (2008), Egger *et al.* (2008), Lee *et al*. (2009), Martínez-Zarzoso *et al.* (2009), Vicard (2011) and Athukorala (2012). These studies focus on modeling the impact of RTAs on trade with the use of the GM. The reason for the extensive usage and adoption of the GM in international trade research in the last few decades cannot be isolated from the robustness of the model in dealing with bilateral trade relations. Recently, myriad studies have adopted this methodology as readily evident in the work of Kepaptsoglou *et al*. (2010) that reviewed over 75 papers on the GM in the last decade (i.e. from year 2000 to 2010) alone.

Different modifications have been made to correct for misspecification and omission bias in the GM. For example, cross sectional formulations without the inclusion of country specific effects have been noted to be a misspecification that introduces a bias in the assessment of the effect of RTAs on bilateral trade (see Carrere, 2006; Baier and Bergstrand, 2002; 2007). For panel specification however, Soloaga and Winters (2001), Anderson and van Wincoop (2003) and Feenstra (2004) suggest accounting for country-specific effects while Longo and Sekkat (2004), Baier and Bergstrand (2007), Jugurnath *et al.* (2007), Magee (2008), and Athukorala (2012) argue for the inclusion of both the time-invariant and country-invariant effects. Carrere (2006) and Vicard (2011) suggest the inclusion of both country-and time-effects and county-pair heterogeneity; Baltagi *et al*. (2003), in addition to all the mentioned effects, suggest the consideration of an interaction effect. In short, these aforementioned studies emphasize the importance of controlling for these effects in order to prevent bias that may result from ignoring them.

In line with the foregoing, Salisu *et al*. (2012) developed a broader generalized framework in an attempt to examine the trade effects of RTAs in a spatial framework. The study is an improvement on Baltagi *et al.* (2003) as it accounts for the Kelejian *et al*. (2012) type of trade creation and trade diversion effects, a specification which is more compact and insightful.

To the best of our knowledge, only a few studies have conducted extensive studies on UEMOA, some of them include Salisu *et al*. (2012) and Agbodji (2008). While the former examined the determinants of intra-UEMOA trade, the latter investigates the trade creation or trade diversion effects of UEMOA in relation to the rest of the world. Although we find these studies insightful, they are not all encompassing as some salient research gaps are yet to be filled especially with regards to trade effects. Therefore, the present study contributes to the existing literature in three ways. First, it analyses the bilateral trade effect of UEMOA using an augmented GM of the Kelejian *et al*. (2012) type of trade creation and trade diversion effect. Second, it employs the more generalized GM proposed by Salisu *et al*. (2012) that accounts for all possible dimensions of the panel. Lastly, it examines the implication of ignoring these effects on the outcome of bilateral trade analysis in UEMOA.

Summarily, like the previous literature, our results show that economic size, geographical and political factors are the major drivers of bilateral trade in UEMOA. In addition, our results reveal that ignoring interaction effects in the analysis of bilateral trade, when in fact they exist, may yield biased and inconsistent estimates.

Following this introductory section, we present some stylized fact about UEMOA's trade in section 2. Section 3 specifies the models estimated while the estimation technique and results are presented in section 4. Section 5 concludes with policy recommendations.

2.0 Stylized Facts about UEMOA's Trade

In this section, we examine the pattern of intra-UEMOA trade from 1995 (i.e. a year after the formation of UEMOA) to 2010 in order to understand the intensity of trade linkages among members of the RTA. Other stylized facts about UEMOA trade between the period 1995 and 2010 are extensively drawn from Salisu *et al*. (2012).[3]

2.1 Intra-UEMOA Trade

Intra-regional trade share among the countries in the region has been unequal and lop-sided. As depicted in Table 1, in total, Cote-d'Ivoire accounted for the largest share of trade flows with about 23.7 percent. In addition, it also recorded the highest share of export for the period under study, though it has the least share of total imports in the region. This perhaps, is an indication Cote-d'Ivoire is the major intra-regional exporter in the UEMOA region and is relatively independent of other member countries in the region in terms of import.

Conversely, although Mali had an equivalent share of total trade in the region as Cote-d'Ivoire contributing about 23.2 percent of total trade, a similar story cannot be told about its share of total export as it recorded a relatively low share in the period under study. To validate its huge share of total trade, it is imperative to note that Mali had the largest share of imports from other countries in the region. Niger and Togo contributed the least to the total trade in the region with about 7.6 and 4.5 percent respectively. Particularly, Niger has not been able to contribute up to 10 percent to both export and import at any time in the region. This is probably a pointer to the low level of productivity and resource endowment of the country relative to other members.

On a general note, studies have found that the level of intra-regional trade in UEMOA is low and suffers from various bottlenecks (see Agbodji, 2008; Coulibaly, 2009 and Salisu *et al*., 2012).

Table 1: UEMOA's Intra-regional trade shares (in %) 1995-2010

Country	Period	BEN	BFA	CIV	MLI	NER	SEN	TGO

[3] In Salisu *et al*. (2012), effort was made to examine the pattern of trade of UEMOA across different products (i.e. primary commodities, all food items and manufactured good) for different economic groupings (i.e. the major RTAs in the world; developed and developing countries; and different sub-regions in Africa)

	1995-2000	2.48	4.29	56.92	14.74	4.37	12.58	4.62
	2001-2005	7.38	6.94	47.92	4.47	1.15	17.76	14.40
Export share	2006-2010	12.50	4.07	43.50	5.36	0.76	22.69	11.13
	1995-2000	8.87	22.87	3.64	37.19	8.58	9.32	9.52
	2001-2005	8.78	27.27	3.08	34.90	8.89	8.86	8.23
Import Share	2006-2010	11.30	24.28	3.01	41.81	8.33	7.36	3.90

Source: Computed by the authors from the UNCTAD Trade Statistics, 2011.
Note: The ISO Codes have been used to name countries above. Therefore, BEN – Benin, BFA – Burkina Faso, CIV – Cote D'Ivoire, MLI – Mali, NER – Niger, SEN – Senegal, TGO – Togo.

2.2 Other stylized facts about UEMOA's trade

Trade in Manufactured goods (1995 to 2010)

Members of UEMOA imported more manufactured goods from developed countries of the world which accounted for 62 percent of the region's total imports while its exports of manufactured goods were dominated by developing countries. This trend is not surprising considering the low level of competitiveness of the region's few manufactured goods which can only compete favourably with products from developing countries. As depicted in Table A1 in the appendix, a similar pattern is noticed in terms of UEMOA's trade with the major RTAs around the world. The table shows that while 39 percent of UEMOA's manufactured exports went to ECOWAS, about 40% of its imports were from the European Union (EU).

Trade in Primary Commodities (1995 to 2010)

The analysis of the region's (UEMOA) trade with the rest of the world (both developing and developed) is not far from expectations as it exported a larger proportion of its primary commodities to the developed world, accounting for almost 54 percent. However, the reverse holds for the proportion of imports of primary commodities into the region with about 65 percent of its imports coming from the developing countries of the world. Of course, this is expected since the developed countries are the industrialized ones who get raw materials from the developing ones (of which UEMOA is inclusive) and the developing countries often import majorly raw materials from one another. As shown in Table A2 in the appendix, trends in trade relations with economic regions do not seem to deviate significantly from the aforementioned as unions from either developed or emerging regions of the world dominated UEMOA's total export while she imports substantially from unions from developing regions of the world. These opinions do not discount the possibility that other factors in theory like distance, economic considerations, political and colonial ties may give explanations to the observed trends.

UEMOA's share in Total Trade across the major RTAs

UEMOAs share in total trade across all the RTAs is largely insignificant although ECOWAS stands as an exemption. Specifically, Table A3 in the appendix shows that UEMOA got only 5 percent of the total trade of ECOWAS with a similar proportion in both import and export. This perhaps implies that UEMOA is a small economic union relative to other major ones around the world and that there is still ample

opportunity for it to increase trade within (i.e. intra-regional trade) and outside the region (i.e. inter-regional trade).

3.0 Model Specification

3.1 The Model

Although it has its origins in physics and precisely in the postulates of Sir Isaac Newton's *"Law of Universal Gravitation",* the GM has no doubt earned itself a near universal acceptance as it has been applied to a range of academic disciplines (including geography and sociology). In international economics, the GM has become the main tool for estimating the determinants, patterns and effects of bilateral trade since it was first adopted by Nobel Laureate Timbergen (1962) and later by Linnerman (1966). Particularly, the model has gained popularity with analyzing the effects of RTAs on trade and welfare in different geographical and economic regions of the world. In this respect, a GM involves regressing bilateral trade on a series of explanatory variables, then using dummy variables to ascertain whether this relationship is affected by the existence of RTAs (Jugurnath *et al*., 2007). These explanatory variables include the traditional variables of the model namely economic sizes (usually proxied with GDP) and transaction cost (usually represented with the distance between trading partners) and other variables that have been incorporated into the model overtime. According to Head (2003), the model in its conventional form can be expressed as;

$$F_{ijt} = R_{ijt} \frac{M_i M_j}{D_{ij}} \dots\dots\dots (1)$$

Given the multiplicative form of equation(1) , the model can be re-specified in a log-linear form after taking the natural logs as;

$$ln\, F_{ijt} = \beta_1\, ln\, M_{it} + \beta_2\, ln\, M_{jt} + \beta_3\, ln\, D_{ij} + \beta_4\, ln\, R_{ijt} + \varepsilon_{ijt} \dots\dots\dots (2)$$

Where F_{ijt} is bilateral trade between countries *i* and *j* and M_i and M_j are the GDPs or economic size equivalent of countries *i* and *j* respectively. D_{ij} represents bilateral distance between the two countries while R_{ij} denotes remoteness of the trading partners from the rest of the world. Other variables have been incorporated in different studies to augment the afore-said variables though most of them lack theoretical justification as noted by Anderson and Van Wincoop (2003).Given the strong empirical prowess and theoretical acceptance of the GM for the analysis of bilateral trade flows, this study adopts the model with plausible modifications.

3.2 Model 1

In line with the objectives of this study, we specify and estimate a modified GM hereafter. This modified GM is in line with the suggestion by Wooldridge (2002) that panel data with country pair and country specific effects properly estimates the effects of RTAs on trade. Hence, we inculcate these effects in the model. The model is estimated with a view to examining the determinants of UEMOA members' bilateral trade with other countries in the ECOWAS region and to investigate the trade creation and trade diversion effects associated with UEMOA in the ECOWAS region.

In the literature, several additional variables have been included in the GM equation to control for differences in geographic factors, historical ties and policy framework. In particular, some of such include common border, common language, a measure of whether the trading countries are landlocked or coastal in nature, total land area of trading partners, level of infrastructural development, political stability and economic policy to mention but a few (see for recent examples, Ghosh and Yamarik 2004; Longo and Sekkat 2004; Carrere, 2006; Baier and Bergstrand 2007; Jugurnath *et al.* 2007; Agbodji 2008; Magee 2008 and Martínez-Zarzoso *et al.* 2009 and Vicard 2011) Thus, our modified GM is specified as;

$$\begin{aligned}\ln EXPORT_{ijt} = {} & \alpha_0 + \alpha_1 ln\, GDP_{it} + \alpha_2 ln\, GDP_{jt} + \alpha_3 ln\, D_{ijt} + \alpha_4\, BORDER_{ijt} + \alpha_5\, LANGUAGE_{ijt} \\ & + \alpha_6 LANDLOCKED_{it} + \alpha_7 LANDLOCKED_{jt} + \alpha_8 ln\, AREA_{it} + \alpha_9 lnAREA_{jt} \\ & + \alpha_{10} ln\, INFRA_{it} + \alpha_{11}\, lnINFRA_{jt} + \alpha_{12}\, lnECOPOL_{it} + \alpha_{13} ln\, ECOPOL_{jt} \\ & + \alpha_{14}\, POLSTAB_{it} + \alpha_{15}\, POLSTAB_{jt} + \alpha_{16} UEMOA_{(1,1)} + \alpha_{17} UEMOA_{(1,2)} \\ & + V_{ijt} \dots\dots\dots (3)\end{aligned}$$

$BORDER_{ij} = 1$ if countries i and j share a common border and 0 (zero) otherwise. $LANDLOCKED_{i(j)} = 1$ if country i (j) is landlocked and 0 (zero) otherwise. $LANGUAGE_{ij} = 1$ if both countries share a common language and 0 (zero) otherwise.

The infrastructure variable is computed as an average of road length per capita and number of telephones per capita while the political stability index is obtained from World Governance Indicators. The economic policy variable used is the flow of FDI into the country as this is believed to reflect, to a large extent, the level of confidence of rational investors on the economy.

It is expected that the economic size of trading partners is positively related to trade between them so that α_1 and α_2 are expected to be positive. The distance variable is a proxy for transportation cost and therefore higher distance is expected to mean an increase in transportation cost and consequently a reduction in bilateral trade (so $\alpha_3 < 0$). Countries with a common border and language are expected to trade more with one another based on this level of affinity, so we expect that $\alpha_4, \alpha_5 > 0$. Countries that are landlocked find it more laborious and expensive to trade majorly because of their lack of accessibility to markets, so α_6 is expected to be negative. Availability of infrastructure and a stable economic policy are expected to promote trade and hence α_9, α_{10}, α_{11} and α_{12} are anticipated to be positive. Political stability is expected to foster trade so that we expect α_{13} and α_{14} to be positive. The sign of the coefficient of area is indeterminate as revealed by Jugurnath *et al.*, (2007).

$UEMOA_{(1,1)} = 1$ if both exporting and importing countries are members of UEMOA and 0 otherwise while $UEMOA_{(1,2)} = 1$ if the exporting country belongs to UEMOA while the partner country does not at time t and 0 otherwise. Our GM affords us the opportunity to ascertain whether or not trade has exceeded the normal level as a result of the formation of a RTA. In line with this, Martinez-Zarzoso *et al.* (2009) posit that the GM represents a good counterfactual to identify the effects of an RTA, since it suggests a "normal" level of bilateral trade for a given sample and dummies are used to capture "above or below normal" levels of trade resulting from an RTA. In the case of equation 1 above, $UEMOA_{(1,1)}$ captures how intra-UEMOA export has changed (i.e. how far is it above or below the normal level?) as a

result of its formation. Therefore, positive coefficient of $UEMOA_{(1,1)}$ (i.e. $\alpha_{16} > 0$) implies that intra-UEMOA export has increased while a negative coefficient implies a decrease.

Similarly, $UEMOA_{(1,2)}$ measures how members of UEMOA's export to non-members have changed overtime. It takes the value of 1 if the exporting country belongs to UEMOA while the partner country does not at time t and 0 otherwise. Therefore, for UEMOA to be deemed trade creating in terms of export, α_{16} and α_{17} will be positive. Otherwise, it implies that export to non-members of UEMOA has reduced as a result of its formation. It is very instructive to note that the analysis of trade effect of RTAs is done under the assumption that members of such RTAs were rational enough to trade with only the most cost efficient partners before the formation of the RTA. This forms the basis for the interpretation of the coefficients above.

Data used for the empirical analyses were obtained from the following sources:

(1) Bilateral Export trade data were obtained from UNCTADSTAT (2011).[4]
(2) GDP, Infrastructure and Economic Policy and Total land area were obtained from World Development Indicators, 2011.
(3) CEPII Distance Database was the source of bilateral distances, Common (official) language and Border.[5]
(4) Data covering Political Stability/ No Violence Index was collected from World Governance Indicators, 2011.

3.3 Model 2

In line with our objective, we adopt the more generalized framework developed by Salisu *et al*. (2012) to examine the trade effect of UEMOA. Empirically, this specification allows us to control for all possible dimensions of the panel, namely main and interaction effects as shown below. According to Baltagi *et al*. (2003), one interesting advantage of controlling for all the dimensions of the panel is that it follows an eclectic approach which captures the different theories of trade. The Linder's hypothesis, which states that trade volumes are smaller, the more dissimilar two countries are in terms of relative factor, may be accounted for with country pair effects. Similarly, the classical Heckscher, Ohlin and Samuelson (H-O-S) trade theory, which assumes that the pattern of bilateral trade is determined by differences in relative factor endowment, can be captured with country i and j specific effects as well as country pair effects. Also, the New Trade Theory (NTT) which deals with economies of scale combined with product differentiation and transportation costs in relation to trade are usually captured with market size (GDP), distance as a proxy for trade cost and some country pair characteristics. Therefore, we expect the results of the traditional GM for UEMOA to be substantially affected when we account for both the main and interaction effects as well as the spatial effects. Therefore, our model 2 can be specified as;

[4] Find data at: http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx.
[5] Find data at: http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

$$ln\,EXPORT_{ijt} = \alpha_0 + \alpha_1 ln\,GDP_{it} + \alpha_2 ln\,(GDP_{jt}/D_{ij}) + \alpha_3 lrer_{ijt} + \alpha_4 UEMOA_{(1,1)} + \alpha_5 UEMOA_{(1,2)} + \alpha_6 UEMOA_{(2,1)} + \mu_i + \gamma_j + \lambda_t + (\mu\gamma)_{ij} + (\mu\lambda)_{it} + (\gamma\lambda)_{jt} + \varepsilon_{ijt} \ldots\ldots\ldots (4)$$

Anderson and Van Wincoop (2003) noted that most variables included in recent GM studies lack theoretical justification. Hence, in equation 4, only the theoretically justifiable variables are included. $ln\,EXPORT_{ijt}$ is the log of real bilateral export between countries i (exporter) and j (importer); $ln\,GDP_{it}$ is the log of real GDP of country i and $ln\,(GDP_{jt}/D_{ijt})$ is the log of distance-weighted real GDP of country j. These two income variables are usually used to measure the market size of the trading partners. $lrer_{ijt}$ is the bilateral exchange rate between countries i and j. The definitions of UEMOA variables remain the same as in equation 3. The effects have been grouped into main effects and interaction effects. The main effects are denoted by μ_i, γ_j and λ_t and are used to account for fixed exporter, importer and time effects respectively. $(\mu\gamma)_{ij}$ is a country-pair effect, i.e., an interaction effect between unobserved exporter and importer characteristics. The other two interaction effects represent exporter specific time-variant effects like the exporter country's business cycle, its cultural, political, or institutional characteristics$(\mu\lambda)_{it}$, while the other $(\gamma\lambda)_{jt}$ accounts for these influences from the importer's perspective.

4.0 Regression Results

We employ the Least Square Dummy Variable (LSDV) approach of fixed effects which allows for the inclusion of both the main and interaction effects in the analysis. Studies have argued that the omission of these effects in a trade model will not only bias our results but also affect inferences derivable from such estimations (see Wooldridge, 2002; Baltagi *et al*., 2003; Longo and Sekkat, 2004; Carrere, 2006; Jugurnath *et al*., 2007 and Magee, 2008). Data used cover the period 1995 to 2010 for 11 out of the 15 ECOWAS with UEMOA countries serving as the source or exporting country in the analysis.[6]

4.1 Model 1 - Results

In terms of its goodness of fit, the estimated equation 1 has a high explanatory power as the GM traditional variables and other empirically validated determinants of bilateral trade explain about 64 percent of the total variation in bilateral export. It is not surprising therefore that most of the coefficients for the estimated equation performed quite well particularly in terms of significance and meeting *a priori* expectations. The traditional determinants are particularly significant and correctly signed with the elasticity of income and distance of about 0.8 and -1.6 respectively. In other words, as in virtually all GMs, economic size and distance play an important role in bilateral trade between UEMOA countries and other countries in the ECOWAS region.

Other significant determinants of trade between UEMOA members and other countries in the region include the sharing of a common border, sharing of a common language, landlockedness of trading partners, landmass or area, economic policy and expectedly the level of political stability in the source or exporting country. Precisely, our results reveal that while sharing of a common language, a common border and having a large landmass promote trade between UEMOA members and non-members, trade with landlocked countries is relatively lower than coastal countries in the ECOWAS region. In short,

[6] The countries used are Benin, Burkina Faso, Cote-d'Ivoire, Mali, Niger, Senegal, Togo, Gambia, Ghana, Ginuea and Nigeria. Other countries in the ECOWAS region (i.e. Sierra Leone, Liberia, Guinea Bissau and Cape Verde) were excluded because of lack of sufficient data as some of them faced problems of social unrest for a long period. However, we are confident that their exclusion will not significantly affect the estimation results as these countries have relatively small contributions to the region.

these variables meet *a priori* expectations and conform with results of other empirical studies done on RTAs in Africa (see Cassim, 2001; Longo and Sekkat, 2004; Musila, 2005; Agboji, 2008; Salisu *et al*., 2012 for example)

One important question this paper seeks to answer is whether or not UEMOA has been trade creating or trade diverting as an RTA in the ECOWAS region. The result of this analysis is as shown in the second column of Table 2. In terms of bilateral export, we find that the coefficients of both intra-UEMOA export and UEMOA members' export to non-UEMOA countries are positive and significant. On one hand, a positive intra-UEMOA export coefficient implies that export between members of UEMOA has increased significantly than its normal level as a result of their belonging to the RTA. On the other hand, our results reveal that, despite the increase in intra-UEMOA export, UEMOA members' export to non-members has increased significantly over the period of this study. Thus, it is tempting to conclude that UEMOA has been export creating.

4.2 Model 2 – Results

Table 3 reports our fixed effects regression results, where we carefully account for the various effects in a systematic manner. Essentially, we present the results of nine different fixed effects models. With the exception of model 2a, these models include the main exporter, importer and time effects, but differ in terms of the inclusion of interaction terms. Model 2a is the baseline model which does not include both the main and interaction effects. The full model, which includes all the effects (both the main and interaction effects) is described with model 2c. All other models (i.e. models 2a-2b and 2d-2i) are restrictions thereof. Specifically, models 2c-2e restrict only one interaction effect to be zero, while models 2f-2i restrict two of the interaction effects to be zero. Model 2b restricts all the three interaction terms to be Zero while model 2a (as earlier emphasized) restricts all the effects to be zero. Evidently, model 2g is the frequently used specification with country-pair fixed effects as in Cheng and Wall (1999), Glick and Rose (2002) and Egger and Pfaffermayr (2005), whereas model 2b accounts for only the main effects, as suggested by Matyas (1997).

Our findings show that accounting for both the main and interaction effects is significant for bilateral trade relations. Based on the various diagnostics such as F-test, Adjusted R-Squared, Root Mean Square Error (RMSE) and the Likelihood Ratio (LR) tests used in this paper to test for the restrictions, we find that both the main effects and the interaction effects must be accounted for in the study of UEMOA bilateral trade relations. For example, the F-test shows that the all encompassing model (i.e. model 2c) is the most preferred model and this complemented with the highest adjusted R-Squared and the lowest RMSE. In addition, we test for any probable significant difference between the baseline model and each of the variants accounting for differing effects. We also find that the baseline is statistically different from all these variants. Thus, ignoring these effects in the analysis of UEMOA trade will lead to serious standard error biases and inefficient results.

In sum, in addition to country specific factors such as factor endowments and country pair factors like distance, common borders and common language, time-variant exporter and importer specific effects like economic, institutional and political dynamics also matter. In the same fashion, as long as one is interested in the included core determinants of bilateral trade volumes, one should account for these

unobserved factors of influence by including the respective interaction effects. Second, all estimated models reveal a significant positive impact of the gravity variables on UEMOA bilateral trade. In terms of trade creation and trade diversion effects, all the models tend to suggest conflicting results. Nonetheless, the preferred model (i.e. model 2c) indicates that UEMOA has not been trade creating. These conflicting results with the previous studies and particularly the result of equation 3 may be attributed to the omission bias in the latter occasioned by non-inclusion of significant effects in their trade regressions.

5.0 Policy Implication and Conclusion

In a panel of bilateral trade between 11 ECOWAS countries over the period 1995 to 2010, our results reveal that economic size, geographical and political factors are the major drivers of bilateral trade between UEMOA members and other countries in the ECOWAS region. More importantly, our results show that a generalized model which includes all the possible dimension of trade effects (both the main and interaction effects) is more appropriate for the analysis of bilateral trade in UEMOA. Therefore, ignoring any of these effects gives misleading inferences as suggested by the results of the analysis carried out.

In terms of policy implications, we recommend that concerted efforts should be geared at increasing the productive capacity and value addition in countries in the ECOWAS region. This will not only promote trade and output but result into more employment opportunities, increased revenue and attract the much needed capital inflow into the region. Also, despite the fact that infrastructure is inevitable for growth in intra-regional trade; it is currently insufficient and dilapidating in nature in ECOWAS as a whole. This calls for adequate attention. Giving the importance of political stability to trade, we recommend that all stakeholders should strive for the prevention and prompt resolution of conflict and political instability in the region. Finally, analysis of bilateral trade in UEMOA should always take cognizance of all the dimensions of the panel, especially since countries in the region differ or change over time and space.

Table 2: Regression Results for Equation (3)

Explanatory Variables	**Without RTA dummies**	**With RTA dummies**
GDP Source	0.80***	0.92***
	(7.61)	*(12.29)*
GDP Partner	0.50***	0.50***
	(4.82)	*(6.71)*
Common Language	1.22***	-0.26
	(3.67)	*(-0.62)*
Bilateral Distance	-1.58***	-1.22***
	(-5.13)	*(-4.37)*
Common Border	1.05**	1.00**
	(*2.30)*	*(2.50)*
Land Area Source	0.69***	
	(3.68)	
Land Area Partner	0.48**	
	(2.54)	
Landlocked Source	-2.30***	
	(-4.90)	
Landlocked Partner	-0.85*	
	(-1.80)	
Economic Policy Source	0.10***	0.09***
	(3.65)	*(3.16)*
Economic Policy Partner	0.03	0.01
	(1.23)	*(0.38)*
Political Stability Source	0.18***	0.09
	(2.73)	*(1.29)*
Political Stability Partner	0.11	0.08
	(1.59)	*(1.22)*
Infrastructure Source	-0.11	0.04
	(-0.66)	*(0.36)*
Infrastructure Partner	0.07	-0.08
	(0.69)	*(-0.69)*
UEMOA Dummy (1,1)	-	2.43***
		(4.49)
UEMOA Dummy (1,2)	-	1.06**
		(2.07)
R^2	0.60	0.67
No. of observations	1760	1760

Source: Authors' Computation.

Note: 1. The z-statistics for the coefficients are in italics and bracket below them. *, **, *** represent 10%, 5% and 1% levels of statistical significance respectively.

2. Equation 3 was estimated in two variants to escape the problem of perfect multi-collinearity.

Table 3: Regression Results for Equation 2

Explanatory Variables	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f	Model 2g	Model 2h	Model 2i
ln GDP $_{it}$	1.804***	1.077*	0.724***	0.836***	1.012***	1.501***	0.988***	1.041*	1.509***
	-46.02	*1.95*	*5.41*	*5.4*	*2.75*	*9.91*	*2.69*	*1.83*	*10.28*
ln (GDP $_{jt}$***/D*** $_{ijt}$***)***	1.206***	1.622***	1.494***	1.142***	1.584***	1.627***	1.196***	1.625***	1.622***
	34.84	*27.27*	*6.94*	*3.24*	*7.29*	*26.19*	*3.26*	*26.5*	*26.99*
lrer $_{ijt}$	-0.093	-0.003	0.196	0.195**	0.03	-0.007	0.066	-0.007	-0.001
	-6.03	*-0.12*	*1.6*	*2.6*	*0.45*	*-0.25*	*1.24*	*-0.29*	*-0.03*
waemu (11)	3.218***	5.468***	-0.145	-0.095	3.355***	2.661	4.114**	5.388***	2.91*
	20.7	*2.97*	*-0.11*	*-0.08*	*2.82*	*1.41*	*2.4*	*2.76*	*1.65*
waemu (12)	1.557***	2.268**	-1.513	0.329	0.353	0.059	2.315	2.338**	0.057
	9.41	*2.35*	*-1.91*	*0.18*	*0.42*	*0.09*	*1.08*	*2.35*	*0.09*
waemu (21)	-0.106	1.499	1.863*	1.983*	2.177**	0.891	2.198**	1.338	1.155
	-0.63	*0.96*	*1.68*	*1.87*	*1.97*	*0.5*	*2.08*	*0.8*	*0.7*
Main Effects									
Exporter	-	55.86***	25.02***	25.06***	21.82***	3.26***	24.02***	52.6***	3.69***
F(11, residual df)									
Importer	-	24.32***	10.87***	18.39***	6.34***	3.35***	15.15***	3.51***	23.65***
F(10, residual df)									
Time	-	1.89**	3.90***	6.18***	0.9	0.99	4.48***	0.38	1.77**
F(15, residual df)									
Interaction Effects									
Exporter-by-importer	-	-	29.38***	28.48***	26.51***	-	26.13***		-
F(100, residual df)									
Exporter-by-time	-	-	2.05***	1.95***	-	0.75	-		0.76
F(150, residual df)									
Importer-by-time	-	-	1.22**	-	1.04	0.45	-	0.43	-
F(150, residual df)									
Observations	1760	1760	1760	1760	1760	1760	1760	1760	1760
Model degrees of freedom	6	40	426	277	277	339	128	190	189
Residual degrees of freedom	1753	1719	1333	1482	1482	1420	1631	1569	1570
Adj. R-Squared	0.673	0.782	0.915	0.913	0.905	0.765	0.905	0.771	0.778
RMSE	1.889	1.54	0.963	0.974	1.013	1.599	1.015	1.58	1.557
LR-test (baseline in Model 1)		751.04***	2851.82***	2627.17***	2485.98***	955.22***	2310.33***	822.7***	872.83***
Chi-Square degree of freedom		34	420	271	271	333	122	184	183
Rank	9	5	1	2	3	8	3	7	6

Source: Authors' Computation.

Note: The z-statistics for the coefficients are in italics and bracket below them. *, **, *** represent 10%, 5% and 1% levels of statistical significance respectively.

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APPENDIX

Appendix A1: UEMOA's Trade on Manufactured Goods with the Rest of the World (USD'M) 1995-2010

REGIONS	EXPORTS		IMPORT		AGGREGATE TOTAL	
	TOTAL	%	TOTAL	%	TOTAL	%
Developed	11321.89	34.03	65876.09	62.38	77232.02	55.57
Developing	21944.14	65.97	39731.03	37.62	61741.13	44.43
GRAND TOTAL	33266.03	100	105607.1	100	138973.20	100
ECONOMIC UNIONS						
APEC	1597.24	4.06	28958.41	21.02	1.16	4.06
APTA	2524.69	6.43	16232.50	11.78	1.83	6.43
ASEAN	220.21	0.56	3316.34	2.41	0.16	0.56
CEMAC	1472.54	3.75	164.45	0.12	1.07	3.75
COMESA	334.09	0.85	470.98	0.34	0.24	0.85
EAC	85.11	0.22	63.29	0.05	0.06	0.22
ECCAS	1770.93	4.51	170.20	0.12	1.29	4.51
ECO	35.79	0.09	1241.61	0.90	0.03	0.09
ECOWAS	15196.71	38.68	10002.28	7.26	11.03	38.68
EFTA	71.77	0.18	1305.53	0.95	0.05	0.18
EU	10354.43	26.35	54676.86	39.69	7.52	26.35
FTAA	1740.27	4.43	6969.79	5.06	1.26	4.43
MERCOSUR	294.09	0.75	1211.97	0.88	0.21	0.75
NAFTA	767.09	1.95	5489.63	3.99	0.56	1.95
SAARC	2260.74	5.75	3239.24	2.35	1.64	5.75
SACU	104.37	0.27	2087.37	1.52	0.08	0.27
SADC	462.72	1.18	2142.09	1.56	0.34	1.18
GRAND TOTAL	39292.80	100	137742.50	100	28.53	100
AFRICAN COUNTRIES						
Eastern Africa	148.75	0.83	107.48	0.76	257.06	0.80
Middle Africa	1764.75	9.82	169.41	1.19	1943.98	6.02
Northern Africa	312.96	1.74	1843.83	12.97	2158.52	6.68
Southern Africa	104.37	0.58	2087.37	14.68	2192.32	6.79
Western Africa	15641.62	87.03	10013.28	70.41	25741.93	79.71
GRAND TOTAL	17972.44	100	14221.37	100	32293.81	100

Source: Salisu *et al*. (2012)

Appendix A2: UEMOA's Trade Statistics on Primary Commodities with the rest of the world (USD M) 1995-2010

	Export		IMPORT		AGGREGATE TOTAL	
REGIONS	TOTAL	%	TOTAL	%	TOTAL	%
Developed	66240.05	53.58	32163.73	34.76	98457.36	45.53
Developing	57386.01	46.42	60375.47	65.24	117807.90	54.47
GRAND TOTAL	123626.06	100	92539.20	100	216265.30	100
ECONOMIC UNIONS						
APEC	26381.77	15.70	13196.67	11.00	39594.13	13.74
APTA	11022.05	6.56	3890.79	3.24	14919.40	5.18
ASEAN	6326.61	3.77	7547.95	6.29	13878.33	4.82
CEMAC	2167.69	1.29	1311.54	1.09	3480.52	1.21
COMESA	1125.72	0.67	425.24	0.35	1551.63	0.54
EAC	47.96	0.03	51.18	0.04	99.16	0.03
ECCAS	3085.02	1.84	104.59	0.09	3191.44	1.11
ECO	1424.22	0.85	1355.04	1.13	2780.11	0.97
ECOWAS	27543.24	16.39	12018.98	10.01	39578.61	13.73
EFTA	882.01	0.53	36025.12	30.02	36907.65	12.81
EU	53441.66	31.80	601.19	0.50	54074.65	18.77
FTAA	13304.26	7.92	28176.91	23.48	41489.09	14.40
MERCOSUR	2022.40	1.20	7786.11	6.49	9809.71	3.40
NAFTA	10777.78	6.41	2831.96	2.36	13616.15	4.73
SAARC	6073.79	3.61	2830.13	2.36	8907.53	3.09
SACU	638.23	0.38	888.34	0.74	1526.94	0.53
SADC	1776.40	1.06	978.56	0.82	2756.02	0.96
GRAND TOTAL	168040.80	100	120020.30	100	288161.10	100
AFRICAN COUNTRIES						
Eastern Africa	271.71	0.80	104.59	0.25	376.71	0.50
Middle Africa	3082.01	9.08	1354.37	3.28	4439.65	5.89
Northern Africa	2152.34	6.34	1874.41	4.53	4030.02	5.35
Southern Africa	638.23	1.88	888.34	2.15	1527.53	2.03
Western Africa	27805.60	81.90	37110.44	89.78	64958.33	86.23
GRAND TOTAL	33949.88	100	41332.14	100	75332.25	100

Source: Salisu *et al*. (2012)

Appendix A3: UEMOA's share in Total Trade across the regions 1995-2010

REGION	UEMOA's Share in Export	UEMOA's Share in Import	UEMOA's Share in Total Trade
APEC	0.04	0.05	0.05
APTA	0.09	0.13	0.11
ASEAN	0.07	0.11	0.09
CEMAC	1.38	0.68	1.06
COMESA	0.17	0.07	0.11
EAC	0.15	0.05	0.08
ECCAS	0.78	0.30	0.56
ECO	0.06	0.08	0.07
ECOWAS	5.37	5.59	5.48
EFTA	0.11	0.06	0.09
EU	0.12	0.13	0.12
FTAA	0.06	0.04	0.05
MERCOSUR	0.10	0.17	0.14
NAFTA	0.05	0.03	0.04
SAARC	0.45	0.18	0.28
SACU	0.62	0.28	0.43
SADC	0.49	0.19	0.33

Source: Salisu *et al*. (2012)