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REGIONAL INTEGRATION AND EXPORT SUPPLY CONSTRAINTS: EVIDENCE FROM ECOWAS ZONE

Kwami Ossadzifo Wonyra, Phd¹

Abstract

Abstract: *The objective of this research is to reexamine the constraints to export supply in ECOWAS countries, mainly in intra-regional trade. To achieve this objective, we use gravity model estimated with the Pseudo-Poisson Maximum Likelihood (PPML) techniques. Our results show that the number of products positively affects intra- and extra-regional exports. Moreover, the estimates show tariffs are not a constraint on ECOWAS countries' export supply. From these results, we conclude that the low export diversification of ECOWAS economies remains the major constraint on their capacity to supply the intra-regional market and the market of their main trading partners. As policy implication, ECOWAS countries have to continue to promote export diversification strategies. On the other hand, one of the challenges of these diversification policies remains the capacity of ECOWAS countries to integrate the requirements of non-tariff measures in order to respond, to a lesser extent, to international demand.*

Key words: *exports supply constraints, intra-regional trade, gravity model.*

JEL: *F1, F14, F15*

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1.0. INTRODUCTION

In recent decades, the difficulties of giving birth to multilateral trade agreements and especially the implementation of Article XXIV of the General Agreement on Tariffs and Trade (GATT) and Article V of the General Agreement on Trade in Services (GATS) have contributed to the proliferation of regional trade agreements throughout the world. Regional integration of Africa's economies has long been at the forefront of the agenda of African leaders. It represents an opportunity for African countries to ensure a more equitable distribution of the benefits of trade liberalization and therefore to ensure a coherent and equitable economic development among countries. In this quest for prosperity, African countries have embarked on a number of overlapping initiatives to create an enabling environment for development. However, regional integration is not a simple process; it requires a willingness for sustained cooperation and actions within groups to achieve regional integration "de jure".²

The Economic Community of West African States (ECOWAS) is a good example of ongoing and sustained efforts for regional integration on the African continent, among the initiatives that have been implemented effectively. This Regional Economic Community (REC) was created more than four decades ago. It has also spawned a number of affiliated institutions and organizations that not only promote economic integration, but also broaden the scope of cooperation to other areas such as justice and security. Comprising 15 countries, ECOWAS represents more than 30 percent of the African population and a quarter of all African production comes from this region³.

The official ECOWAS statistics show that 10 to 15 percent of trade of the member countries is carried out within the ECOWAS area. Based on statistics from the United Nations Economic Commission for Africa (UNECA), Lang (2006) gives an estimate of the share of intra-ECOWAS trade which was changing by 3 percent at the beginning of 1970s to 10 percent in 2001. In 2014, exports were estimated at less than 10 percent among ECOWAS Member States. In 2015, the share of intra-ECOWAS exports was about 10 percent of total exports, lower than the 19 percent for MERCOSUR, 24 percent for ASEAN, and 73 percent for OECD countries (UNCTAD, 2017). Even within Sub-Saharan Africa, with the exception of the Economic Community of Central African States (ECCAS), intra ECOWAS exports were smaller than for other groups. On the other hand, ECOWAS had the second highest intra-regional share of imports. Although intra-ECOWAS trade remained relatively low, intra-regional trade was diversified (UNCTAD, 2017)⁴.

Despite favorable conditions for regional exporters, a significant share of the top 30 commodities are imported by extra-regional partners (TradeMap, ITC, 2016). This mismatch between demand and regional supply could be due to several factors that prevent ECOWAS companies from taking full advantage of the regional market. These include limited production capacity, lack of infrastructure, lack of distribution of information and knowledge across borders, strenuous export procedures and rules, as well as shortcomings in the business environment for traders. What are the export supply constraints that face ECOWAS countries?

The recent empirical literature suggests more broadly that the export supply capacity constraints which face many African countries largely reflect weaknesses in their macroeconomic and trade regime deficiencies of trade-related infrastructures and inefficiencies of the trade-related inputs and services. In this context, while considerable progress has been made in many African countries with regard to stabilizing their macroeconomic policy environment as well as liberalizing and rationalizing their trade regimes, much remains to be done in the areas of customs and trade regulations (Oyejide, 2004; Oyejide et.al, 2004a, 2004b; and Ajakaiye and Oyejide, 2005). Other studies support that exports face

² "Facilitating trade in ECOWAS - Insights from the ITC Business surveys on non-tariff measures", ITC, 2016.

³ "Facilitating trade in ECOWAS - Insights from the ITC Business surveys on non-tariff measures", ITC, 2016.

⁴ See Ametoglo, Guo and Wonyra (2018)

increasingly stringent and complex health, safety and environmental standards (ITC, 2001; Oyejide et.al, 2001, Jaffee and Henson, 2004). For Ackah, Turkson & Opoku (2013), trade costs measure the trade-depressing effect of separation between countries. In this vein, distance not only induces transportation costs, but also creates barriers to information and reduces the probability that a trade connection between two countries will take place. Supply-side constraints and inefficiencies in partner countries have similar effects.

Moreover, African countries, specially, lack the appropriate standard, quality assurance, accreditation, and metrology (SQAM) systems for meeting these requirements. They also do not, typically, have access to cost-effective systems of certification. Furthermore, constraints at the firm level relating to production and marketing know-how, access to finance and the institutional structure of production can limit export supply response even when macro-level reforms are adequate. (Biggs et.al, 1994; ITC, 2001; Minetti, R., & Zhu, 2011; Paravisini, and al, 2015; Manova and al, 2015).

The objective of this study is to re-examine the export constraints in ECOWAS zone. Specifically, the study intends to: (i) determine the supply capacity's effect on the intra-regional exports of ECOWAS, and (ii) the foreign market access effect on ECOWAS intra-regional exports. To achieve these objectives, we use gravity model estimated with the Pseudo-Poisson Maximum Likelihood (PPML) techniques. Our results show that the number of products positively affects intra- and extra-regional exports. Moreover, the estimates show tariffs are not a constraint on ECOWAS countries' export supply. From these results, we conclude that the low export diversification of ECOWAS economies remains the major constraint on their capacity to supply the intra-regional market and the market of their main trading partners.

The rest of the paper is as follow. Section 2 presents an overview on intra-regional trade statistics in ECOWAS zone while section 3 contains the literature review. Section 4 discusses the methodology and data. Section 5 presents and analyzes the empirical results and Section 6 concludes.

2.0 OVERVIEW OF INTRA-REGIONAL TRADE STATISTICS IN ECOWAS ZONE

Analyzing bilateral trade statistics based on WDI and UNCTADstat, it is easy to see that exports of ECOWAS goods and services in 2015 are dominated by Nigeria and Ghana, which together account for 68.79 percent of transactions. Nigeria alone provides more than 52.22 percent of regional exports and Ghana 16.57 percent. For their part, Côte d'Ivoire and Senegal are third and fourth with 12.62 percent and 4 percent, respectively. Mali, Burkina Faso and Benin follow respectively with 2.88 percent, 2.7 percent, and 2.36 percent of regional exports. Guinea, Niger and Togo each account for about 1 percent of regional exports.

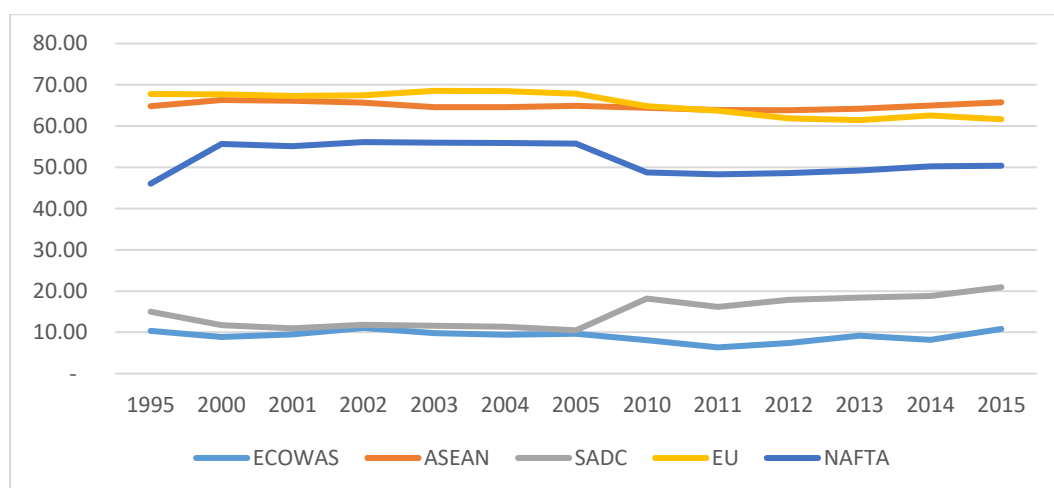
ECOWAS countries are among the top five export partners of countries in very few countries in the community. Only four countries can be mentioned, Gambia, one of the top five partners of three countries in the community. For Togo, Benin and Senegal have only one. In other words, the ECOWAS countries export more to non-member countries of the community. This reflects the lack of dynamism of intra-regional trade. Indeed, the most exported goods for example by Côte d'Ivoire are: agricultural raw materials, fuel and food products. These same goods are most present in the exports of Nigeria, Ghana etc. Obviously, the countries of the community cannot be mutual export partners if they export the same goods. Another characteristic of these exports is that countries have a very small export basket.

In addition, they mainly export products in their raw state. The most important products in ECOWAS exports are hydrocarbons from the extractive industries. These products account for three quarters (75 percent) of exports and are mainly supplied by Nigeria (73 percent). Cocoa and cocoa-based foods are mainly exported by Côte d'Ivoire (5 percent of exports from the region, or 50 percent of Côte d'Ivoire's exports), precious stones (3 percent) and cotton, fruits, plastics, wood and wood products, fish and crustaceans (about 1 percent), together with hydrocarbons, constitute the main export products of the Economic Community of West African States. It is then noted that the number of products exported by ECOWAS is limited, generally speaking they are essentially products with low value-added content as presented in the following graph. Commodities account for 93 percent of exports from ECOWAS countries.

The main primary product exported by ECOWAS countries is fuel. The export of the latter is growing in total exports. In 1995, fuel accounted for 47.8 percent of ECOWAS exports, in 2000, this figure was 79.1 percent and in 2006 was 80.6 percent. The main partners of ECOWAS are: Europe with about 28 percent of ECOWAS exports, of which 23 percent for the European Union. The Americas represent 40 percent, of which 24 percent for the United States, Canada and Mexico. The opening of trade in the context of the development of South-South trade shows a significant advance of the countries of Asia and Oceania, which represent 16 percent of exports, of which 0.3 percent for Near and Middle East (Lloyd and Adeyemie, 2013). The global trade of the countries of the Economic Community of West African States with the rest of the world does not show a flourishing trade, and a promising external sector. The next section examine trade between Member States.

Like integration into world trade, intra-ECOWAS trade is characterized by a relatively small volume. A comparison of intra-ECOWAS exports with that of other groupings is important in order to make clear the gap that characterizes the intra-ECOWAS trade share with the latter.

Figure 1: Intra-regional trade as percentage of total trade



Source: Author's calculation from UNCTADstat, 2017

Intra-ECOWAS trade, however, still represents only a very small percentage of the trade in the community. Intra-regional trade accounted for 10.84 percent of total trade in 2015, compared to 11.06 percent in 2002. The evolution of ECOWAS trade remains lower than those observed in other regions of Africa, particularly in the countries of the South African Development Community (SADC), which experienced a nearly 50 percent increase in the intra-African trade rate. In fact, they reached 20.92 percent in 2015 while in 2002 it was 11.81 percent. Comparing to the percentage on other continents, those of Africa remains very low. In particular ASEAN, EU, NAFTA in 2015 were respectively 65.72 percent, 61.65 percent and 50.35 percent (UNCTADstat, 2017).

The weakness of the ECOWAS' intra-trade in comparison with the groupings of countries can be explained at two levels. The first is historical. Indeed, during the colonial period, Africa was used as a source of raw material by Westerners. The commercial relationship with the settlers was to export raw materials to feed their industries. The new African states inherited this commercial relationship during the post-colonial period. This situation was fueled by the fact that Africa is a continent rich in natural resources, particularly at a time when African economies were very poor in industry. The second relates to the opinion of some economists who consider that the low level of intra-ECOWAS trade is related to the similarity of production structures in most African countries and the low income level. In addition, there is a lack of industry building cooperation among African countries, based on the endowments of member countries' economies.

Intra-regional trade is weak and stagnant in most African RECs. Among African RECs, SADC has one of the highest ratios in the community. This performance is possible due to the intensity of the transaction in countries such as Botswana, Namibia, Swaziland and Zambia. South Africa is by far the largest player in the region, accounting for 51 percent of intra-community exports. On the other hand, with intra-Community imports, it is pushed by Zambia in fourth place, behind Botswana, Namibia and Swaziland. In the SADC, as in COMESA and ECOWAS, the largest economy is not always the main player in intra-community trade, especially when it comes to intra-Community imports.

In the ECOWAS zone, intra-community trade accounts for 10.9 percent of total trade. But when Nigeria is excluded, the ratio becomes 23.2 percent (27.1 percent for exports, and 20.9 percent for imports). Like all RECs, the intensity of intra-community trade is not the same for all member countries. In particular, the three landlocked countries of the region, Burkina Faso, Mali and Niger, are the main actors in intra-ECOWAS trade. Burkina has the highest ratio of intra-regional trade at 53 percent, and Nigeria the lowest at 4 percent. Note that Nigeria covers 76 percent and 46 percent of ECOWAS exports and imports (ECA, 2012). However, its share in intra-regional trade is only 10 percent for imports and 35 percent for exports. An effort by Nigeria to increase intra-regional trade could significantly increase intra-Community trade.

3.0 LITERATURE REVIEW

3.1 Regional integration and trade: a theoretical review

The first analysis in this field of regional integration goes back to Viner (1950). Indeed, Viner's (1950) analysis have shown that the necessary condition for a free trade area or a customs union to create trade and increase the welfare of the countries participating in it is that for a particular good, the practical price by the partners of the economic grouping is lower than the practical price by the rest of the world. Another sizeable condition for successful trade integration is a reasonable degree of elasticity of trade goods or the absence of supply constraints that can undermine the productive sector. Some subsequent theoretical work, Balassa (1965), De Melo et al. (1993), Krugman (1993) and Hugon (2001) who pursued

Viner's (1950) analysis, successfully demonstrated that the process of regional integration generates benefits for member countries.

In the case where the economic grouping partners are less efficient than the rest of the world, it is the diversion effect that will be observed. Viner (1950) states that this latter case corresponds to the situation in which trade integration makes imports from member countries substitute for imports from third countries which have been previously more efficient. Particularly in the case of a free trade area, Bhagwati (1995) and Panagariya (1996) have shown that for small countries the effect of trade diversion is inevitable.

Monetary union is considered the most advanced phase of economic integration after the free trade zone, the customs union and the common market. A monetary union can be expected to strengthen trade, including that of agricultural products among member countries, by making transactions easier and more beneficial, as it reduces transaction costs by means of a common currency. Transaction costs correspond to the commissions and foreign exchange margins borne by economic agents to convert their national currency into a currency when carrying out a transaction with the outside world. In the case of developed countries where currencies are convertible, these foreign exchange commissions are paid to banks and financial institutions. When transaction costs are high, they can constitute monetary barriers to traded agricultural goods produced by partner countries in the same way as a prohibitive tariff. In fact, for a given farm property, when the transaction costs are higher than the price differential between the partners, the good is no longer exchanged to the extent that the profitability of the exchange is negative.

3.2 Empirical review

The empirical findings on export constraints concerns both the constraints of trade policy measures and therefore of market access and the constraints that can be called traditional constraints, those linked to the natural endowments of countries.

In the literature, some authors identify tariff barrier as an obstacle to Africa export performance. For example, a major obstacle to the expansion and diversification of African exports to Asia is Asian tariff barrier against African exports. Another constraint is tariff escalation. Indeed, a substantial escalation of the tariff structure creates a significant bias against the export of processed and value-added products from Africa (Oyejide, 2007). However, Fugazza, (2004) analyzed the determinants of export performance in the world's economic regions, as well as export supply constraints and revealed that, in general, the economic regions in the South and the Pacific Asia, Western and Eastern Europe, North America have good access to the foreign market, with good supply capacity and very good export performance but conversely, RECs in Africa and Latin America have good access to the foreign market, but they fail to achieve export performance due to supply capacity constraints.

In the context of regional integration, the intra-regional trade tends to grow faster than world trade everywhere for various reasons. Transport which can be a major obstacle to international trade may not be so constraining to trade between neighboring country markets where the distribution chain may be much shorter. It is often easier for smaller firms to move up the value chain by establishing business links across national borders within a region. In addition, as a result of similarities in consumption patterns, regional markets should provide a firm with a more easily satisfied customer base than the market in a high-income country far away. It is not necessarily the case that the generally low levels of income in African countries reflect limited trading opportunities; neither is it necessarily follow that because African countries produce similar goods, there are no trading complementarities. Viewed at a sufficiently disaggregated level, considerable diversity and complementarity exist within the product baskets of African countries to offer substantial intra-African trading opportunities. In the absence of

proactive and well targeted export development strategies, African countries generally import a wide range of semi processed and final products from non-African sources which is available under competitive conditions in other African countries (Oyejide, 2007).

As previous analysis shows, intra African exports are increasing as a proportion of total exports. Hence, concerted efforts to seek market access enhancement in Africa can be a significant means of achieving the continent's objective of export expansion and diversification. As in the case of Asia, these efforts must include initiatives to sharply reduce, with a view to eliminating, all existing barriers against intra-African trade.

The access of African exports to the markets of high-income countries, particularly in Europe and North America has been influenced primarily by various non-reciprocal preferential trade arrangements since the 1960s. It is the general conclusion of most of the studies that have examined the impact of these trade preferences that although many African countries are among those granted the deepest preferences, most of them (exceptions include a few such as Mauritius) have not managed to expand and diversify their exports significantly in the last 40 years (see, for instance, Francois et.al, 2005).

Several factors appear to be associated with the derivation of limited benefits by African countries from the preferential trade schemes. One set of these factors relates to the African countries themselves; while another set is intrinsic to the specific non-reciprocal preferential trade schemes. The first category is the limited export supply response capacity in the African beneficiary countries; trade preferences cannot be taken advantage of if there is no export supply for the products covered. Factors in the second set include product exclusions from the trade preference schemes where potential exports exist, exclusion of particular countries from available benefits, restrictive rules of origin that require higher than existing levels of processing or manufacturing capacity in the potential beneficiary countries, as well as high administrative costs in gaining access to the trade preferences. These high access costs may be responsible for the low utilization rates that are observed with respect to some of the existing non-reciprocal preferential trade schemes (see Oyejide, 2007).

Oyejide (2007) analyzing the role of the special export development strategies in Africa, concludes that there has been increased focus on strategies for relaxing national export supply response capacity constraints as well as appropriate measures for facilitating the expansion and diversification of exports. However, Oyejide finds that two major gaps continue to limit the chances of effectively achieving the desired goals. First, it is not yet the case that many countries have effectively mainstreamed trade and trade policy into their overall development strategies. Second, it also appears to be the case that results of policy research and analysis with particular reference to the appropriate strategies for expanding and diversifying exports have not been achieved.

Export supply constraints analysis reveal the concept of trade costs that measure the trade-depressing effect of separation between countries. The distance not only induces transportation costs, but also creates barriers to information and reduces the probability that a trade connection between two countries will take place. Supply-side constraints and inefficiencies in partner countries have similar effects. (Ackah, Turkson & Opoku, 2013). According to Ackah and al (2013), trade costs have two main categories of sources. The first has to do with entirely bilateral factors of separation between the exporter and the importer that are more dependent on exogenous factors than particular policy choices. Examples include: geographical distance; transportation costs or the lead time associated with transportation; and common features between trading partners, such as language, common history, sharing a border, or participation in the same economic community. The second category of trade cost sources includes endogenous trade costs, which are factors specific to the origin or destination, and which in a sense represent the "thickness" of their borders. Examples include: logistics performance

(cost, delay, and reliability) and trade facilitation bottlenecks (such as border control and transit systems with third countries); international connectivity, such as the existence of regular maritime, air or terrestrial services, notably in view of the hub-and-spoke organization of international transportation; tariffs; and nontariff measures.

At micro level, some findings identify access to credits as major constraints to firm export supply. Minetti and Zhu (2011) find that the probability of exporting is 39 percent lower for rationed firms and that rationing reduces foreign sales by more than 38 percent. While credit rationing also appears to depress domestic sales, its impact on foreign sales is significantly stronger. The analysis also suggests that credit rationing is an obstacle to export especially for firms operating in high-tech industries and in industries that heavily rely on external finance. Manova and al (2015) provide firm-level evidence that credit constraints restrict international trade flows and affect the sectoral pattern of multinational activity. Their findings are consistent with multinational subsidiaries being less liquidity constrained because they can tap additional funding from their parent company and/or access foreign capital markets. More broadly, they suggest that FDI can alleviate the impact of domestic financial market imperfections on aggregate growth, trade and private sector development. Paravisini and al (2015) find that credit shocks affect the intensive margin of exports, but have no significant impact on entry or exit of firms to new product and destination markets. Their results suggest that credit shortages reduce exports through raising the variable cost of production, rather than the cost of financing sunk entry investments.

In a recent report on Republic of Kenya, we denote some export constraints which can be applied across all the sub-sectors with different degree of intensity. High cost of electricity, labors and inputs; lack of adequate and affordable land to support establishment of competitive manufacturing ventures; inadequate fiscal policies to support manufacture for export markets; prohibitive Business Enabling Environment as documented by the World Bank 'Ease of Doing Business Index'; inadequate awareness of export driven manufacturing sector opportunities to elicit private sector response and investments; inadequate capacity of Standards and SPS competent authorities to support manufacturing sector in production of exports in line with destination market requirements; weak value and supply chains characterized by severe shortage of raw material and excess capacity in industrial establishments; inadequate finance instruments (long terms and short term) in support of production of manufactured products for export; inadequate awareness of manufacturing technology to produce target products in response to destination market opportunities; weak and inadequate skills capability for application in the manufacture of products for target markets; inadequate capacity among some existing industries (especially SMEs) for sustainable supply of large orders in destination markets; weak trade facilitation support (Standards, SPS, Customs, Logistics); Non-Tariff Barriers to regional markets of EAC and COMESA, among others (Republic of Kenya, 2018)⁵.

To summarize, the literature review on export supply constraints pointed out geographical, trade policies, credits' access, infrastructure and demand constraints. In the context of regional integration, little research are focused on the analysis of export supply constraints. To fill this gap in empirical literature, this research reexamine the export supply constraints in ECOWAS zone as regional integration area using gravity model.

⁵ Republic of Kenya. (2018). *Integrated National Export Development and Promotion Strategy*. Retrieved from http://www.trade.go.ke/sites/default/files/NEDPS_Main_File_0.pdf

4.0 METHODOLOGY

4.1 Theoretical model

Our analysis is based on the theoretical gravity model of Fugazza (2004). The latter has developed a theoretical equation based on two well-known works in the history of trade flow analysis. The first is that of Krugman and Venables (1996), which highlighted the role of supply capacity in determining a country's export performance. In particular, these authors have identified the possibility of decomposing bilateral trade into two categories: access to the foreign market and supply capacity. The theoretical framework of their work is essentially that of the standard model of new theories of international trade based on product differentiation, derived from the demand function with constant elasticity of substitution. The second work is that of Baier and Bergstrand (2005), the theoretical development of the gravity model of these authors is the reference of the majority of recent empirical estimates. On the one hand, the analytical framework maximizes the profit of firms in the monopoly competition market and, on the other hand, maximizes the utility of Dixit-Stiglitz's preferred consumers (Baier and Bergstrand, 2005).

In short, the theory developed by Fugazza, from which our empirical analysis derives, is as follows. Assume an economic region comprised of N countries. Suppose the production is carried out under the conditions of economies of scale, and the goods produced, or used for consumption are differentiated goods. Consumer preferences are represented by the Constant Elasticity Substitution (CES) utility function, σ , between two goods is invariant for all pairs of goods. The representative utility function of country j is as follows:

$$U_j = \left[\sum_i^N n_i x_{ij}^{(\sigma-1)/\sigma} \right]^{\frac{\sigma}{\sigma-1}} \quad \sigma > 1 \dots \dots \dots (1)$$

In this function n_i represents the set of product variety available in the country i and x_{ij} consumption in the country j of a variety set of the country i. Under these conditions, the demand of country j for each variety produced in country i is a function of the total expenditure on differentiated products E_j , the price of the good P_{ij} and the price index P_j defined on the basis of the individual prices of each variety produced in i and sold in j. total expenditure is assumed to be exogenous and given. The demand for each variety is given by:

$$x_{ij} = P_{ij}^{-\sigma} E_j P_j^{(\sigma-1)} \dots \dots \dots (2)$$

with

$$P_j P_j = \left[\sum_i n_i P_{ij}^{1-\sigma} \right]^{1/(1-\sigma)} \dots \dots \dots (3)$$

The elasticity of demand is identical for all varieties and equal to σ . $E_j P_j^{(\sigma-1)}$ is the factor of economy of scale, which indicates the positioning of the demand curve on the market j. The price of the producer p_i is supposed to be the same for all the varieties in the country i. Transportation frictions, which represent the costs of moving a commodity produced in i, are proportional to the producer's price. This cost is made up of three components: the transportation cost of the good from inside the exporting country to the border, the transportation cost from the border into the country of destination (t_i and t_j respectively) and the cost representing the costs necessary to cross the border (T_{ij}). The intra-country routing costs, t_i may reflect the internal geographical situation and the transport infrastructure. The inter-country cost may reflect the external geographical situation t_j and the police barriers costs, T_{ij} . Thus the price $p_{ij} = p_i t_j T_{ij} t_j$ and the value of exports from country i to country j is given by:

$$n_i p_i x_{ij} = n_i p_i^{1-\sigma} (t_i T_{ij} t_j)^{1-\sigma} E_j P_j^{(\sigma-1)} \dots \dots \dots (4)$$

Equation (4) can be rewritten as follows:

$$n_i p_i x_{ij} = [n_i (p_i t_i)^{1-\sigma}] (T_{ij}^{1-\sigma}) [E_j (\frac{P_i}{t_i})^{\sigma-1}] \dots \dots \dots (5)$$

The first term, $[n_i (p_i t_i)^{1-\sigma}]$, represents the supply capacity of the exporting country. In the following discussion, this first term will be called sc_i . This is the product of the variety number and their price competitiveness, which is measured by the producer price and internal transportation costs. The term $(T_{ij}^{1-\sigma})$ measures the component that captures the transportation costs of crossing the border. The last term is the country's market capacity j , is named m_j . It is positively correlated to the total expenditure in country j , to the internal transport cost in country j and the number of varieties entering the competition as well as their price expressed by the price index. At the country level, this refers to the total value of country i exports, so we get:

$$X_i = n_i p_i \sum_{j \neq i}^N x_{ij} = sc_i \sum_{j \neq i}^N (T_{ij})^{1-\sigma} m_j \dots \dots \dots (6)$$

The term $\sum_{j \neq i}^N (T_{ij})^{1-\sigma} m_j$ represents for the country i access to the foreign market FMA_i (Foreign Market Access) or the equivalent of the market potential of country i relative to the concept developed by Harris (1954). It corresponds to the sum of the market capacities of all the countries of destination of exports, including the costs of bilateral trade. Thus, the total value of the country's exports is obtained through the product of foreign market access and supply capacity. The linear form of equation (6) gives the equation (7) which is the model to be estimated.

$$\begin{aligned} \ln(X_{ijt}) = & \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(Pop_{it}) + \beta_4 \ln(Pop_{jt}) + \beta_5 \ln(Dist_{ij}) \\ & + \beta_6 Col_{ij} + \beta_7 Lang_{ij} + \beta_8 Front_{ij} + \beta_9 Enl_i + \beta_{10} Ecowas_{ij} + \beta_{11} \ln(Ide_{it}) \\ & + \beta_{12} \ln Ntv_i + \beta_{13} Tariff_{ij} + \beta_{14} Doc_{import} \\ & + \varepsilon_{ijt} \end{aligned} \dots \dots \dots (7)$$

The error term ε_{ijt} can be rewritten to take into account the individual heterogeneity and idiosyncratic error. $\varepsilon_{ijt} = \gamma_i + \mu_{ijt}$

$$(8)$$

4.2 Variables, data and source

The dependent variable is the value of bilateral exports noted X_{ij} . i denotes the exporting country and j denotes the importing country. In the specification of our empirical model, the supply capacity is captured by the total number of varieties of goods produced in the country i (Ntv_i). As for access to the foreign market, we use the customs duty applied to exports of country i by the country of destination j ($Ddaij$).

The gravity model traditionally uses a set of explanatory variables in accordance with the theory presented above. We retain GDP_i , GDP_j respectively the gross domestic product of the exporting country (i) and the importing country (j); Pop_i (Pop_j), respectively the size of the population of country i (j); $Dist_{ij}$ the distance between trading partners. These variables are often present in the previous studies of the gravity model. The measurement of distance is a controversial subject. In the

empirical literature, three types of measurement are often mentioned. In the context of this work, we use the distance that connects the capital of country i and to that of country j .

A set of dummy variables will also be utilized: $Lang_{ij}$ and $Front_{ij}$ denote respectively common language and common border. They are equal to 1, when the partners have the same official language and a common geographical boundary, respectively and 0 otherwise. $Encl_i$ takes the value 0 if country i is a coastal country and 1 otherwise. col_{ij} , the colonization variable, which takes the value 1 if the two countries in exchange have a historical relationship of colonization or if both countries have the same colonizer and 0 if neither of the two cases is verified. The dummy variable $Ecowas_{ij}$ captures the membership to ECOWAS trade agreements or not. It takes values 1 if countries i and j are both members of ECOWAS and takes the value 0 if no. For this purpose, a set of partner countries in the ECOWAS member country is taken into account.

The variables of the model are classified into two categories. The first one is composed of continuous variables, expressed in logarithm; this is the case of GDP and distance. This form allows us to interpret the coefficient of these variables as elasticity. There are dummy variables (they take 0 or 1). These variables are called "multilateral resistance" as in the case of language, isolation, a common past (colony, even colonizer). They are country-specific and reflect individual characteristics or close links with partners that are likely to influence the volume of trade.

Our analysis consists of twenty-five countries, including the fifteen ECOWAS, and their main trading partners in Africa, Europe, Asia, and America. The data are annual and cover 10 years from 2006 to 2015, which allows us to take into account recent realities. These are secondary data taken from different sources: export data were collected from the COMTRADE database; data on GDP, population, and foreign direct investment come from the World Bank's World Development Indicators (WDI) 2016 statistics. The variables, namely distance, isolation, colonization, and internal transport friction are obtained through the CEPII database.

Table 1: the expected relationship between the explanatory variables and Export supply

Variables	Expected sign
GDP $_i$	+
GDP $_j$	+
Distance	-
Area	+
Isolation	-
Colonization	+
Border	+
Tariff $_{ij}$	-
NTV	+
DOCIMPORT	-
FDI	+

Source: Computed by the Author

4.3 Estimation techniques

To estimate equation (7), we use the Pseudo-Poisson Maximum Likelihood (PPML) method, following Silva and Tenreyro (2006) and Silva and Tenreyro (2011). The biases are present both in the traditional specification of the gravity equation and in the Anderson–van Wincoop (2003) specification, which

includes country specific fixed effects. So to address the various estimation problems, a simple Poisson pseudo-maximum-likelihood method is proposed and assess its performance using Monte Carlo simulations. In the presence of heteroscedasticity, the standard methods can severely bias the estimated coefficients, casting doubt on previous empirical findings. The PPML, instead, is robust to different patterns of heteroscedasticity and, in addition, provides a natural way to deal with zeros in trade data Silva and Tenreyro (2006). According to De Sousa and Lamotte (2009), the Poisson estimator integrates all the observations and thus avoids a potential selection bias. This bias is all the more likely because in our sample we have zero values in the bilateral export data. Recall that, the PPML estimator of Silva and Tenreyro (2011) is an extension of the work of Silva and Tenreyro (2006) considering that the data are generated by a model with constant elasticity. The authors confirm that the PPML estimator is best suited, even in the case where the proportion of zeros in the sample is very large.

5.0 RESULTS AND DISCUSSIONS

In this paper, we have two sets of variables of interest⁶. First, the domestic determinants of exports, captured by the GDP of the exporting country and the number of varieties of goods exported, reflect the exporting country's supply capacity. Second, the external determinants of export performance, which reflect access to the foreign market, are captured by the bilateral applied customs duties and the number of documents required importing into the partner country. Our results reveal that the coefficient of the variable that captures the number of varieties of goods exported has a positive and significant impact on the volume of bilateral exports.

⁶ The descriptive statistics are computed in annex 2.

Table 2: Empirical Analysis of supply constraints of ECOWAS countries

Variables	ECOWAS and Rest of The World's trade	Intra-Regional trade
LGDPi	0.172*** (0.0279)	0.1375** (0.0732)
LGDPj	0.0637*** (0.00457)	0.0296 (0.0113)
Lpopi	0.0456*** (0.00978)	-0.0106 (0.0865)
Lpopj	0.0295*** (0.00857)	0.0959*** (0.0193)
Ldist	-0.101*** (0.0271)	-0.2812*** (0.0337)
Colij	0.108** (0.0434)	0.6493 (0.736)
Langij	0.109*** (0.0419)	-0.3426 (0.736)
Borderij	0.199*** (0.0463)	0.0821 (0.0522)
Encli	-0.223*** (0.0615)	-0.1058 (0.0842)
Ecawas	0.189*** (0.0584)	
Lidei	-0.0511*** (0.0132)	-0.0607** (0.0289)
Lntv	0.466*** (0.129)	0.9219*** (0.0657)
Ddaij	0.00158 (0.00265)	-0.0002901 (0.00377)
doc_import	0.00997 (0.00705)	0.0211*** (0.0078)
Constant	-6.548*** (0.449)	-5.9731*** (0.6692)
Observations	1,550	929
R-squared	0.599	0.505

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: author

In fact, a variation of 1 percent in the number of varieties of goods exported leads to a variation of exports of 0.46 percent. With regard to the coefficient of GDP, this coefficient reflects a country's ability to supply the foreign market when its domestic production is large.

As policy implication, ECOWAS countries have to continue to promote export diversification strategies. To achieve this, there is a need for coherence of export promotion policies with trade policies as mentioned by Oyejide (2007). On the other hand, one of the challenges of these diversification policies remains the capacity of our countries to integrate the requirements of non-tariff measures in order to respond, to a lesser extent, to international demand.

The formulation of this policy implication is also justified by the coefficient of the tariff barriers' variable that is not significant. This shows that tariff barriers are not a major obstacle to the trade of ECOWAS countries with their trading partners. As for the number of documents needed to import into the partner country (to a certain extent of administrative obstacles), the coefficient is not significant. This would mean that countries do not face administrative barriers when exporting to developed countries. In summary, the ECOWAS countries are not limited in their exchanges by external constraints but rather by internal constraints (in other words by their supply capacities). These results are consistent with the findings of Fugazza, (2004).

For intra-regional trade, estimates show that, within ECOWAS, GDP, whether of the partner country or the exporting country, positively and significantly affects bilateral trade. This fact is theoretically justified because countries export what they produce or import what their partners have produced. Indeed, the gross domestic product is used to satisfy domestic demand as well as external demand and when the gross domestic product increases, *ceteris paribus*, exports also augment. This positive relationship between bilateral exports and GDP is highlighted in other works, such as (Shuaibu, 2015). In another sense, this result informs that, in order, to increase intra-regional exchange the member countries must produce more. However, the evolution of GDP is relatively slow, which partly explains the weakness of intra-ECOWAS trade.

Most of the commodities traded by ECOWAS countries are agricultural goods. However, the evolution of the value added of these products is very low to significantly increase intra-regional trade in this sector. Moreover, these products are exchanged without transformations. Excluding Nigeria, whose added value per worker is the largest in ECOWAS (\$ 8,578 in 2015), the other countries have weak added value. Production techniques in the agricultural sector have not really been improved over the years. Climatic hazards make it even more difficult to achieve good agricultural performance. Countries that manage to perform well in agricultural crops often lose a significant part of their agricultural production, due to the location of in rural areas and bad road infrastructures.

The number of varieties of exported goods is a variable that reflects the ability of the exporting country to produce goods that satisfy foreign demand. The coefficient of this variable is positive and significant. This suggests that the ECOWAS countries can significantly increase their exports by putting new products on the sub-regional market. It also signals the existence of a great potential for trade between ECOWAS member countries. This result is in line with the work of Geda and Seid (2015). The ECOWAS sub-regional market is characterized by a basket of few produced goods, making the product range traded, very limited. Tariffs seem to have no effect on trade between the countries of the community. The coefficient of the bilateral tariff variable indicates that tariffs do not have a significant effect on trade between ECOWAS member states. Indeed, the ECOWAS countries are currently at the stage of the customs union of regional integration. This underlines that the community has already consolidate free trade and that the goods should move freely. This demonstrates the remarkable progress of the subregion in terms of free trade between member countries. This result is in line with the work of (Ackah, Turkson, and Opoku 2013).

As a policy implication, on the sidelines of the free trade efforts between the ECOWAS countries, a real industrialization policy of the countries is needed in order to increase the capacity of the local industries to satisfy the demand of the consumer goods of the populations. It will be necessary to go towards a specialization of the economies in order to benefit from the comparative advantages available to the 15 countries of the zone. In doing so, the regional integration of the ECOWAS zone will also make it possible to take advantage of the effects of trade creation and economies of scale.

6.0 CONCLUSION

The analysis of the trade flows of the ECOWAS countries highlighted the relatively weak nature of its trade, both globally and in intra-Community trade. On the non-Community level, the ECOWAS countries are not competitive, pointing the hope for trade expansion towards intra-Community trade. This paper aimed at determining the constraints of the ECOWAS intra-community trade supply offer. We used the gravity model, over a period of ten years (2006-2015), for the 15 ECOWAS countries and their ten main partners.

The analysis of the relationship between trade and its internal components has shown that, ECOWAS, in its exports, is constrained by a weak supply capacity. The GDP and the total number of varieties of goods exported by the ECOWAS countries affect this supply capacity. In order to boost their GDP, ECOWAS countries need to improve some factors such as the transport infrastructure, telecommunications, electrical energy, techniques in the agricultural sector, as well as the economic and political environments. As for the number of varieties of goods exported, the results show very little diversity. As policy implication, ECOWAS countries have to continue to promote export diversification strategies. To achieve this, there is a need for coherence of export promotion policies with trade policies. On the other hand, one of the challenges of these diversification policies remains the capacity of ECOWAS countries to integrate the requirements of non-tariff measures in order to respond, to a lesser extent, to international demand.

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Annex 1: ECOWAS countries and their main trade partners

ECOWAS Countries	Trade partners
Benin	South Africa
Burkina Faso	Germany
Cabo Verde	Holland
Côte d'ivoire	Brasilia
The Gambia	India
Ghana	Italy
Guinea Bissau	Japan
Guinea-Conakry	China
Liberia	USA
Mali	France
Niger	
Nigeria	
Senegal	
Sierra Leone	
Togo	

Source: Author

Annex 2: Descriptive statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
Export _{ij}	overall	196481.2	1381104	0	3.48e+07	N= 4220
	between		1171377	.4961	1.94e+07	n = 421
	within		735806.8	1.56e+07	1.92e+07	T-bar= 0.0238
Import _{ij}	overall	109474.8	508358.4	.011	1.15e+07	N = 4220
	between		441338.9	1	6273262	n = 421
	within		253962.4	-6163787	7035462	T-bar= 0.0238
GDP _i	overall	1.66e+10	3.88e+10	5.87e+08	1.95e+11	N= 4200
	between		3.82e+10	6.78e+08	1.53e+11	n = 420
	within		7.07e+09	-2.39e+10	5.88e+10	T = 10
GDP _j	overall	1.33e+12	2.62e+12	5.50e+08	1.48e+13	N = 4200
	between		2.62e+12	6.78e+08	1.38e+13	n = 420
	within		2.08e+11	1.29e+11	2.87e+12	T = 10
Distance	overall	4269.091	3479.116	105.1806	14383.85	N= 4200
	between		3482.851	105.1811	14383.8	n = 420
	within		.0372474	4268.285	4269.775	T = 10
Area	overall	357348.3	428233.8	4033	1267000	N = 4200
	between		428693.4	4033	1267000	n = 420
	within		0	357348.3	357348.3	T = 10
Isolation	overall	.147619	.3547642	0	1	N= 4200
	between		.355145	0	1	n = 420
	within		0	.147619	.147619	T = 10
Colonization	overall	.25	.4330643	0	1	N= 4200
	between		.4335291	0	1	n = 420
	within		0	.25	.25	T = 10
Border	overall	.0883333	.2838129	0	1	N = 4200
	between		.2817133	0	1	n = 420
	within		.0368438	.8116667	.8883333	T = 10
Language	overall	.247381	.4315414	0	1	N = 4200
	between		.4317559	0	1	n = 420
	within		.0146402	.652619	.347381	T = 10
Tariff _{ij}	overall	13.45704	3.423081	0	50	N = 2468
	between		2.720415	0	25.966	n = 397
	within		2.529109	4.767962	42.95704	T-bar= .21662
NTV	overall	116.8977	61.46894	12	256	N = 4200
	between		17.56833	94	140.0357	n = 420
	within		59.01978	5.969156	277.8977	T = 10
DOCIMPORT	overall	48.2619	9.991935	29	67	N = 4200
	between		9.489638	30.33333	65.44444	n = 420

	within		3.15851	28.48413	58.2619	T = 10
FDI	overall	7575916	8.31e+07	82.8921	1.45e+09	N = 4200
	between		4.67e+07	.4154854	2.88e+08	n = 420
	within		6.91e+07	2.75e+08	1.17e+09	T = 10

Source : Computed by the Author