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Impact of Trade Policies and Institutions on Global Value Chain Participation in ECOWAS

By

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Abstract

This paper investigates the impacts of institutions and trade policies on Global Value Chains (GVCs) participation in ECOWAS. Leveraging on the New Trade Theory as a theoretical framework, the study estimates a gravity model consisting of 15 ECOWAS members' countries for the period 2000-2018. The paper control for the possible endogeneity and other econometrics issues like heteroskedasticity and autocorrelation by adopting Poisson Pseudo-Maximum Likelihood estimation method. The results revealed that institutions significantly enhance GVCs participation, this positive impact was maintained even when it was disaggregated into various subcomponents. The result, however, revealed that tariffs on intermediates, infrastructures, and technology are harmful to GVCs participation in the West African region, while the impact of RTAs on GVC participation has been mixed. This implicates the objective of improving GVCs among West African States through the formation of RTAs is dependent on the harmonization and implementation of low tariffs on intermediates, improve the level of infrastructures and technology within a framework of qualitative institutions.

Key Words: Institution; Value Chain; Trade; ECOWAS; Panel data techniques; Tariffs

JEL CODES: F13; F14; C30; C33; O24; 043 D23; **P14; P26**

1.0: Introduction

The major source of a country's prosperity in the contemporary global economy is the globalization of trade, production, and distribution systems. This heralds a total shift away from the old thinking based on the theory of protectionism to that of free trade. For instance, the second half of the 18th century was characterized by the development of commercial capitalism with a new class of merchants that required the existence of a strong state to protect their trading interest, hence trade was based on the concept of protectionism. During this period through the early 1990s, most merchants in advanced capitalist economies produced and purchased domestically, the bulk of their products and inputs. However, the specialization by merchants of most advanced capitalist economies in value-added segments of manufacturing and services, while outsourcing the labour intensive and intermediate goods from the low-income economies (Eckhardt and Poletti, 2018), have been identified to be the fundamental cause of industrial transformation of the 1990s and growth of many developing countries. Therefore, fragmentation of production and knowledge transfer inherent in Global Value Chains (GVCs) (World Bank, 2020) is a game-changer in trade theory with far-reaching implications on foreign policies of most countries.

In line with this, the global economy has experienced a significant reduction in the political support for the adoption of restrictive policies like anti-dumping measures in favour of trade liberalization through Preferential Trade Agreements (PTAs) (World Bank, 2020). The preference for PTAs is underscored by significant roles played by PTAs in advancing the value chain together with its inherent benefits, which include a reduction in production cost, streamlining of production, creation of jobs, and poverty reduction. In Africa, different Regional Trade Agreements (RTAs) like Economic Community of West African States (ECOWAS), Central African Economic and Monetary Community (CEMAC), West African Monetary Zone (WAMZ), and West African Monetary Union (WAEMU) among others have also been formed. In the recent past, precisely in March 2018, African countries signed a landmark trade agreement, the African Continental Free Trade Area Agreement (AfCFTA) with the capability of creating a single African market of over a billion consumers with estimated total GDP of over 3 trillion, making it the largest Free Trade Areas in the world, in term of size. The objectives are to create a single continental market, expand intra-African trade and improve competitiveness and economic diversification (Tralac, 2019).

A recent report by Economic Commission for Africa (ECA) revealed that African intra-regional trade increases value chain, by encouraging exchange in the manufactured and processed goods, and higher transfer of knowledge when compared with trade with other continents (Songwe, 2019). The World Bank Report (2020) has also noted that more complex value chains are associated with stronger regional integration. Songwe, (2019) further noted that African intra-regional trade favoured exchange in manufacturing goods more than when they trade with countries outside the region. For instance, between 2014 and 2017, the continent experienced an increase in the volume of regional export in manufacturing goods from 14.8% to 41.9%.

This notwithstanding, West African countries' GVCs integration has been more about global than regional compare to East Asia where linkages are more regional than global. For instance, in 1990 the SSA share of GVC trade in total GVC trade rose from 17.5% to 23% in 2015. Again, in 2018, 42% and 23% of the imported intermediates embodied in its exports originated from Europe and Central Asia, and East Asia and Pacific, respectively, while only 6% originated from other African countries. This implies that the region is mainly integrated in European supply chains (World Bank, 2020), while regional integration in the production network is still very low (UNECA, 2015). As a region, African participation in GVCs is still at the stage of limited manufacturing as most of its exports tend to enter the global market at an early stage of GVCs making the continent's participation in GVCs to be insignificant, accounting for just 3 percent of global trade in intermediate goods.

This disappointing pattern of GVCs integration in Africa, specifically in the West African sub-region could be explained by various constraints being faced by the region in any of the GVCs drivers. These drivers are market size, geography, endowments, and institutions. Trade liberalization through PTAs like AfCFTA is capable of overcoming the constraints likely to be encountered concerning demand and input associated with market size while, improving ICT, transportation infrastructures can address disadvantages associated with remote location (geography) (Gereffi, 1994; World Bank, 2020). Institutions remain a great constraint for GVCs entry in most African countries. This is underscored by the fact that a day delay in goods traded in GVCs, is equivalent to the imposition of over 1% tariff on the cost of the goods. Unfortunately, most countries in the West African region ranked poorly in institutional quality. For instance, in

2019, out of 190 countries on the ranking of the ease of doing business, only Rwanda ranked among the first forty countries, while in 2020, none of the countries in the region could make the list of economies with relatively sound regulatory framework concerning trade across borders (World Bank, 2020b). Also, property rights protection and contract enforcement are not only important for the growth of innovative and complex value chains but also help in ensuring that legal arrangements within the network of firms are stable and predictable (World Bank, 2020). In SSA, the quality of property rights and contract enforcement is weak with a score of 38.9%, falling behind the Middle East and North Africa with an average score of 48.0% as of 2019 (Heritage Foundation, 2020).

There are numerous empirical studies on the four key factors that shape GVCs as identified by Gereffi (1994), however out of these four factors, market size (Lopez-Gonzalez, 2012; Kowalski et al. 2015; Rubínová, 2017; Cheong, Kwak & Tang, 2018; Barnabas et al, 2019) and geography have received significant attention in the GVC research, while institutions seem to be accorded little attention (Antras & Staiger 2008; Dominique, 2014; Barnabas et al, 2019). For example, Lopez-Gonzalez, (2012) work focuses on OECD countries, Cheong, Kwak, and Tang (2018) covers both developed and developing economies irrespective of their regions apart from neglecting the role of the institution. More relevant to this study is the work of Barnabas et al, (2019), which estimates a gravity model to examine the influence of intermediate tariffs on intermediate export and its implications on Regional Value Chains (RVCs) in the West African region while controlling for the institution. This study significantly differs from their study in terms of focus and approach. The study focused on the role of the institution in GVCs without downplaying the importance of intra-regional trade agreements. Specifically, the study adopted a set of institutional indicators that are specific to trade rather than using a generic institutional variable as produced by WGI. Equally, the study proxy GVC participation with Global Value Chain index developed by Koopman et al. (2010) to capture value chain participation instead of using intermediate export that captures only domestic value-added. Most importantly, different techniques of estimating the gravity model have been applied in the literature: System GMM, OLS, and Heckman two-step technique as in the case of Barnabas et al. (2018). One major shortcoming associated with the use of the Heckman technique is the difficulty in finding good exclusion restriction in the first stage probit estimation, thereby producing biased results (Yoyo, Roberta,

Monteiro, and Larch, Und.). The study adopts Poisson Pseudo Maximum Likelihood (PPML) technique developed by Santos, Silva, and Tenreyro (2006) a model that produces a robust result, even in the presence of many zeros common with the gravity trade model. The study, therefore, aims at investigating the role of RTAs and institutions on GVCs participation in ECOWAS Countries over a period of 19years (2000-2018). The paper is organized as follows: Section 2 reviews the relevant literature on the link between trade policies, institutions, and GVCs; section 3 derives the standard gravity model, the dataset used, and techniques, while Section 4 documents the procedures and discussion of the results. The final section concludes with policy recommendations.

2.0: Methods

To estimate the influence of institutions and other drivers of GVCs participation, the study adopts a gravity trade model consisting of 15 ECOWAS countries covering a period of 19years (2000-2018). In terms of the scope, we are constrained by the non-availability of data for some variables over a long period. In particular, data on intermediate tariffs are only available from the year 2000. A standard gravity trade model posits that trade across international borders between two countries varies directly to the ratio of their sizes and indirectly related to the trade friction between them. Following Yotov et al., (2016) we specified a standard gravity model as shown in equation 2.1

$$X_{ij} = \bar{G} \frac{Y_i E_j}{T_{ij}^{\theta}} \dots \dots \dots (2.1)$$

Where X_{ij} is the exports from countries i and j , $\bar{G}$ is the inverse of world production Y_i and E_j stand for country i domestic outputs, country j total expenditure, and T_{ij}^{θ} is define as $T_{ij}^{\theta} = \left(\frac{l_{ij}}{(\Pi_i \rho_j) \Pi_i} \right)^{1-\alpha}$ Equation 2.1 indicates a theoretical gravity equation that can be decomposed into two components; the trade size $(Y_i E_j)/Y$ and the trade cost term $l_{ij}/(\Pi_i \rho_j)$ as shown in equation 2.2.

$$X_i = \frac{Y_i E_i}{Y} \left(\frac{t_{ij}}{\Pi_i \rho_j} \right)^{1-\alpha} \dots \dots \dots 2.2$$

Where $\Pi_i^{1-\alpha}$ and $\rho_i^{1-\alpha}$ are as defined in equation 2.2A and 2.2B respectively:

$$\Pi_i^{1-\alpha} = \sum_i \left(\frac{t_{ij}}{\rho_i} \right)^{1-\alpha} \frac{E_i}{Y} \dots \dots \dots 2.2A$$

$$\rho_j^{1-\alpha} = \sum_i \left(\frac{l_{ij}}{\Pi_i} \right)^{1-\alpha} \frac{Y_i}{Y} \dots \dots \dots 2.2B$$

The wisdom behind the size term $(Y_i E_i)/Y$ is to account for the level of frictionless trade between partners i and j , if no trade cost exists. A frictionless world market indicates that the price of a given commodity is the same for all consumers regardless of their location. Thus, the size term ensures that the export of large producers i will be higher to all markets, while the importation of countries with the rich and bigger market j will be more. Assuming countries j and i are similar in size, the flows of trade between the two partners will be more (Yotov et al., 2016). The trade cost term $\left(\frac{t_{ij}}{\Pi_i \rho_j} \right)^{1-\alpha}$ on the other hand, consists of three components used to measure the total overall effects of trade cost that create barriers between realized and frictionless trade. ρ_j represents inward multilateral resistance, measuring importer j ease access to market, while the structural term Π_i stands for outward multilateral resistance and measure exporters' i ease of entering the market (Anderson and Van Wincoop, 2003). Given equation 2.2, we log linearize the equation and add an error term that is additive.

$$\ln X_{ij,t} = \ln E_{j,t} + \ln Y_{ij} - \ln Y_t + (1 - \sigma) \ln t_{ij,t} - (1 - \sigma) \ln \rho_{j,t} - (1 - \sigma) \ln \Pi_{i,j} + \varepsilon_{ij,t} \dots \dots \dots 2.3$$

Gravity model of the type in equation 2.3 is biased, characterized by inconsistencies, and does not control for multilateral resistance terms. The multilateral resistance terms $\rho_{j,t}$ and $\Pi_{i,j}$ are not directly observable resulting in Gold Medal Mistake (Baldwin and Taglioni, 2006). Feenstra (2016) suggested an approach that overcomes the shortcomings associated with Anderson and Van Wincoop, (2003) by accounting for the multilateral resistance using exporter-time and importer-time fixed effects, while at the same time absorbing the size and cost variables ($E_{j,t}$ and $Y_{i,t}$) together with other country-specific characteristics that are both observable and unobservable which vary across entities. Some of these country-specific features are institutions, exchange rate, infrastructures, and national policies. A common approach used in empirical literature to proxy for the bilateral trade cost term $(1 - \sigma) \ln t_{ij,t}$, in a gravity specification is by using a series of observable variables that have become standard covariates in the empirical gravity model (Yotov et al., 2016), as defined in equation 2.4:

$$(1 - \sigma) \ln t_{ij,t} = \alpha_1 \ln \text{DIST}_{ij} + \alpha_2 \ln \text{CONTIG}_{ij} + \alpha_3 \text{COML}_{ij} + \alpha_4 \text{Landlocked}_{ij} + \alpha_5 \text{RTA}_{ij} + \beta_0 T_{ij,t} \dots \dots \dots 2.4$$

Substituting equation 2.4 into 2.3 we have equation 2.5

$$\ln X_{ij,t} = \Pi_{i,t} + \chi_{j,t} + \alpha_1 \ln \text{DIST}_{ij} + \alpha_2 \text{CONTIG}_{ij} + \alpha_3 \text{COML}_{ij} + \alpha_4 \text{Landlocked}_{ij} + \alpha_5 \text{RTA}_{ij,t} + \beta_0 T_{ij,t} + \beta_1 z_{ij,t} \dots \dots \dots 2.5$$

Where $\Pi_{i,t}$ represents the vector of export-time time effects (outward multilateral resistance and $\chi_{j,t}$ denotes importer-time effects (inward multilateral resistance. DIST, CONTIG, COML, and Landlocked represent the bilateral distance between two trading partners, contiguity, common language, and landlocked, while RTA and $T_{ij,t}$ are both trade policies (regional trade agreement and bilateral tariffs respectively). $z_{ij,t}$ is a vector of other country-specific features that are observable and $\ln E_{j,t}$ and $\ln Y_{ij}$ are as defined in equation 2.3. The estimation of gravity model using OLS of the type in equation 2.5 has some drawbacks, some of which are its inability to account for the information contained in zero trade flow (in our own case zero value-added), particularly when dealing with a disaggregated trade data (Yotov et al., 2016). Head and Meyer (2014) suggested the use of an arbitrary but very small value to replace the zero trade flows with its associated shortcomings, while Helpman Melitz and Rubinstein (HMR) (2008) propose a two-step selection process where some fixed costs must be absorbed by exporters to penetrate a market. The limitation of HMR (2008) is difficulties in finding good exclusion restrictions for the first stage Probit estimation (Yotov et al., 2016). Thus, this study adopts a more convenient and easy approach to the presence of zero trade flows proposed by Santos Silva and Tenreyro (2006), by applying (PPML) estimator to estimate the gravity trade model. There are many advantages associated with PPML approach: (i) its estimator has the ability to accounts for heteroscedasticity, which often distort trade data; (ii) take advantage of the information contained in the zero trade flows and (iii) it equally ensures that the fixed effects are identical to their corresponding structural terms (Fally, 2015). Above all, considering the peculiarities associated with African bilateral intermediate trade with about 40 percent of zeros total trade, a technique like PPML that is capable of handling zeros trade comes to mind. We compare the result from PPML with those of other techniques (OLS and FGLS) as a robustness check.

Following the work of Rubínová (2017) and Barnabas et al. (2019) by extension we specify an augmented multiplicative gravity trade model, as shown in equation 2.6:

$$\begin{aligned}
 GVCP_{ijt} = & \Pi_{i,t} + \chi_{j,t} + \alpha_1 \ln(INST_{it} \cdot INST_{jt}) + \alpha_2 \ln(IMTR_{it} \cdot IMTR_{jt}) + \alpha_3 WAMZ_{ijt} \\
 & + \alpha_4 WAEMU_{ijt} + \alpha_5 (CONTIG_{ijt}) + \alpha_6 COML_{ijt} + \alpha_7 Landlocked_{ijt} \\
 & + \alpha_8 \ln(DIST_{ijt}) + \alpha_9 \ln(SIMGDP_{ijt}) + \alpha_{10} \ln(FEDW_{ijt}) + \alpha_{11} lnfst_{ijt} \\
 & + \alpha_{12} lngfc_{ijt} + \alpha_{13} lnexr_{ijt} + \alpha_{14} lnEduc_{ijt} \\
 & + \varepsilon_{ijt} \dots \dots \dots (2.6)
 \end{aligned}$$

Where GVCP represents GVC participation, which stands as the dependent variable. To measure GVCs participation, previous studies in particular Barnabas et al., (2019) have measured value chains as intraregional intermediate export which only captures domestic value added (DVA) (Dominique, 2014). In this study, we follow Koopman et al. (2010) and UNCTAD (2013) formula to generate an indicator for global value chain participation as:

$$\frac{FVA}{TEXP} + \frac{DVA3}{TEXP} = \frac{FVA + DVA}{TEXP}.$$

Where FVA represents the foreign value-added, DVA3 captures the proportion of the country's value-added in part of third-country export and TEXP represents the total country export. The equation implies a country is well integrated into global production networks if it sources many of its inputs from abroad (downstream participation) and a large proportion of its value-added is part of third countries' exports (upstream participation), relative to its total exports (Dominique, 2014). SIMGDP on the other hand is the size term, which measures similarity in the level of economic development. Following the new trade theory and in line with the previous empirical studies, the larger the volume of trade between two countries, the more similar they are in size (Yotov et al., 2016). Therefore, we expect a positive relationship between similarity in size and GVC participation. Following the work of Barnabas et al., (2019), we measure the similarity in level of

economic development as $1 - \frac{GDP_{it}^2}{(GDP_{it} + GDP_{jt})^2} - \frac{GDP_{jt}^2}{(GDP_{it} + GDP_{jt})^2}$. To capture the influence of differences in factor endowment (FEDW) on global value chain participation, we introduce two different proxies; total labour force (lab) and total natural resource rents (Tnrr) in line with Weng (2010) and Ruba and Andrew (2020) respectively. We expect a positive influence of *FEDW* on GVCP. *IMTR*, *WAEMU*, and *WAMZ* are proxies for trade policy. *IMT* represents intermediate tariff used to capture the impact of trade policy on GVC participation, sourced from World Trade

Integrated Solution WTIS. High intermediate tariffs on goods that cross borders multiple times is capable of increasing the cost, thereby discouraging GVCs participation (Barnabas et al., 2019). WAMZ (consisting of Nigeria, Gambia, Ghana, Guinea and Sierra Leone) and WAEMU (consisting of Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo) are used to capture the presence of bilateral Regional Trade Agreements (RTAs) between two trading partners, which is also a dummy variable that takes the value of 1 if the two countries are a member of the same RTAs, and 0 otherwise. For the list of WAEMU and WAMZ.

Our variable of interest is institution (InInst) proxy by the index of economic freedom consisting of four major categories of the institution; (i) rule of law, (ii) government spending, (iii) business efficiency, and (iv) open market. The existence of an effective and efficient institution ensures that individuals are allowed to acquire, hold, use private property, while contracts are adequately enforced and the rule of laws respected. It is an index bounded between 0-100, the higher the score, the better the quality of the institution. The previous empirical literature has also considered institutional quality as determinants of the global value chain (Álvarez and Barbero, Rodríguez-Pose, Andrés and Zofío, 2018; Barnabas et al., 2019), some of which have either adopted the World Governance Indicators (WGI) or International Country Risk Guide (ICRG) institutional data set. This study considered the index of economic freedom to be of more relevance in a trade-related study. The index specifically measures the extent to which an economy is opened to international trade without downplaying the issue of property rights and rule of law within a country (Heritage Foundation, 2020). To test the robustness of the various dimensions of institutional quality on regional value chains, we again regressed four separate sub-components of the economic freedom index; property rights, government integrity, business and trade freedoms on GVCP using a step-wise approach to estimation. For instance, weak property rights (sub-components of the rule of law) that impair the enforcement of the contract, increase the cost of intermediate goods, and discourages GVCP by acting as tariffs on risk-neutral traders (Azmat and Biman, 2006). Government integrity measures the extent of the systemic corruption of government institutions by an act such as bribery and embezzlement, with a high probability of discouraging intra-regional GVCP by adding to trade cost (Wei, 2000).

Our gravity data, $CONTIG_{ij}$ is an indicator variable, which represents contiguity used to capture the presence of contiguous borders between two trading partners. It assumes the value of 1 if the pairs of countries share a common border and 0 otherwise. It is expected that the likelihood of trade between two countries that share the same border will be higher. $COML_{ij}$ is also a dummy variable that takes the value of 1 for common official language between country i and j . Previously considered in a trade model as an explanatory variable is landlocked. A landlocked economy is in most cases a natural resource-based economy usually at a disadvantage in global trade competitiveness with weak export-based (UN- OHRLLS, 2013), thus we expect the declining impact of landlocked on GVCs participation. To account for the influence of bilateral distance ($\ln Distw$) between trading partners i and j on GVCs, the paper measured $DIST$ by weighted distance. It is expected that the closer the distance between two countries the higher the probability of increased volume of trade between the two countries and by extension the higher the GVC participation rate.

Additional regressors included in z_{ijt} are motivated by the literature on intra-regional trade. These are infrastructures, exchange rate, and level of technological advancement. The Economic Commission for Africa (2010) noted that the degree of African Intra-regional trade has been low when compared with other regions, due to poor infrastructure development, while Azmat and Biman (2006) argued that an appreciation of exchange rate does not harm GVC growth. Therefore, these three important variables were also considered. Infrastructural facilities ($lnfst$) proxy by mobile telephone diffusion rate and measured as a total number of cellular subscriptions in a country per 100 can help to overcome the obstacles likely to be faced by a landlocked economy while exchange rate ($lnexr$), level of education ($lnEduc$) used as a proxy for the quality of skills and level of technology ($lngfc$) were measured by the real effective exchange rate, secondary school enrolment, and annual total gross fixed capital formation respectively. The $lnexr$ is included as an important measure of a country's international price competitiveness, while differences in the level of technology are a significant determinant of comparative advantages and thus country's participation in GVC (Azmat and Biman, 2006). ε_{ijt} indicates idiosyncratic error term for country i and j at time t . All the variables are transformed into the natural log except for gravity data and data that are in rates. Apart from data used in the computation of GVCs participation rate, gravity data and institutional data that were sourced from UNCTAD-Eora data, CEPII data-based, and

Heritage foundation, respectively, all other variables were sourced from the World Bank database (2020). The data were analysed using Stata version 14.0

3.0: Review of Literature

Global Value Chain (GVC) is the fragmentation of production of goods and services into a series of stages with value addition in each of the stages and two of which are in different countries. Therefore, a country participates in GVC if it is involved in at least one of these series of stages. Although the form of foreign value-added in production GVC will take is not specifically stated, it is usually linked to international trade in raw materials or intermediate goods. GVC ensures an international division of labour through breaking down of production into stages across international borders, thereby increasing specialization, as well as ensuring optimum allocation of resources not only across borders and sectors but even within sectors. One main distinguishing feature between GVCs trade and international trade is the crossing of borders of intermediate goods multiple times and compare to ordinary international trade that can take place within the two countries. Four key drivers of GVCs have been identified in the extant literature among which is an institution. An institution is the rule of the game, formal or informal, that is humanly devised to; ensure the protection of property rights and contract enforcement, and guide social interaction (North, 1990). Institutions are not only important for the growth of innovative and complex value chains but also help in ensuring that legal arrangements within the network of firms are stable and predictable (North 1990; World Bank, 2020). An institution can be viewed in three different ways; Viewing institution as formal rules, encompasses laws, policies, bureaucratic institutions, government agencies with significant organizational standing, while as informal, it encompasses culture (beliefs and values) and popularly shared meanings by people that are generally approved in society. In between the formal and informal types of institutions, institution can be considered as a stable pattern of interaction between individuals' stakeholders and public officials, which structure how the interest of the society comes to be unified as a set of rules guiding economic activities. This emanates through voluntary adherence to common rules, reciprocity, and trust (Eckhardt and Poletti, 2018).

A review of the literature revealed the existence of several international trade theories, industrial organization theory, new economic location theory among others. More relevant to this paper is

the New Trade theory which is an offshoot of the international trade theory. The new trade theory argued that the economies of scale in production will be higher when a country specializes in the production of few goods in which it has a higher comparative advantage than struggling to produce all its needs. To the proponents of this theory, world output will be greater and consumption will be higher with free trade, which encourages countries to produce limited goods within their capacity, allowing other countries to engage in the production of goods in which it has a lower comparative advantage (Barnabas et al., 2019). This conclusion is predicated on the economic theory that the consumer always wants more than less. This instinct inherent in every economic being promotes the need for product innovation and differentiation by firms, which satisfy their cost minimization and larger output objectives through trade in intermediate goods (Lopez-Gonzalez, 2012).

Lopez-Gonzalez (2012) examined the impacts of the Free Trade Area (FTA) on the value of intermediates imports obtained from input-output (IO) tables for the Trade-in Value Added (TVA) among Organisation for Economic Cooperation and Development (OECD) member countries. The result from the fixed effects model after controlling for endogeneity revealed that FTA positively influenced the value of intermediate imports by 25%. Cheong, Kwak, and Tang (2018) used bilateral tariff rates for 90 importing and 149 exporting economies to investigate trade effects of Free Trade Agreements (FTAs) over a period of 1996-2010. The result of the gravity model indicates that: (i) the custom unions (CUs) and FTAs increases the volume of trade, though the effects of the customs union are stronger, especially for FTAs' intensive margin (volume) of trade and the extensive margin (probability) of trade; (ii) the effect of customs union stems mainly from changes in non-tariff measures, while that of FTAs comes from changes in both tariff and non-tariff measures; and (iii) changes in non-tariff measures connected with CUs have a stronger trade impact on those connected with FTAs.

Rubínová (2017) constructs a panel of 31 developing economies to look at the impact of regional economic integration on the types and the extent of GVC participation measured by the *sum of domestic value-added* (DVA) and foreign value added (FVA). Using PPML technique, he confirmed that FTA increases production fragmentation and enhances trade between developed

and developing economies as well as improving the participation of the less developed countries in upstream stages of production and contribute more domestic value-added into the supply chain

Álvarez *et al.*, (2018) investigate the nature of the influence of national institutional quality on bilateral sectoral trade flows together with the trend of the influence. Using a cross-country data set covering 186 countries over a period of 17years (1996-2012). The study adopted PPML technique to estimate the impact of institutions measured by Kaufmann institutional indicators from WGI on the trade of tangible goods. Their empirical results confirmed that the quality of an institution of the importing countries and the institutional distance are significant determinants of bilateral trade. The result of the sector-by-sector analysis indicates that the influence of institutional conditions on bilateral trade exhibits a stable increase across all the sectors with agriculture taking the lead, followed by raw material. The results further revealed that trade policy proxy by a regional trade agreement, exchange rate, contiguity, and common language positively influence bilateral trade.

Souleymane (2009) examines the effects of trade agreements on bilateral trade flow, focusing on 22 RTAs involving 176 exporters and 180 importers mostly developing economies over the period 1962-2006. Using Hausman -Taylor specification, it was found that distance measured by Geo-distance, is a declining function of bilateral trade flows while higher GDP proxy for size induced higher bilateral trade. The study further indicates that higher infrastructural facilities measured by the number of telephone subscribers also impact bilateral trade positively. Examining the effects of RTAs on trade volume, the study revealed a mixed result. Specifically, ArFTA barely impacts intra-regional trade positively, while it has a significant declining impact on the members' import, indicating that ArFTA is more about trade diverting than trade creating in terms of intra-regional trade. It was further revealed that Intra-CACM export performance over the years under review seems to be below for the whole of RTAs considered in the study by impacting members exports to the rest of the world negatively.

In another study on the trade diversion and trade creation effects of RTAs, Yang, and Inmaculada (2013) adopted the Heckscher-Ohlin model as a theoretical framework for a gravity trade model consisting of 31 countries over the period covering 1995 to 2010 to investigate the impact of the ASEAN-China Free Trade Agreement (ACFTA) on exports. The results of the pool OLS and

fixed-effects models revealed that ACFTA has trade creation effects on manufacturing and chemical goods using disaggregated data. The aggregated panel further confirms a significant trade creation effect on exports with an average treatment effect of 118.6 percent which was higher than expected from normal levels of trade.

In a panel of four countries, Azmat and Biman (2006) look at the impacts of an institution on trade measured by the ratio of exports to GDP, the ratio of imports to GDP, and the ratio of total trade to GDP using data covering a period of 1996 – 2005. The pool OLS results revealed that institution proxy by rule of law has a significant negative impact on trade, while the impact of government effectiveness is also insignificantly negative. The impact of control of corruption and regulatory framework on bilateral trade is significant and positives. The results further revealed that on average, the impact of exchange rate proxy by the real exchange rate and technology on trade is positive but insignificant and positively significant respectively.

In addition to institution, several studies have also demonstrated that factor endowment is crucial for value chain participation. The endowment view argued that differences in natural resource endowment had an indirect significant influence on intra-regional trade through its impact on the quality of institutions (Mohsen, 2017; Ruba and Andrew, 2020) and directly on the global value chain (Barnabas et al., 2019). Mathias, Axel, Silke and Steffen (2007)'s empirical study on the nexus between institutions, governance, and trade in ECOWAS countries revealed that population, a proxy for factor endowment has an insignificant positive impact on intra-regional trade throughout the estimations. They concluded that qualitative institution is fundamental to a successive intra-regional trade. This result is further confirmed by Barnabas et al. (2019) in a study on ECOWAS when they concluded that on average the effect of relative factor endowment on GVCs is negative and significant. Nicholas and Maxwell (2018) look at the relationship between African RTA and intra-regional trade using the gravity trade model. The results of the estimated PPML techniques suggest that RTA is trade creation by enhancing intra-regional trade, while the impact of natural endowment on intra-regional trade is on the average, insignificant. Ying, David and Xinding (2020) investigates the impact of institutions on GVC participation in OBOR and non-OBOR countries using a panel of 56 sectors across 43 countries in WIOD from 2000 to 2014. Their results confirmed a positive significant impact of all indicators of institutional quality on

GVCs. This suggests that an economy with qualitative institutions will achieve a higher degree of GVCs participation in industries that depend on better institutions.

In a panel of both developing and developed economies, Kowalski et al. (2015) examined various determinants of the value chain and its economic benefits through the estimation of the gravity model, while controlling for time-invariant country-specific characteristics. Adopting variation in per capita domestic value-added as a proxy for GVCs performance, their empirical evidence indicates that improved productivity, diversified export-based, and enhance product sophistication are some of the opportunities an economy stands to gain in GVCs participation. For an improved GVCs participation, their results identified geography, population, level of development within a framework of strong and qualitative institutions to be germane.

Furthermore, the importance of information and communication infrastructure in enhancing GVCs participation was also highlighted by some empirical studies. For example, Jiang and Dinkneh (2019) analysed the impact of institutional quality and infrastructures on intra-regional trade covering a sample of 44 African countries on 173 trade partners for the periods 2000–2014. Principal components analysis was used to derive aggregate indicators for both institutions and infrastructure and adopted a two-step Heckman (1979) sample selection procedure to estimate the gravity model of trade flow of African countries. Their result implicates institutional quality, transport efficiency, physical and communication infrastructure as significant determinants of intra-regional trade.

Few studies have directly examined the link between institutions and GVCs in Africa, some of which are Slany (2017) and Barnabas et al., (2019). Slany (2017) looked at the effects of trade policies in the expansion of regional value chains spanning 2006 through 2012. Using a matrix of global value-added export sourced from UNCTAD-EORA CVC database as dependents variable, the result of the fixed effects estimator after controlling for cross-sectional dependence and auto-correlation revealed that, South Africa stands out among other countries when considering the level of trade integration in the African region. Slany (2017) further found that tariffs on capital goods placed the highest constraints on imported foreign value-added. In the case of Barnabas et al., (2019), analyzing the effects of intermediate tariffs on intraregional intermediate export among

ECOWAS countries spanning the period 2000-2015, using Heckman Two-step technique to estimate the gravity trade model. They found that the existing effective applied tariff level has an insignificant impact on the dependent variables. This implies the prevailing tariff policy in the region would neither help in the creation of new value chains nor deepen the integration of existing ones in ECOWAS. Further, Heckman revealed that the quality of the institution has a significant positive influence on GVCs, while the auxiliary regression indicates an insignificant influence. Based on the result of auxiliary regression Barnabas et al., (2019) conclude that the quality of institution in the ECOWAS region constraints intermediate exports. More relevant to this study is the work of Barnabas et al. (2019), unfortunately, the study suffered from measurement error by measuring value chains as intraregional intermediate export, which only captures Domestic Value Added (Dominique, 2014). This study attempts to correct this shortcoming by using indicators for global value chain participation as developed by Koopman et al. (2010).

4.0: Empirical Results and Discussion

The analysis of data commenced with the estimation of baseline equation 2.6. For comparison purposes, different techniques of data analysis, such as Pool OLS, Feasible Generalized Least Squares (FGLS), and Poisson Pseudo Maximum likelihood (PPML) were employed. The PPML technique is the technique of interest upon which conclusions were drawn. The estimation of equation 2.6 commences with ordinary OLS without controlling for multilateral resistance terms and the result is presented in Column (1) of Table 4.1. The estimated results in Columns (2) and (3) use exporter-time fixed effects and importer-time fixed effects in the estimation of OLS and FGLS respectively. Finally, in column (4) we estimated the PPML fixed-effects approach. This last approach is adopted throughout the estimation of auxiliary regressions presented in Table 4.2. Table 4.1 here

The results in Table 4.1, column (1) confirm that aggregate institutional quality (lnInst) has a negative significant impact on GVCP. Controlling for the remoteness index using OLS, FGLS, and PPML techniques as presented in Columns (2-4) the results revealed a positive significant impact of institutional quality on product fragmentation. Based on the result of our technique of interest (PPML), it could be concluded that qualitative institution is GVCs enhancing. This result corroborates previous empirical studies by Marquez-Ramos (2016) and Ying, David, and Xinding (2020) in a sectoral analysis of firms in china and Jiang and Dinkneh (2019) on the impact of

institution and infrastructure on GVCs in Africa. The result of Barnabas et al. (2019) is mixed while considering the West African sub-region. Their baseline regression result is supportive of the present findings while the result of the auxiliary regression indicates that the quality of institutions in ECOWAS countries constraints intermediate exports. These mixed findings on the impact of institutions on GVCs confirmed by Barnabas et al. (2019) might be attributed to the choice of proxy used in the measurement of GVCP and institutional quality.

For the sake of comparison and to further empirically established the nature of the impact of the institution on GVCP, a stepwise regression analysis for each of the four subcomponents of economic freedom was conducted. The results of auxiliary regression presented in Table 4.2 Columns (5-7) further confirmed that on the average, institution has a significant positive influence on GVCP except for trade freedom (LnTrafr) in column (8) that exerts a significant negative impact on GVCP. This result provides empirical support for the recent report by the World Bank in which out of 42 economies with the highest score in terms of improved ease of doing business, five were from the West African sub-region (World Bank, 2020b). Trade freedom measures the extent at which tariffs and nontariff policies constraints imports and exports of goods and services. Therefore, one can but not expect anything better because intermediate tariffs in West African sub-region is still very high and has not been helpful in encouraging intra-regional trade. The insignificant impact of property rights (LnPropr), which assesses the effectiveness of government in protecting individuals' rights to acquire, hold, and utilize private property, per established rules of laws indicates the need for an improved adherence to the rule of law in the region.

Table 4.2 here:

On the impact of trade policy on the GVCs participation, the result in Table 4.2 Column (4) revealed that the coefficient of intermediate tariff (LnImtr), a proxy for trade policy is correctly signed and significant, tariffs on intermediate goods increases production cost thereby discouraging intra-regional trade in production fragmentation in line with the work of Obasaju, Olayiwola, Okodua, and Obasaju, (2018). This result provides further support for the significant negative impact of trade freedom (one of the sub-components of economic freedom index, a proxy for institutional quality) obtained in the auxiliary regression presented in Table 4.2, Column (8). The negative significant impact of intermediate tariffs on intra-regional trade implicates the

inability of ECOWAS as a regional body to achieve one of their mandates relating to harmonization and achievement of tariff rates that are supportive to intra- regional trade flow. The auxiliary regression presented in Table 4.2 Columns 5-8 using PPML with fixed effects techniques further confirmed that $\ln \text{Intr}$ is unfavourable to intra-regional trade flow. Conclusively, tariff rates in the Africa sub-region are yet to be reduced to such an extent that it can improve GVCs within the region. These called for the need by policymakers in the region to look inward and arrests the upward trend of intermediate tariffs in the region.

Regional Trade Agreements (RTAs) as another proxy used in examining the impact of trade policy on GVCs in West Africa and whether they are trade creating or trade diverting. It was confirmed that WAEMU, which represents trade agreement has a positive and significant impact on GVCs participation going by the results of FGLS and OLS at 1% and 5% level of significance. This implies that WAEMU encourages trade amongst members and as such trade creating in line with Nicholas and Maxwell (2018). On the other hand, the coefficient of WAMZ, is negative and significant, indicating that the RTA is trade diverting also in support of Barnabas et al. (2019) which used export as a proxy for GVCP.

Looking at the behaviours of our gravity data, (Contig, Coml, landlocked, $\ln \text{Distw}$), the results generally are correctly signed, but insignificant going by our baseline regression (PPML) results. Except for the coefficient of OLS presented in Column (1) of Table 4.1, the impact of sharing a common border on GVCP is positive but insignificant. It is expected that sharing of the border and speaking of the same official language between two countries should be an increasing function of bilateral trade, but the reverse is the case in the present study. This contradicts the findings of Obasaju, Olayiwola, Okodua, and Obasaju, (2018) in which a significant negative significant impact was confirmed, but in line with the results obtained from Heckman result presented by Barnaba *et al.* (2019). The coefficient of distance is wrongly signed and insignificant, going by the OLS results in Columns (1) and (2) while using FGLS and PPML techniques it was positive but equally insignificant. On the average, we could conclude that distance is not a constraint to bilateral trade as against the proposition of Head and Meyer (2014). Going by the scope of this study that focuses on a single region, the majority of which shares the same borders, one should not, but expect a positive influence of distance even though the impact is insignificant. From the results

reported in Columns (3 & 4) of Table 4.1, one might observe that the estimates of distance and contiguity are no longer negatives using FGLs and PPML that control for multilateral resistance. This indicates that the OLS result presented in Column (1) were truly biased as argued by Anderson and Van Wincoop (2003). The coefficient of Landlocked presented in Table 4.2 is statistically significant and in line with economic theory lending support to establish facts that landlocked is a declining function of intra-regional trade. The result of the auxiliary regression further confirms the results obtained from the baseline regression that the presence of landlocked is harmful to bilateral trade in intermediates, corroborating Barnabas et al. (2019) findings. The coefficient of output is significant and positive, which is in line with the expected results while that of expenditure is negative, but insignificant as reported in columns (1-3) of Table 4.1. These contradictory results can be explained by Olivero and Yotov (2012) conclusion that output and expenditure covariates usually account for dynamic forces in a panel specification. The coefficient of exporter remoteness index is positive but insignificant indicating exporter ease of entering the market as an insignificant increasing influence on intra-regional trade, while importer remoteness (importer ease of entering the market) index is significantly negative and large indicating it is a decreasing function of GVCP.

Considering the similarity in size of countries as a determinant of bilateral trade flows, SIMGDP impacts GVCs participation among ECOWAS countries positively at 1% level of significance. This result was further confirmed in the auxiliary regression results presented in Table 4.2 column (7&8), indicating the presence of South-South trade. Therefore, the similarity in the size and level of development among the countries in West Africa presents opportunities for increased global value chains in the region. This is in line with Linder's hypothesis and similar studies have also established the possibility of South-South trade.

Other important variables considered in the study are level of technology ($\ln Gfc$), which is economically significant, but statistically insignificant throughout the estimations refuting the earlier conclusion of a positive and significant impact of technology by Azmat and Biman (2006). This contradictory result might be explained by the Pool OLS technique adopted by Azmat and Binam (2006) with a very small panel of four countries. Existing literature have identified differences in the level of technology as a significant determinant of comparative advantages,

which underline bilateral trade. In Africa, the technology level is low, hence the majority of the countries in the region still depend on developed countries for the transformation of their intermediate goods to finished goods, a scenario that explains the low rate of intra-regional trade. The coefficient of Infrastructure (lnInfs) going by the results of OLS, and FGLS as shown in Table 4.1 in Column (1-3) are economically and statistically significant at 1%, while the PPML result revealed a negatively significant impact of infrastructure on GVCP. Base on the superiority of PPML techniques earlier identified over other techniques, we conclude that infrastructures have hindered intra-regional trade in the region. It should be noted that infrastructural facilities are the only alternative to overcome problems associated with landlocked economies, hence the negative significant impact of landlocked on GVCP can be attributed to poor levels of infrastructures in the region. The exchange rate, which determines the country's international price competitiveness was dropped by the PPML due to endogeneity of the variable, but going by the OLS and FGLS results in Table 4.1 Column (1-3), exchange rate positively impact GVCs in the region contradicting Azmat and Biman (2006) whose result confirmed a positive but insignificant impact.

Examining the impact of factor endowment proxy by total labour force (lnLab) and total natural resource rents (FEDW) on production fragmentation, the results revealed that factor endowments have significant negative impacts on GVCs going by the result of PPML technique. This indicates a breakdown of both Heckscher-Ohlin and the new trade theories, and in line with the findings of Barnbas (2019) in which only the total labour force was used as a proxy. Based on the Heckscher-Ohlin theory, bilateral trade between two or more countries with similar relative factor endowments could still be beneficial to the trading partners as far as they specialize in the production of goods in which they have a comparative advantage, while the new trade theory posits that the insatiable instincts in every consumer will spur a producer to demand for semi-finished goods, establishing the basis for the crossing of borders of intermediate goods in multiple of times. It is imperatives to note that the level of technology in the West African sub-region is low and as such little value could be added to the available natural resource endowments, hence the presence of these natural resources can be said to be trade diverting then trade creating. The coefficient of the level of education (lnEduc) is economically and statistically at 1% level of significance. This implies the acquisition of skills through qualitative education is germane for the participation of countries in GVCs.

Examining the robustness of the overall results presented in Table 4.1, column (1-4) it could be concluded that the model is robust to all post estimation tests irrespective of the technique adopted as revealed by the P-value for the reset test, the Wald chi-squared and the R-squared values. The R-squared values indicate that the independent variables explain about 97% of the behaviour of the dependent variable. All the standard errors are robust to autocorrelation and heteroskedasticity.

5.0: Conclusion and Recommendation

Intra-regional trade in Africa, in particular, trade in intermediate goods which enhances GVCs participation rates has been low due to the presence of various challenges like unharmonized trade policies, geography, and economic size required for successful integration to global markets. Attempts to overcome these challenges and enhance production fragmentation within the region, particularly in the West African sub-region, led to numerous regional trade agreements like WAEMU and WAMZ, while a new agreement for the establishment of the African Continental Free Trade Area (AfCTA) is about to take-off. Using PPML technique to analysed a panel of 15 countries covering a period of 19years, this paper provides new evidence on the significance of institutions in the enhancement of GVCs in the West African sub-region. Empirical evidence thus supports the significant roles of institutions in enhancing GVCs participation in ECOWAS countries, while indicating that trade policies have failed to improve the level of global value chains in the sub-region. In particular intermediate tariffs have not been reduced to an extent that it could encourage intra-regional trade, while the impact of RTAs on the level of GVCs participation in the regions have been mixed. Also confirmed as obstacles to the growth of GVCS are geography, infrastructures, and technology. However, the similarity in the level of development among countries in West Africa presents opportunities that could mitigate obstacles to the growth of intra-regional fragmentation of production. In this respect, the policymakers in the region should consider harmonization of tariffs as paramount while strengthening the quality of institutions, infrastructures, and technology necessary for overcoming obstacles associated with landlocked and factor endowments. The paper concludes institutions are central to GVCs participation in the West African sub-region and indeed it enhances intra-regional trade.

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Declarations

Ethics approval and consent to participate: Not Applicable

Consent for publication: The author consents to the publication of the paper.

Availability of data and materials: All raw data generated or analysed during this study are included in this published article as supplementary information file.

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Appendix I Here:

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