

Tariffs, Margins, and the Export Response: ECOWAS at Europe's Gate

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ABSTRACT

This paper quantifies how EU tariff cuts transmit to export performance among ECOWAS economies by embedding tariff variation into a gravity-model panel with country-pair fixed effects. Using logged trade values and multiple estimators (OLS, FE, RE, BE) alongside a Hausman test, the analysis isolates an elasticity whereby a 1% reduction in EU import tariffs is associated with roughly a 0.487% rise in ECOWAS exports. Robustness comes from cross-specification stability and diagnostic tests, translating into policy-relevant guidance on sequencing liberalization to unlock extensive-margin participation and product scope expansion. While observational rather than experimental, the design maps tariff policy to export competitiveness with transparency on assumptions and limitations, informing negotiations and preference schemes between the EU and West African partners..

Keywords: Export competitiveness, trade liberalization, EPA, gravity model, panel data, fixed effects, Hausman test, ECOWAS, EU.

1. INTRODUCTION

The connection between trade policy and export performance is also a classic concern in development and international economics, especially in areas that want to be further integrated in global markets on a basis of asymmetric trade (Sukanya, 2025a). Among the economies of West Africa that are placed under the Economic Community of West African States (ECOWAS) the entry to the European Union (EU) market has long been modeled as a gateway to export expansion, industrial modernization as well as overall changes in the economy. The EU-ECOWAS Economic Partnership Agreement (EPA) was crafted with the aim of facilitating these objectives through allowing the preferential and gradually liberalized ECOWAS exports into the EU, whilst allowing gradual adjustment by west African nations. Even though a policy significance of this accord is undeniable, empirical understanding of the degree to which any decisions concerning EU import tariffs would be converted into quantifiable export benefits of the country within the ECOWAS region remains still to be clarified to a larger degree when one considers the disparities existing among countries, products and time (Sukanya, 2025a). This connection is essential as the presence of tariff preferences is not a sufficient outcome to create competitiveness when the supply side of competition is undercut by structural limitations, productivity disparity, or institutions. The standard trade models opine that with lower tariffs in destination markets the cost of trade declines, relative prices are enhanced in the minds of exporters, and they stimulate trade quantity generation and the switching into new lines of products (Sukanya, 2025b).

There have been mixed reflections on empirical evidence of the developing regions, however. Other research sees robust positive export reactions to a cut in tariffs, and others are precise reactions that are moderate or

disproportional that are forced by the constraints of domestic supply, ineffective infrastructures, or the capacity of firms (Sukanya, 2025b). These issues are especially topical in the ECOWAS case as the region relies on a limited set of primary commodities, the unequal development of industry, and prominent inequality between the states of the region on the economic scale (Kumar, 2025). The expansion of ECOWAS exports to the EU was observed between the mid 1990s and mid 2010s but this was concentrated within just a few countries (Nigeria, Cote d Ivory, and Ghana) whereas smaller economies were more volatile. Meanwhile, the tariff rates on ECOWAS products at EU dropped continuously notably after 2010, which illustrates the slow application of the aspects of the EPA (Kumar, 2025). The primary issue examined in the proposed research is the unavailability of region-specific, methodologically sound, evidence on the effects of EU tariff cuts on the performance of the ECOWAS exports, in the presence of unobservable bilateral characteristics and time effects (Kumar, 2025).

The available literature on trade liberalization is usually based on cross-sectional data, broad regional sampling, or on simple tariff measures which do not reflect the real margin of preference of the exporters (Lunenborg & Roberts, 2021). The policy-makers and negotiators regarding ECOWAS policies may not paint an accurate picture of the region. The study fills these gaps by introducing panel-based tariff measures into a gravity-model framework and focusing it on analyzing country pairs of ECOWAS-EU countries between 1995-2014 to enable a more believable identification of the export response to changes in tariffs. The main objective of this study is to measure the effect of EU tariff cuts on the export performance of the ECOWAS member states and to determine the intensity of such a relationship in a manner that has a direct point point application in trade policy. The research is aimed at estimating the elasticity

of ECOWAS exports as a percentage change in EU tariffs, but holds other core variables of the solution to include, economic size, distance, and exchange rates, and productivity, technology and institutional factors.

The specific objectives include: measuring the responsiveness of ECOWAS exports to variations in the level of tariffs in the EU, comparing the impact of the simple average and weighted average tariffs and test the strength of the relationship estimated among a chosen range of econometric specifications. By employing the fix effects and by using Hausman tests, the analysis aims at assuring that some characteristics of countries which cannot be observed do not skew the analysis. It serves the trade literature by giving special evidence about one of the key North-South trade arrangements that have yet to get popular quantitative evaluation despite the significance. The study does so by having a balanced dataset on panel data on different countries over a number of different years, and does so to apply the established techniques of gravity-model, to have a stronger empirical basis on understanding tariff policy in its application in the development regions of nations. The implications of the findings in terms of policies are very applicable to the ECOWAS governments, EU, and any other stakeholders in the trade negotiation and development planning. In the event that the reduction of tariffs is proven to possess positive and consistent influencing impact on exports, it is an argument in favor of greater access of the market and increased leveraging of existing inclinations (Lunenborg & Roberts, 2021). A small effect can signal the importance of other domestic reform (e.g., in infrastructure, productivity, and quality of institutions) which is complementary to the liberalization in order to reap all the benefits. By so doing, the study aids to push the discussion out of the abstract argument in support of free trade in the sense that it is based on evidence-based policy-making in the context of West African economies that have different realities.

Research Question

How can the export performance of ECOWAS member states be affected by the declining European Union import tariffs over time controlling to the factors of their economic size, trade costs, productivity and their institutional factors?

Literature Review

2.1 Export Performance and Trade Liberalization

Trade liberalization and export performance has been a hot point of debate in the economic literature and has yet to be clearly seen by region and across time (Bouët, Diallo, & Traoré, 2024). The classical theory of trade holds that reducing the tariffs would enhance the outcome of exports by minimizing trade expenses and enhancing price competitiveness in the international market. Tariff cuts are supposed to catalyze the amount of exports, firms would like to venture into new markets, and specialization basing on the comparative advantage (Bouët et al., 2024). This simple prediction, however, faces much challenge by empirical findings. Some studies have recorded high response to export due to liberalization of tariffs, whereas others are of the view that the effects are poor, slow, or unevenly distributed among countries and sectors.

This inconsistency leads to the question of whether reduction in tariffs suffices in stimulating export growth especially in developing countries. Within the framework of the ECOWAS countries, the assumption of enhanced export creative effects via enhanced access to the EU market is too optimistic (Ichimi, 2024). The growth in aggregate exports has been spread out with time, but it is in a limited number of economies of power and in limited number of products (de Pina Rosa, 2022). This trend implies that structural factors that include inadequate industrial capacity, poor infrastructure and relying on primary products might decrease the capacity of firms to react towards tariff incentives (Ichimi, 2024). The liberalization of trade can impact the competitive countries and leave the economies in the weaker state.

2.2 Utilization of Tariffs

One of the main threads of the literature is devoted to tariff margins and the degree to which exporters can sell with the help of existing trade preferences (Lindell, 2025). Preferential trade agreements like the EU- ECOWAS EPA are meant to give developing countries tariff benefits against their rivals in terms of exports. Theoretically, an increase in tariff margins will result in an increase in export. However, in reality, the rates of the utilization of preference are usually low, which weaken the beneficial effect of tariff reductions (Lindell, 2025). The administrative complexity, rules of origin, and low awareness at the firm level may make exporters not to be able to fully benefit with preferential access (Albornoz, Brambilla, & Ornelas, 2021). This is more of a concern to ECOWAS exporters, most of whom have to incur high compliance costs as compared to the value of their exports. Internal protection can eliminate the anticipated benefits even with lower tariffs at the border through internal protection including certification processes, logistics expenses, and poor-quality inspection by the custom department (Grant, Ning, & Peterson, 2018). There are studies that state that weighted average tariffs may be more representative of the actual amount of protection to exporters and that simple averages will overestimate the effect of liberalization (Albornoz et al., 2021). The ambiguous evidence on preferences utilization creates a significant contradiction: tariffs can be written down on paper, but the actual effects they have can be converted to real trade flows depending on whether or not firms and institutions can follow through on these preferences (Grant et al., 2018). This casts doubt on how well a tariff based means of trade policy can work in the absence of complementary conditions.

2.3 Gravity Model and Empirical Measurements

The gravity models are now the most commonly used empirical models of bilateral trade flows that include the impacts of tariffs. The assumption made by these models is that trade between two countries is positively related to their economic size and negatively related to trade costs (e.g. distance and tariffs) (Cipollina & Salvatici, 2019). Although the use of gravity models is highly esteemed due to its high level of empirical performances, it is highly debatable concerning their ability to capture causal relationships. Critics contend that the estimates of gravity can be a manifestation of correlation and not the actual

impacts of the policy, in cases where other factors that cannot be observed are also affecting both tariffs and trade volumes. More recent literature based on panel data and fixed effects is responding to these fears by attempting to control unobserved country pair characteristics (Cipollina & Salvatici, 2019). This method enhances accuracy in estimation by balancing long lasting drivers including historical relations, similarity of the institutions and trade relations. Despite the advancement, it is possible that even the latest generation of the gravity models cannot isolate the effect of tariff changes among the more widespread economic trends and in case of ECOWAS-EU trade, increase in export (Matthee & Gallego, 2017).

2.4 Trade Theory Foundations

Classical trade theories, especially the Ricardian and Heckscher–Ohlin (H–O) models, can be used to trace the connection between trade liberalization and export performance. The Ricardian theory maintains that countries profit from trade by specializing in goods for which they have a relative productivity edge, hence highlighting technological differences across them (Kunroo & Ahmad, 2023). Tariff reductions under this system reduce trade expenses and let nations more completely use comparative advantage, hence boosting welfare benefits and export volumes. Trade liberalization is therefore projected to produce obvious and rapid export reactions (Guo, 2025). The Heckscher–Ohlin model builds upon this reasoning by paying attention to variations in factor endowments. The H–O theory holds that nations export products dependent on limited resources and import goods making great use of their plentiful inputs (Kunroo & Ahmad, 2023). Abundant labor and natural resources suggest in growing regions such ECOWAS specialization in labor-intensive or primary commodity exports once tariffs are lowered. From this viewpoint, favored access to major markets such the European Union should improve export competitiveness and foster sectoral specialisation.

But both theories depend on extreme assumptions: ideal competition, frictionless markets, and full factor mobility inside countries. Often, these presumptions fail to hold in developing nations distinguished by institutional constraints, restricted industrial capacity, and structural rigidity (Guo, 2025). Although classical trade theory offers the underlying justification for tariff reduction, its predictions might not quite come true in reality, thereby inspiring empirical study using contemporary econometric approaches (Zhang, 2017).

Methodology

The approach that has been taken in this research is to test empirically the effects of the liberalization of the European Union tariffs on the export performance of the member states in the ECOWAS regional bloc in a methodology of a gravity-model. The data used in the analysis is a balanced, panel data which consists of 15 countries in ECOWAS and 15 members of the European Union between the year 1995 and 2014. This period is able to include both pre- and post-liberalization periods and it is possible to observe the dynamics of long-run trade in changing tariff regimes. The dependent variable is the bilateral export values of the ECOWAS nations to the EU

partners and are in the form of logarithm in order to stabilize the variance but is also meant to be interpreted in degrees of elasticity. The explanatory variables are standard variables found in the gravity-model to explain trade flows. The economic size is measured in terms of purchasing power parity where the logarithm of GDP is used as an economy measure in exporting and importing countries.

The logarithm of bilateral distance between capital cities (stemming out of known geographic databases) proxy geographic trade costs. Other controls involve population density, mobile cellular subscriptions and the exchange rates that can explain market size, growth of infrastructures and macroeconomic conditions that can affect the export capacity. The issue of productivity is included with the measure of total factor productivity and productivity improvement with the course of time in order to consider the influence of efficiency and the development of technologies on the competitiveness in exports. Using the politics rights and governance condition indices, institutional quality and political conditions are factored or controlled. Two alternative indicators are used to measure the tariff liberalization in order to identify the effective level of protection experienced by the ECOWAS exports into the EU markets. The former is the basic ECOWAS tariffs average rate which uses statutory tariff schedules without considering the trade composition. The second is that of the weighted average tariff rate where tariff rates have been weighted based on the factual export structure of ECOWAS countries. This is a very important distinction, because weighted tariffs are a better count of the tariffs actually being paid and they consider the use of preferences and product concentration. All of the tariff variables are taken in the log form so that the estimated coefficients could be interpreted directly as elasticities. Empirical specification is based on an augmented gravity model estimated using logs.

The country-pair fixed effect is added to account time-invariant bilateral attributes that include historical relations, cultural proximity, and colonial relationships as well as old institutional similarities that can affect the trade flows but have low observability. It also has time fixed effects to capture global shocks, most changes in policies, and macroeconomic trends that occur to all country pairs that include global financial crises and world demand shifts. Such a two direction fixed effect design enhances the causal interpretation as it isolates the within country-pair change across the years. The data are estimated through various panel data methods in order to make it robust and evaluate the pattern of consistency. Ordinary least squares estimation gives the baseline results without considering all the unobserved heterogeneity. Fixed effects estimation is thus used as the main method since they can regulate unobservable country-pair attribute which might be correlated with tariff level and the other regressors. Estimates of random effects and between effects are also used to compare the two and assess both within-country and between-country variation of trade flows. The test that is done to determine the suitability of fixed versus random effects is the Hausman specification test, whose outcomes indicate that

this test of suitability was passed by the fixed effects estimator because the data indicate a correlation between unobserved heterogeneity and explanatory variables. To increase accuracy of the estimates, it is done by doing all the regressions with strong standard errors to consider the possibility of heteroskedasticity and serial correlation in the panel structure. The sensitivity of the results is tested by estimating alternative specifications using alternative tariff measures and with subsets of control variables. The stability of the estimated tariff elasticity is supported by the similarity of the results within specifications. In general, this methodological tool permits developing a rigorous evaluation of the impact of EU tariff cuts on ECOWAS export performance considering structural, institutional, and macroeconomic factors that determine the bilateral trade relationships.

Results

The analysis employs a balanced panel of 15 ECOWAS countries and 15 EU member states (EU-15) from 1995 to 2014. Data are sourced from the World Development Indicators (WDI), UNIDO, CEPIL, and Freedom House. Key variables include export values (current USD), tariff simple average, tariff weighted average, GDP (PPP), population density, mobile cellular subscriptions, distance, exchange rates, total factor productivity (TFP), and political rights indices.

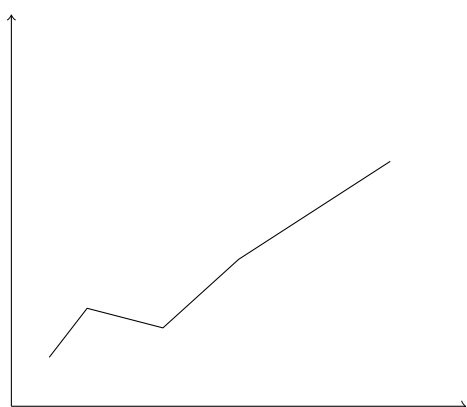


Figure 1 Trend of ECOWAS Exports to EU-15 (1995–2014)

Figure 1 illustrates the trend in ECOWAS exports to the EU-15 over the sample period. A steady upward trajectory is evident, punctuated by a dip during the 2008–2010 financial crisis. Nigeria, Côte d'Ivoire, and Ghana dominate exports, while smaller economies exhibit more volatile patterns. Figure 2 plots the evolution of EU tariff rates applied to ECOWAS goods. Both simple and weighted averages declined over time, particularly after 2010, aligning with the phased implementation of EPA provisions. Table I summarizes the descriptive statistics. Export values vary widely across countries, reflecting differences in economic size and export diversification. Tariff averages also exhibit cross-country variation due to product composition and preference utilization.

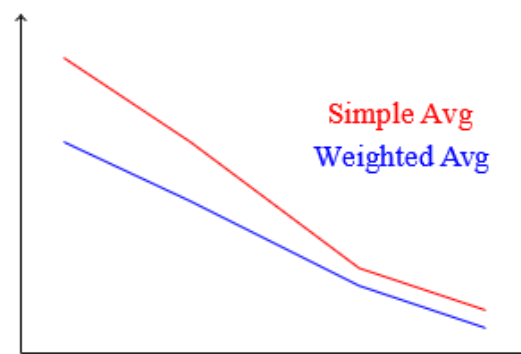


Figure 2 EU Tariff Averages on ECOWAS Imports

Table 1 Descriptive Statistics (1995–2014)

Variable	Mean	Std . Dev.	Min	Max	Observations
Export Value	10.52	2.34	4.15	16.88	748
(log)					
Tariff Simple	3.60	0.85	1.20	5.80	748
Avg (%)					
Tariff Weighted	2.50	1.12	0.10	7.20	748
Avg (%)					
GDP	22.45	1.89	18.33	26.12	748
Exporter					
(log)					
GDP	27.11	0.76	25.42	28.05	748
Importer					
(log)					
Distance	8.02	0.45	6.88	8.74	748
(log)					
Mobile Sub-	2.89	1.67	-2.30	5.12	748
Descriptions					
(log)					

$$\log X_{ijt} = \beta_0 + \alpha_{ij} + \theta_t + \beta_1 \log Y_{it} + \beta_2 \log Y_{jt} + \beta_3 \log D_{ij} + \beta_4 \log N_{jt} + \beta_5 \log FX_{ijt}$$

| „—————” }

Core Gravity Variables

$$+ \beta_6 \log MCS_{it} + \beta_7 \log PW_{it} +$$

$$\beta_8 \log TFP_{it} + \beta_9 \log \Delta TFP_{it}$$

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Productivity and Cost Factors

$$+ \beta_{10} \log S_{jt} + \beta_{11} \log W_{jt} + \beta_{12} \log Z_{it} +$$

$$\beta_{13} \log Z_{jt} + \varepsilon_{ijt}$$

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Policy and Institutional Variables

Robustness checks include alternative tariff measures, sample splits, and inclusion of additional controls (e.g., regional trade agreements). Results remain consistent, underscoring the stability of the estimated tariff elasticity.

2. DISCUSSION

When the empirical findings are considered, it is clear that European Union tariff cutting has contributed to the export performance of the ECOWAS countries in a significant aspect dependent on the way the tariffs are measured as well as the treatment of the unobserved heterogeneity (Honoré & Kesina, 2017). The fixed effects model comes out as the specification of choice across all estimation techniques and the Hausman test supports this point of view by stating that unobservable country-pair characteristics are also correlated with main explanatory variables (Kabir, Salim, & Al-Mawali, 2017). This observation explains why within-pair variation over time is applicable in determining the effect of tariff adjustments and is more convincing that the interpretation of the results obtained is causal (Honoré & Kesina, 2017). The result with most relevance is in the tariff weighted average that shows the negative and statistically significant coefficient in the fixed effect and the random effect models (Kabir et al., 2017). The fixed effect estimate suggests that a 1 percent decrease in the weighted average tariff in EU would cause a rise in the ECOWAS exports to rise by about 0.487 percent. The implication of this elasticity is that the export gains on liberalization of tariffs under the EPA regime have been in the form of quantifiable tariff weighted export gains as far as actual export composition is concerned (Millimet & Bellemare, 2025).

The simple average tariff measure test is not significant to fixed effects model meaning that statutory tariff schedules are only exaggerating the actual level of protection experienced by exporters (Hwang & Lim, 2017). This deviation underscores the significance of the consideration of the preference utilization and product concentration effects on the assessment of the impact of trade policies. There is a lot of expected behavior of core gravity variables (Millimet & Bellemare, 2025). The effects of exporter and importer GDP on bilateral trade

flows are positive and significant in majority of the specifications, which accords economic size as a primal factor in bilateral trade flows. The negative effect of distance in identified models is also very strong, and it supports the contribution of trade costs and geographic bottlenecks (Hwang & Lim, 2017).

The fact that it has no variation among the country pairs justifies its irrelevance in the fixed effects model, as opposed to its irrelevance (Kinzius, Sandkamp, & Yalcin, 2019). Proxies - such as infrastructure and technology like mobile cellular subscriptions - no longer play a significant role when the fixed effects are added, and it can be argued that their effect is much more strong country-specific than temporary (Buvelot, 2017). These results are further put into context using descriptive trends. Though ECOWAS exports to the EU were steadily growing during the sample period, it was within few countries and products and this indicates that tariff liberalization is not a one-sample effect to foster uniform export growth (Kinzius et al., 2019). The regression findings facilitating this interpretation is that tariff cuts have not been significant in those situations where exporters have not yet been in a position to take advantage of it. The results indicate that EU tariff liberalization has had a positive implication on the export performance of ECOWAS but its functionality relies on export structure, use of preferences and an underlying economic capacity, prompting the need to carry out similar domestic reform in conjunction with market access programs (Buvelot, 2017).

3. CONCLUSION

The research paper was able to analyze the effects of decreasing tariffs in the European Union on the performance of the ECOWAS members in export markets during the period of 1995-2014. The analysis based on a gravity-model with panel data and country-pair fixed effects offered fundamental support that the growth in exports in a developing region can be supported by tariff liberalization in the destination markets. The findings depict that EU tariff cuts, especially with weighted average tariffs, are linked with a remarkable rise in ECOWAS exports. This observation validates the assumption that effective tariffs than statutory tariff schedules serve to provide a more accurate indication as to the actual state of trade when exporters deal with it. Simultaneously, the findings show an uneven trend of the growth of exports in the ECOWAS; gains have been skewed toward larger economies; and in fewer products. This indicates that tariff preferences in itself cannot be used to create a broad based export growth throughout the region. The structural factors include production capacity, infrastructure, and productivity, which help in determining the ability of the countries to respond to the tariff incentives. In general the study provides region specific empirical data to the trade liberalization discussion and demonstrates that although tariff reduction has a role to play in the process, its effectiveness is based on the extent to which countries are strategic enough to exploit the opportunities presented by the new market environment.

4. RECOMMENDATION

According to the results, some policy recommendations are generated concerning the ECOWAS governments and trade partners. To do this, they should improve on using the available tariff preferences within the EU-ECOWAS EPA. This involves ease of rules of origin, lessening of administrative processes and ease of access to information by the exporters especially the small and medium sized firms. Greater utilization in preference would enable exporters to enjoy the advantages of tariff measures that are already reduced. Second, countries in the ECOWAS region ought to supplement the trade liberalization process with internal supply-side reforms. The transport infrastructure, the energy reliability, and the efficiency of ports would be investing in and this would lead to the reduction in the internal trade costs as well as the increase in the competitiveness of the exports. The development of capacity and skills, availability of finance and aiding value addition would also make firms react to external market opportunities better. Third, it should be diversified in export. High primary commodities dependency constrain information about benefits of tariff liberalization and exposes them to price shocks. The beneficial impact of market access would be extended to policies that support export of manufacturing and agro-processing products. Lastly, a trade policy needs to be consistent with industrial policy, so that the available tariff favors will lead to both renewed export growth and economic growth in the long run.

5. LIMITATION

Irrespective of its contributions, this study has a number of limitations, which have to be realized. First, the analysis is based on bilateral trade aggregate data that might mask such significant differences at the firm or product level. Responses to tariff changes can be quite different in export across industries, the size of firms, and the type of products, yet it is impossible to examine all those dynamics with the country-level data only. Second, even though the fixed effects methodology aids the investigator to put to check unobserved bilateral attributes, the study is observational in nature. Due to this, the approximations indicate relationships and not entirely causal influences. Other performance changes that are not

measurable include modifications in non-tariff measures, quality standards or world demand circumstances among others that could affect the export performance in addition to the tariff cut. Third, the applied tariffs used base their calculations on applied tariffs and fail to protect fully the non-tariff barriers, compliance costs, and informal trade restraints which are also especially significant to ECOWAS exporters. Lastly, the time frame of the sample is 2014, and therefore there are not recent advances in terms of trade policy and global value chains registered. All these restrictions imply that caution should be observed when making extrapolation of the findings to the study context.

6. FUTURE IMPLICATIONS

This study can be enhanced in a number of ways in future research. The one potential avenue is the utilization of product-level or firm-level of data to gain a greater insight into the impact of lowering tariffs on various export margins, including the volume of exports, the product mix, and new market penetration. This kind of information would allow determining which industries have the most to gain in terms of liberalization of tariffs and those that cannot be broken down. The other avenue would be the incorporation of non-tariff measures and trade facilitation indicators. Tariff information would be complemented by the measurements of standards, customs performance, and logistic performances that would bring a more comprehensive picture of trade costs experienced by the ECOWAS exporters. Further research can also be used to expand the analysis covering the later years after 2014 to determine the impact of EPA implementation in the long term. Inter-regional comparisons would strengthen the knowledge base on the effects of tariff liberalization on domestic situations. Lastly, the inclusion of political economy variables, including institutional quality and political stability may enhance understanding of why certain countries turn market access into export growth more effectively than others. The result of such research would contribute to more specific and efficient trade and development policies

REFERENCES

1. Albornoz, F., Brambilla, I., & Ornelas, E. (2021). Firm export responses to tariff hikes.
2. Bouët, A., Diallo, S. S., & Traoré, F. (2024). Agricultural trade integration in ECOWAS.
3. Buvelot, C. L. (2017). The effect of import tariffs on the race to the bottom in employment protection standards.
4. Cipollina, M., & Salvatici, L. (2019). The trade impact of EU tariff margins: An empirical assessment. *Social Sciences*, 8(9), 261.
5. de Pina Rosa, S. (2022). Integration of Cape Verde in the ECOWAS Subregion: Challenges and Viability. Walden University.
6. Grant, J. H., Ning, X., & Peterson, E. B. (2018). Trade elasticities and trade disputes: New evidence from tariffs and relative preference margins.
7. Guo, B. (2025). Exploring the Heckscher-Ohlin Theory Again: World Trade Structure, Factor Demand Law, and General Trade Equilibrium. Factor Demand Law, and General Trade Equilibrium (August 25, 2025).
8. Honoré, B. E., & Kesina, M. (2017). Estimation of some nonlinear panel data models with both time-varying and time-invariant explanatory variables. *Journal of Business & Economic Statistics*, 35(4), 543-558.
9. Hwang, C. W., & Lim, S. S. (2017). Effect of non-tariff measures on international tea trades. *Journal of Korea Trade*, 21(4), 309-323.
10. Ichimi, G. S. (2024). The WTO, ECOWAS and the Prospects for Food Security in West Africa The World Trade Organization and Food Security in West Africa: Prospects for the ECOWAS Region (pp. 107-162): Springer.
11. Kabir, M., Salim, R., & Al-Mawali, N. (2017). The gravity model and trade flows: Recent developments in econometric modeling and empirical evidence.

- Economic Analysis and Policy, 56, 60-71.
12. Kinzius, L., Sandkamp, A., & Yalcin, E. (2019). Trade protection and the role of non-tariff barriers. *Review of World Economics*, 155(4), 603-643.
13. Kumar, K. (2025). Optimizing Computational Performance for Ray Tracing on the Cell Broadband Engine: A Parallel Processing Approach. Paper presented at the 2025 International Conference on Computing Technologies (ICOCT).
14. Kunroo, M. H., & Ahmad, I. (2023). Heckscher-ohlin theory or the modern trade theory: how the overall trade characterizes at the global level? *Journal of Quantitative Economics*, 21(1), 151-174.
15. Lindell, M. (2025). Capacity mechanisms in the electricity markets of the European Union.
16. Lunenborg, P., & Roberts, T. (2021). ECOWAS and AfCFTA: potential short-run impact of a draft ECOWAS tariff offer. *Journal of African Trade*, 8(Suppl 2), 103-114.
17. Matthee, M., & Gallego, M. S. (2017). Identifying the determinants of South Africa's extensive and intensive trade margins: A gravity model approach. *South African Journal of Economic and Management Sciences*, 20(1), 1-13.
18. Millimet, D. L., & Bellemare, M. F. (2025). On the (mis) use of the fixed effects estimator. *Oxford Bulletin of Economics and Statistics*.
19. Sukanya, P. (2025a). AI-Optimized Mechanical Design of EV Suspension Systems for Superior Performance and Durability. *Authorea Preprints*.
20. Sukanya, P. (2025b). Thermal Transport in Engineered Nanostructures: Disruptions in Phonon Dynamics Due to Interface Modifications. *Authorea Preprints*.
21. Zhang, W.-B. (2017). Endogenous wealth and knowledge in Heckscher-Ohlin theory. *International Journal of Development and Conflict*, 7(2), 119-137