Impact of Tariff and Non-Tariff Barriers on Food Security in ECOWAS Region

Umar Isah, YAHAYA and Ojonugwa Anthony, BERNARD and Z.S., SAHEED and salihu, AYODEJI and Yakubu, ALFA

University of Abuja, Nigeria, Airforce Institute of Technology, Kaduna, Nigeria., Nigerian Defense Academy, Kaduna, Nigeria

2024

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[1]YAHAYA Umar Isah
[1] Department of Economics, University of Abuja, Nigeria
yahayaumar.isah@uniabuja.edu.ng
[2]BERNARD Ojonugwa Anthony
[2] Department of Economics, Airforce Institute of Technology, Kaduna, Nigeria.
bernarddecobros@gmail.com
[3]Z. S., SAHEED
[4]AYODEJI Salihu
[5]ALFA Yakubu
[3, 4 & 5] Department of Economics, Nigerian Defence Academy, Kaduna, Nigeria
zssaheed@nda.edu.ng fsayodeji@gmail.com yakubualfa@nda.edu.ng
Corresponding Email: yahayaumar.isah@uniabuja.edu.ng

Abstract

The paper investigates the impact of trade tariff and non-tariff barriers on food security in the ECOWAS region. The paper relied on fixed and random effects approach to empirically capture the effects of tariff and non-tariff barriers alongside relevant trade-related macroeconomic variables on food security among ECOWAS member countries during 2010-2022. Major findings from the fixed effect model revealed that non-tariff barriers have significant negative impact on food security in the ECOWAS region. Further findings revealed that trade regulatory environment and food price inflation have significant positive impact on food security in the ECOWAS region. The paper concludes that regardless of its context, intention and deepening, non-tariff strategic trade policy reduce food security of ECOWAS member countries with a major implication that whether ECOWAS member countries pursue a policy of food self-reliance or food self-sufficiency, adherence to a common customs policy would help eliminate major delays in the movement of essential food items, agricultural labor and machinery across borders, hence, improving food security in the region.

Keywords: Tariff barrier, non-tariff barrier, ECOWAS, food security, fixed effect
***JEL**: F13, F14, F18.*

1. Introduction

Despite efforts by the World Trade Organization (WTO) to make global trade more open and liberal, strategic trade policies through the use of tariff and nontariff policy measures have gained renewed importance among developing economies that now depend mainly on WHO consistent temporary countervailing and antidumping duties and safeguards (Brown & Kee, 2011). While the downsides of trade globalization such as international monopolization, dependency and structural unemployment have long been voiced (Patel, 2009; Lee, 2013; Iles & Montenegro,

2015), the collapse of the Doha Development Agenda (DDA) in 2008 allowed the re-emergence of trade barriers into mainstream policy thinking in what Kernohan and Huw (2008) described as neo-protectionism.

Trade restriction which involves the use of tariff barriers (TBs) such as increase in customs duties and non-tariff barriers (NTBs) such as import quotas, industry bailout, antidumping policies and sanitary and phytosanitary (SPS) requirements are applied by developing economies for different reasons. While TBs are used to overcome market failures resulting from market imperfections such as information asymmetry, externalities and variations in factor availability and pricing, NTBs are used for a variety of reasons including: protection of domestic producers and enterprises at the expense of foreign producers, assistance to domestic producers and enterprises but not at the expense of foreign producers, and ensuring health and safety of people, animals, plants and environment (Deandorff, 2012, Disdier & Tongeren, 2016).

Food, which is often considered an exceptional commodity in trade policy is arguably the most protected commodity of international trade (Aksoy, 2005, Ibrahim, 2024). While countries have different national regulatory frameworks, food trade regulation and restriction find justification in safety concerns (Unnevehr, 2020). Food safety has over the years received greater attention as a reason for food trade restriction in developing countries, not least because of the rapidly modernizing and integrated food system which has shifted the burden of food hazard-mitigating activities from the household to the food industry's policy makers with food security as its ultimate end (Disdier & Tongeren, 2016). Hence, as the bar for food security and safety gets raised high through stringent trade regulations in developed countries, developing countries are left with new trade implications for food security (Unnevehr, 2020; Usman, 2018).

In its efforts to expand its extensive food trade margin and global food market share, ECOWAS seeks to align its tariff and non-tariff measures of trade with those of international standards (ECOWAS, 2022). However, the path and extent to which ECOWAS can achieve greater global food market share in light of food safety standards remains debatable. In addition to regional food safety concerns, larger regional food markets such as Nigeria, Ghana and Senegal take their food trade restriction beyond food safety, to outright protectionism of their domestic markets (Ugwuja & Chukwukere, 2021; Yahaya, 2023). Moreover, political rifts in the ECOWAS region leading to the withdrawal of member countries including: Burkina Faso, Mali and Niger from the regional bloc in January 2024, further puts the credibility of ECOWAS and its food policy tools in question (Westcott, 2024). Hence, it becomes necessary to investigate the extent to which ECOWAS as an emerging customs union can use TBs and NTBs to reduce the problem of food insecurity in the region.

The impact of trade barriers on food security remains deeply contested in theoretical and empirical research, as the question regarding using trade barriers for food and agricultural trade is framed either as opportunity or threat to food security. Some researchers: Karugia, et al. (2010); Oke et al. (2017) and Pasara and Diko (2019) have found TBs and NTBs as important means of attaining food security mainly because it increases incentive for domestic food production and shields the protected economy from global food market uncertainties. Others such as: Balie et al. (2017); Bonuedi et al. (2020); Chande et al. (2016) and Fathelrahman et al. (2021) have found TBs and NTBs as threat to greater food security, as they reduce consumers' sovereignty and widen trade gaps among countries. Interestingly, a good understanding of the conflicting outcomes reveals that the studies in the two groups stem from different ideological and as measurement frameworks. While studies that have found TBs and NTBs as threat to food

security seem to follow an analytical procedure that regard market as the unit of analysis and hence, free and efficient market as a means of attaining food security, those in support of TBs and NTBs as opportunity to greater food security follow an analytical procedure that regards productive capacity of agricultural communities as unit of analysis, hence, food self-sufficiency as the means to food security (Clapp, 2015; Gibson, 2012).

Moreover, while both narratives rely on empirical evaluation of impact of trade barriers on food security, most of the studies who found trade barriers as threat to food security have relied on dimensional measure of food security including: food availability and food access as these indicators are generally identified to respond directly to trade facilitation (Rudloff, 2015). On the other hand, advocates of trade barriers often rely on food self-sufficiency ratio, such as percentage of food consumption that is produced domestically and food import dependency, such as percentage of food consumption that is imported as measures of food security (Clapp, 2015).

What results from the ideological and measurement divides is that both perspectives tend to downplay the opposing viewpoint by portraying it in its extreme and impracticable form, the consequence of which limits the contribution and relevance of empirical findings to policy direction (Clapp, 2015). The rise in food safety concerns in developed and developing countries, in addition to the fact that policymakers usually bid food trade decisions using whatever policy tools are available in the short-term to address the limiting causes of their ability to command food, dictate the importance of a more nuanced approach to understanding the extent to which TBs and NTBs are relevant as trade policy tools (Caliendo et al., 2016; Unnevehr, 2020).

The motivation of this paper stems from the need to bridge the binary ideological and measurement divides. Hence, the point of departure of this paper from existing literature is the adoption of food balance index proposed by Clapp (2015) as a unifying indicator of food

security. The food balance index captures the indicators of both food self-sufficiency and food self-reliance. This paper relies on this indicator to answer the question: what is the impact of TBs and NTBs on food security in ECOWAS region? A panel of 9 ECOWAS member countries is generated over the period 2010-2022. A study of the ECOWAS region is necessary given the waning popularity of trade globalization and the rise of regionalism since the collapse of the DDA in 2008 (Kernohan and Huw (2008). Following this introduction, the next section accounts for conceptual, theoretical and empirical literature reviews. While section three discusses methodology of analysis, section four presents and discusses empirical findings. Finally, section five concludes the paper with policy implications of findings.

2. Literature Review

The empirical relationship between TBs and NTBs and food security has received considerable attention. Researchers are however inconclusive on the extent to which TBs and NTBs impact food security. Using the partial equilibrium model in a multi-county analysis, Fathelrahman et al. (2021) investigated the welfare impact of food TBs and NTBs in India, Egypt, Pakistan, Saudi Arabia, and the United Arab Emirates (UAE). The authors sourced data from the UN COMTRADE database, and considered food availability and food access as indicators of food security. Findings showed that trade creation due to tariff elimination has welfare impact of improving food availability and food access, hence, lowering the highest tariffs on food commodities can raise real incomes and shift consumption towards more diversified and nutritionally sound diets, therefore, greater food security.

A similar finding was elicited by Bonuedi et al. (2020) who investigated the empirical relationship between NTBs and food security in Africa. Considering the impact of NTBs indicators including: **c**ost of import and export, document clearing and time of clearing on food

availability and access in 45 countries in Africa, the authors estimated a panel data using the first-difference instrumental variable (FDIV) estimation technique for the period 2006-2015. The findings revealed that increase in NTBs is associated with significant increase in food insecurity in Africa. The findings by Fathelrahman et al. (2021) and Bonuedi et al. (2020) was contrasted by Pasara and Diko (2019) who employed World Integrated Trade Solution, Software for Market Analysis and Restrictions on Trade (WITS-SMART) to simulate trade creation and trade diversion effects of Africa Continental Free Trade Area (AfCFTA) on food security in fifteen Southern African Development Community (SADC) countries. The study adopted trade in cereal as a proxy for food trade and sourced data from the Harmonized Commodity Description and Coding Systems (HCDCS) of the World Bank. Results showed that countries with previously more protectionist trade policies will gain more from the AfCFTA compared to more open economies in the SADC region.

Oke et al. (2017) examined the impact of TBs on food security in some selected African countries using fixed effect model between the period 1992 and 2013. The findings of the study show that food import prices, food production and employment in agriculture have helped to reduce food insecurity in the biggest African economies. This finding contradicts that of Balie et al. (2017) who investigated the significance of bilateral trade protection in explaining sub-Saharan Africa (SSA) backward and forward participation in the agri-food sector. Using the bilateral gross exports decomposition for global value chains (GVCs) technique on panel data sourced from the UNCTAD database, results show that bilateral protection in SSA negatively affects backward and forward GVCs, hence, import tariffs have a depressing impact on food security in SSA.

Chande et al. (2016) examined the impact of NTBs on market participation in the food sector in Tanzania. Using the maize market as proxy and relying on primary survey following a two-staged stratified sampling technique, the Henchman model was used to analyze the data collected from the major maize-producing Southern Highland districts of Mbozi and Momba in the Mbeya region of the country. Results revealed NTBs to have a significant negative impact on maize market participation and supply and ultimately food security in the region. The finding by Chande et al. (2016) was contradicted by earlier research in Karugia, et al. (2010) who examined the welfare effect of NTBs on maize and beef trade in East Africa and their welfare impact on citizens of three East African Community (EAC) countries including: Kenya, Tanzania and Uganda. The study which utilized a Spatial Equilibrium Model (SEM) relied on data generated from beef and maize transporters and traders through survey method of data collection. The result of the analysis revealed a net positive impact of NTBs on welfare of citizens in the three countries investigated for the beef and maize sectors, as gains from NTBs are found to compensate for its losses in all three countries investigated, hence, NTBs potentially leads to improvements in economic welfare of East African region.

3. Methodology

The main objective of this paper is to investigate the impact of TBs and NTBs on food security for a cross-section of countries in the ECOWAS region. To guarantee robustness, validity and reliability of results, country-pair fixed and random effects regressions are used to analyze a strongly balanced panel data set of nine ECOWAS member countries including: Benin, Cabo Verde, Cote d'Ivoire, Gambia, Ghana, Nigeria, Sierra Leone, Senegal and Togo for the period 2010-2022. In addition to data availability, recent political rifts in the ECOWAS region which led to withdrawal of three member countries including: Burkina Faso, Guinea and Niger from the

regional bloc are the criteria for country selection. A study of the ECOWAS region is necessary given the rise of regionalism since the collapse of the DDA in 2008. Hence, the scope of this paper is justified by the need to investigate the implications of trade regionalism after the collapse of the DDA in 2008.

In line with its main objective, the model for this paper follows the work of Bonuedu et al. (2020). The Model by Bonuedu et al. (2020) was stated as:

$$FS_{i,t} = \alpha + \beta TF_{i,t} + \varphi C_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

Where: FS is food security proxy by prevalence of undernourishment, TF is a vector of trade facilitation measured by NTBs including: time to import and cost of import, and C is vector of set a of control variables including: political stability, population growth, inflation, cereal yield, rainfall and temperature shocks. This model is adapted with modifications in indicators to suit the peculiarities of this paper. The major point of departure between the model of this paper and that of Bonuedu et al. (2020) is that while they used cereal yield, rainfall and temperature shocks to control for food security, this paper considers political stability, population growth, and food price inflation as variables for control. Even though cereal yield, rainfall and temperature shocks may directly impact the prevalence of undernourishment used by Bonuedu et al. (2020) to measure food security, through food production, this paper argues that such variables do not directly influence food trade balance. Hence, they are considered inadequate in measuring food security in the context of this paper. Bonuedu et al. (2020) model is therefore modified in equation 2.

$$FS_{i,t} = \alpha + \beta TB_{i,t} + \delta NTB_{i,t} + \varphi C_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad i = 1, \ldots 15, \ t = 1 \quad (2)$$

$$FS_{i,t} = \alpha + \beta TB_{i,t} + \delta NTB_{i,t} + \beta REGQ_{i,t} + \beta FoodCPI_{i,t} + \beta PStab_{i,t} + \beta POPG_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (3)$$

Where: FS is food security measured by food balance index which is an estimated daily per capita food supply. As argued earlier, this measure of food security serves as a bridge between the dimension-specific and food self-sufficiency ratio measures (Clapp, 2015). TB is tariff barrier proxy by the most favored nation applied tariff which is tariff charged on WTO member countries. This indicator previously used by Fathelrahman et al. (2021) is justified on the premise that all the cross-section of countries employed in this paper are members of WTO. NTB is non-tariff barrier proxied by time and cost of import which are technical barrier to import as previously used by Bonuedu et al. (2020). TB and NTB are the primary explanatory variables of interests to this paper and are both expected to capture the effect of trade protection on food security in ECOWAS region. C is a set of control variables including: food price inflation, population growth, regulatory environment and political stability all of which signal potential level of food trade policy applicability in each country. Data are generated from UN, WTO and World Bank sources. Specifically, data for food balance index and food price inflation are generated from FAOSTAT metadata base. Data on TB are generated from World Integrated Trade Solution, while data on NTB, population growth, regulatory environment and political stability are generated from World Bank Development Indicators.

4. Results and Discussion

This section discusses findings elicited in the investigation of how food security is affected by TBs and NTBs in ECOWAS member countries.

Table 1
Descriptive Statistic of Variables

Variable	Mean	Std. D	Minimum	Maximum
FS	2661.815	135.632	2433.00	3079.00
TB	20.484	4.688	12.770	36.930
NTB	367.107	226.005	131.666	848
REGQ	-0.411	0.291	-1.155	0.268
PStab	-0.566	2.349	-2.479	0.929

FoodCPI	112.604	38.043	65.034	329.813
POPG	2.517	0.590	0.884	3.249

Table 1 presents summary statistics of variables considered in this paper. The results revealed that the dependent variable, FS, has the highest average value of 2661.815 with a minimum value of 2433.00 and a maximum value of 3079.00. Results also reveal a wide difference between the average values of the two primary explanatory variables, TB and NTB. While TB has a mean of 20.484, NTB has a mean of 367.107. The same can be seen in their respective minimum and maximum values. This difference is due to the unit of measurement for both variables. As TB is measured in monetary terms, NTB is measures in hours and level of document compliance at point of food import. As for the control variables, REGQ and PStab are observed to have negative average values to signal relatively low levels of trade regulatory quality and political stability in the ECOWAS region. Moreover, FoodCPI and POPG have positive averages which signal positive increase in food price inflation and population growth in the ECOWAS region.

Table 2
Correlation Matrix

FS	1						
TB	-0.357	1					
NTB	-0.083	-0.082	1				
REGQ	0.367	-0.173	-0.083	1			
PStab	-0.058	0.314	0.463	-0.286	1		
FoodCPI	-0.018	0.387	-0.023	0.679	-0.026	1	
POPG	-0.021	-0.084	-0.134	-0.570	-0.204	-0.199	1

Source: Author's computation using STATA 15 software

The correlation matrix as in Table 3 suggests the sign, magnitude and extent of association among the variables employed. Coefficients of association between the dependent variable and the explanatory variables revealed the existence of a negative and marginal association between food security and its predictors with the exception of REGQ whose coefficient shows a positive association of regulatory quality with food security in the EOWAS region. Similarly, the

association among the explanatory variables are mostly weak, except the relationship between FoodCPI and REGQ and between POPG and REGQ respectively. The marginal association among most of the explanatory variables (TB, NTB, PStab, FoodCPI and POPG) suggest that the estimation models of this paper are expected to be less threatened by the problem of variable bias and collinearity or multicollinearity.

Table 3
Hausman Test Result

Summary	**H0**	**Chi-square statistic**	**Prob.**
Cross-section	Random effect estimates are consistent	6.470	0.037

Note: *** and ** indicate 1% and 5% levels of significance.

Table 3 presents the Hausman test of preference between the FE and RE models. The Hausman test result shows that the p-value is less than the conventional 0.05 level of significance, hence, the rejection of the null hypothesis of the absence of individual fixed effect. This is instructive that the fixed effect estimates be used to analyze the impact of tariff and non-tariff barriers on food security in the ECOWAS region.

Table 4
Results on Econometric Estimations

FS	**Fixed Effect (FE)**	**Random Effect (RE)**
TB	-4.945	-0.860
	(0.154)	(0.829)
NTB	-0.055***	-0.775***
	(0.048)	(0.002)
REGQ	47.772***	36.393***
	(0.001)	(0.004)
FoodCPI	0.761***	0.239
	(0.045)	(0.685)
PStab	-43.221	30.421
	(0.240)	(0.579)
POPG	7.020	-21.724***
	(0.923)	(0.043)
Constant	83.131***	34.315***
	(0.000)	(0.000)
R-Squared	0.611	0.642

F-test (15.790)	(0.000)	

Note: *** and ** indicate 1% and 5% levels of significance.

As instructed by the Hausman test result, the FE estimate in table 4 is explained. In this direction, the corresponding R-squares for FE estimation shows that 61% of the variation in food security in ECOWAS region is jointly explained by indicators of TB and NTB employed in this paper. This is suggestive of a high extent to which the FE model fits the data employed. The significant F-statistic confirms the joint significance of the explanatory variables. The coefficients of the two primary explanatory variables employed: TB and NTB both have negative impact on food security in the ECOWAS region. This implies that a Dollar increase in import tariff leads to a 4.95 unit fall in daily per capita food supply, all other things remaining constant. Similarly, an hour increase in food importation time and cost of border documentation and compliance, all things being equal, lead to a 0.05 unit fall in daily per capita food supply, in the ECOWAS region. These findings contradict expectations of the argument of Filip (2017) who proposed the existence of common tariff barriers through customs union to increase economic welfare (Filip, 2017).

Moreover, while the impact of non-tariff barriers is found to be statistically significant, the impact of tariff barriers is insignificant. A plausible explanation for this is the difference in the pathways through which TBs and NTBs affect food security in the ECOWAS context. With food being a necessity commodity (Dewaal, 2018), ECOWAS region being a net-importer of food items (Global Food Security Strategy (GFSS, 2019), with its population spending an average of 48% to 59% of household income on food commodities (Iwalaiye, 2024) and most importantly, with trade tariffs translating its impact on food balance through domestic food market prices, a rise in tariff may not significantly impact food balance in the region, in as much as necessary food items are made available. On the contrary, since NTBs translate their impacts on food

security by altering market availability of food items, an increase in the import time, documentation and other border requirements may significantly reduce consumer sovereignty and availability of food in market, consequently limiting the ability of the people to command food. The significant impact of NTBs on food security is further explained by the rise in food safety concerns which is argued to cause technical and SPS barriers to global food trade (Disdier & Tongeren, 2016; Unnevehr, 2020). Moreover, this finding supports previous empirical investigations in Bonuedi et al. (2020); Chande et al. (2016) and Fathelrahman et al. (2021) who also found food security to be a significant negative function of TBs and NTBs. However, findings contradict those of Oke et al. (2017) and Pasara and Diko (2019) who found TBs and NTBs to positively determine food security.

Further findings from the FE estimate reveal a significant positive impact of REGQ and FoodCPI on food security. This implies that holding other explanatory variables constant, a unit increase in the estimated quality of the ECOWAS trade environment leads to a 47.77 unit increase in daily per capita food supply. In addition to satisfying expectations a priori, this evidence supports various efforts by ECOWAS during the post-DDA era to harmonize trade regulations in a way that will significantly improve economic outcomes of its member counties (ECOWAS, 2022). Furthermore, the positive impact of food price inflation contradicts expectations a priori and shows evidence to support Iwalaiye (2024) that the ECOWAS region's population spend most of their income on necessary food commodities. Therefore, an increase in food prices coinciding with an attendance of food availability will not cause an expected negative impact on food balance in the regional context, as proven by the outcome of this paper.

5. Conclusion and Policy Implication

This paper investigated the impact of TBs and NTBs on food security among selected ECOWAS member countries during the period 2010-2022. The paper adopted the trade balance index to measure food security as proposed by Clapp (2015) and relied on the FE estimates based on the LSDV estimator. Major findings inform the conclusion that non-tariff strategic trade policy strongly reduces the level of food security in the ECOWAS region. Hence, regardless of its intentions, context and deepening, NTBs reduce food security of ECOWAS member counties. Moreover, food security is highly sensitive to improvements in trade regulatory environment however, threatened by domestic food markets prices much less than factors hindering its market availability.

The policy implications of this paper are as follows: as ECOWAS pursues a diversified means to improving food security of member countries, full institution of the ECOWAS customs union would help eliminate major delays in the movement of essential food items, agricultural labour, and machinery across borders, hence, easing food policy of member countries. Therefore, whether a country pursues self-reliance or self-sufficiency food policy, adherence to a common customs policy would help reduce trade diversion consequences of NTBs, thus, increasing food balances of ECOWAS member countries. As findings of this paper have shown, by increasing strengths and penetration of ECOWAS trade regulatory environment, the region can exploit the customs union channel further to reduce the negative consequences of non-tariff barriers employed by individual member countries and improve the region's food security and overall economic wellbeing.

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