

provisions like the national treatment provisions, transparency mechanisms, competition policies, harmonization models, amongst others.

Sani and Yunusa (2019) assessed the impact of trade liberalization of agricultural sector on economic growth in Nigeria from 1981 to 2016. The study used Error Correction model (VECM) to analyse the data. The study reveals that unidirectional causality emanates from exchange rate to RGDP at weak level of significance (10%) and also a unidirectional causality runs from agricultural export to import and from exchange rate to import at 5% and 1% respectively. However, no evidence of causality was found from GDP to the proxies of trade liberalization and vice-versa. Findings further show that trade liberalization and appreciation in the level of exchange rate exert positive impact on real economic growth in Nigeria. Thus, the study concluded that trade liberalization is good for the Nigerian economy and thus the study recommends for economic diversification to agriculture in order to boost the agricultural production and its export; although it has to be handled carefully as it also has some negative effects. Hence, government should give utmost priority to agricultural sector.

Duru, Okafor, Adikwu, and Njoku (2020) studied the association between trade liberalization and economic growth in Nigeria from 1981 to 2018 using the Autoregressive Distributed Lag Bounds technique to cointegration. The results showed that trade liberalization does not support economic growth in Nigeria. Hence, the genuineness of the extensive trade liberalization campaign in developing countries through the bright idea of international organizations in the late 1980s and early 1990s was not validated. Furthermore, the results showed the presence of unidirectional causality from real Gross Domestic Product to trade liberalization in Nigeria. The study, therefore, recommends that policymakers of the government should balance its strategies of trade liberalization as a result of the inability of the economy to absorb the adverse shocks from foreign trade, appropriate fiscal and monetary policies should be deployed by the government for the protection of the economy against foreign influences and the diversification of the structure of export is necessary to ensure that manufactured products are exported more. Also, the Central Bank of Nigeria and policymakers of the government should prescribe sound macroeconomic policies that will ensure price stability to reduce the uncertainties associated with investment in the economy to boost economic growth. The government should also provide incentives to investors and a conducive environment for investment. Moreover, the government should initiate policies of growth for the promotion of trade.

3. Research Methodology

3.1 Analytical Framework

The analytical framework for this study shall anchor on the work of Mohammad, Shahiki, and Zahra (2012) with further modification. Mohammad, Shahiki, and Zahra (2012) who examined the impact of trade liberalization and financial development on economic growth in Iran, modeled GDP as the dependent variable as a proxy for economic growth as a function of Export to GDP ratio (EX/GDP), Import to GDP ratio (IM/GDP) and Foreign trade to GDP ratio (EX+IM/GDP) to proxy trade liberalization and also used Narrow money ratio (M1/Y), Narrow money to broad money ratio (M1/M2) and Broad money ratio (M2/Y) to proxy financial development as the independent variables.

$$GDP = f (EX/GDP, IM/GDP, EX+IM/GDP, M1/Y, M1/M2, M2/Y) \quad (3.1)$$

Where;

GDP = Gross Domestic Product a proxy for economic growth

EX/GDP = Export to GDP ratio

IM/GDP = Import to GDP ratio

EX+IM/GDP = Foreign trade to GDP ratio

M1/Y = Narrow money ratio

M1/M2 = Narrow money to broad money ratio

M2/Y = Broad money ratio (M2/Y)

But the present study deviates from these scholars by using a dummy to proxy ECOWAS trade liberalization scheme (ETLSFRC) and the three measures of liberalization such as Agric Export (AGEXFRC), and Agric Import (AGIMFRC) in line with Mohammad, Shahiki, and Zahra (2012) and shall also add exchange rate (EXRCFRC) as the explanatory variables.

Thus, the functional form of the model shall be specified as:

$$AGRPFRC = f (ETLSFRC, AGEXFRC, AGIMFRC, EXRCFRC) \quad (3.2)$$

Where;

AGRPFRC = Agricultural sector performance proxied by the proportion of agriculture to GDP

ETLSFRC = ECOWAS liberalization scheme proxied by dummy

AGEXFRC = Agric Export

AGIMPFRC = Agric Import

EXRCFRC = Exchange rate

The linear econometric form of the model or equation (3.2) takes the form of;

$$AGRPFRC = \beta_0 + \beta_1ETLSFRC + \beta_2AGEXFRC + \beta_3AGIMFRC + \beta_4EXRCFRC + \mu \quad (3.3)$$

Where;

β_0 , are the intercepts

$\beta_1 - \beta_5$ are the coefficients of independent variables while μ_1 is the error terms.

AGRPFRC, ETLSFRC, AGEXFRC, AGIMFRC, EXRCFRC are as earlier defined.

3.2 Data Required/Sources

The data for this study shall mainly be annual time series collected from secondary sources covering a period of forty-one years, from 1980 to 2020. Some of these sources include publications of the World Bank and world development indicators (WDI) as presented in table 3.1.

Table 3.1: Variables Description and Sources of Data

S/N	Variables	Description of Data	Source
1	AGRPFRC	Agricultural Sector performance proxied by proportion of Agriculture to GDP (%)	World Development Indicator (WDI)
2	ETLSFRC	ECOWAS Trade Liberalisation Scheme proxied by Dummy	World Development Indicator (WDI)
3	AGEXFRC	Export to GDP ratio a proxy of trade liberalization as the allocation of resources is observed on the level of exports (%)	World Development Indicator (WDI)
4	AGIMFRC	Import to GDP ratio a proxy of liberalization characterizing the dimension of openness related to increased international competition (%)	World Development Indicator (WDI)
5	EXRCFRC	Exchange Rate	World Development Indicator (WDI)

Source: Author's Compilation from Economic Literature (2021)

3.3 Estimation Techniques and Procedures

This study will adopt descriptive statistics, correlation matrix analysis and inferential analytical tools. Specifically, it will adopt pooled Ordinary Least Squares (OLS), fixed effect model, random effect model and Hausman test and Generalized Method of Moment (GMM) to estimate the effect of ECOWAS trade liberalisation scheme on agricultural sector performance in selected West African countries.

3.4.1 Descriptive Statistics

One of the methods economists normally use to investigate the behaviour of the variables is through descriptive statistics. Descriptive statistics is that type of statistics that involves organizing, summarizing and presenting data in a meaningful form or usable format. Thus, in this research simple averages (i. e. mean), histogram, kurtosis, Jarque-Bera shall be employed to analyse the trends on some of the variables used in this study between 1980 and 2020.

3.4.2 Pooled Ordinary Least Squares (OLS)

The study employed the pooled Ordinary Least Squares (OLS) to examine the impact of ECOWAS trade liberalisation scheme on agricultural sector performance in selected West African countries. According to Gujurati (2013), the pooled Ordinary Least Squares (OLS) model simply pools all the observations and estimate a grand regression, neglecting the cross-section and time series nature of the data.

3.4.3 Fixed Effect Model

The researcher also adopts the fixed effect model to estimate the effect of ECOWAS trade liberalisation scheme on agricultural sector performance in selected West African countries. Fixed effect model is a feasible generalised least squares technique which is asymptotically more efficient than Pooled OLS when time constant attributes are present. According to Gujurati (2013), the fixed effect model pools all the observation, but allows each cross-section unit (i. e. each country) to have its own (intercept) dummy variable. The equation for the fixed effects model is stated as:

$$Y_{it} = \beta_1 X_{it} + \alpha_i + \mu_{it} \quad (3)$$

Where;

$\alpha_i(i=1, \dots, n)$ is the unknown intercept for each entity (n entity-specific intercepts)

Y_{it} is the dependent variable (DV). Where i = entity and t = time

X_{it} represents the independent variables (IV)

B_i is the coefficients for the independent variables

Decision Rule

The decision rule for the fixed effects model is that, if the null hypothesis is rejected, it means that there is a fixed effect but if the null hypothesis is not rejected it means that there is not fixed effect.

3.4.4 Random Effect Model

Also, the researcher employed the random effect to estimate the impact of ECOWAS trade liberalisation scheme on agricultural sector performance in selected West African countries. The rationale behind the random effects model is that, unlike the fixed effects model, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model. Thus, the equation for the fixed effects model is stated as:

$$Y_{it} = \beta X_{it} + a + \mu_{it} + \varepsilon_{it} \quad (4)$$

Where;

Y_{it} is the dependent variable (DV). Where i = entity and t = time

X_{it} represents the independent variables (IV)

β is the coefficients for the independent variables

μ_{it} is between-entity error

ε_{it} is within-entity error

Decision Rule

The decision rule for the random effects model is that, if the null hypothesis is rejected, it means that there is a random effect but if the null hypothesis is not rejected it means that there is not random effect.

3.4.5 Hausman Test

The researcher adopts the Hausman test for fixed effect and random effect to model the effect of ECOWAS trade liberalisation scheme on agricultural sector performance in selected West African countries. The rationale behind the Hausman test is to decide whether to use the fixed or random effects for the analysis. It basically tests whether the unique errors (μ_i) are correlated with the regressors, the null hypothesis is they are not.

Decision Rule

The decision rule for the Hausman test is that, if the null hypothesis is rejected, then use fixed effect model. On the other hand, if the null hypothesis is not rejected use random effect.

3.4.6 Generalized Method of Moment Test

The Generalised Method of Moment (GMM) is a generic method for estimating parameters in statistical models. It uses moment conditions that are functions of the model parameters and the data, such that their expectation is zero at the parameters' true value. It is a dynamic panel data estimator. It controls for:

- (i) Endogeneity of the lagged dependent variable in a dynamic panel data when there is correlation between the explanatory variables and the error term in that model.
- (ii) Omitted variables bias
- (iii) Unobserved panel heterogeneity
- (iv) Measurement errors

A priori Expectation

It is expected that increase in these variables - ECOWAS liberalization scheme (ETLSFRC), Agric Export (AGEXFRC), Agric Import (AGIMFRC) and exchange rate (EXRCFRC) will enhance agricultural sector performance in selected West African countries.

4. Data Analysis and Interpretation

4.1 Pooled OLS, Fixed and Random Effects Models Results for Francophone Countries

Table 4.7 presents the results of the pooled OLS, fixed effect model and random effect model in selected Francophone West African countries. This will enable the researcher find out the effect of ECOWAS trade liberalization scheme on agricultural sector performance in selected Francophone West African countries.

Table 4.1: Panel Regression Results for Francophone Countries

Variables	Pooled OLS Result	Fixed Effect	Random Effect
Constant	18.389 (0.000)	23.147 (0.000)	18.388 (0.000)
ETLSFRC	-8.353 (0.000)	-4.716 (0.000)	-8.353 (0.000)
AGEXFRC	0.178 (0.000)	0.081 (0.000)	0.178 (0.000)
AGIMFRC	-1.003 (0.001)	-0.234 (0.482)	-1.003 (0.001)
EXRCFRC	0.016 (0.000)	0.0008 (0.818)	0.016 (0.000)
F-Cal	92.86 (0.000)	13.04 (0.000)	
R ²	0.741	0.562	0.741
Hausman Test for		88.74 (0.000)	

fixed effect			
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The figures in parenthesis are the probability values.

B = consistent under H_0 and H_A ; obtained from xtreg.

B = inconsistent under H_A , efficient under H_0 ; obtained from xtreg.

Note: (** = 5%)

Source: *Extract from Stata*

(a) Pooled OLS Results for Francophone Countries

The pooled OLS results examining the effect of ECOWAS trade liberalization scheme on agricultural sector performance in selected Francophone West African countries presented in Table 4.7 show that across all specifications, ECOWAS trade liberalization scheme (ETLS) has a negative (-8.353) and a significant effect on agricultural sector performance in selected Francophone West African countries. Agriculture export to GDP ratio (AGEX) has a positive (0.178) and a significant impact on agricultural sector performance in selected Francophone West African countries at the 5 per cent level. Similarly, the coefficient of agriculture import to GDP ratio (AGIM) has a negative (-1.003) and significant predictor of agricultural sector performance in selected Francophone West African countries at the 5 per cent level. Exchange rate (EXRC) is a positive (0.016) and significant predictor of agricultural sector performance in selected Francophone West African countries at the 5 per cent level.

Also, the model of selected Francophone West African countries has a good fit as the variation in agricultural sector performance is explained by the regressors is about 74 per cent while the F-statistic is statistically significant across all specifications demonstrating the joint significance of the explanatory variables.

(b) Hausman Test Results for Francophone Countries

The result of the Hausman test in selected Francophone West African countries is presented in table 4.7. The Hausman null hypothesis stated that reject the null hypothesis if the p-value is statistically significant at 5 per cent level and use the fixed effect estimator to run the analysis otherwise, use the random effect estimator. Based on this, since the p-value is 0.000, hence the null hypothesis is rejected and the fixed effect estimator is used to analyse the model in selected Francophone West African countries.

(c) Fixed Effects Model Results for Francophone Countries

The fixed effect (FE) estimator results examining the effect of ECOWAS trade liberalization scheme on Agricultural sector performance in selected Francophone West African countries presented in Table 4.7 show that across all specifications, ECOWAS trade liberalization scheme (ETLS) has a negative (-4.716) and a significant impact on Agricultural sector performance in selected Francophone West African countries. Agriculture export to GDP ratio (AGEX) has a positive (0.081) and a significant impact on Agricultural sector performance in selected Francophone West African countries at the 5 per cent level. Similarly, the coefficient of agriculture import to GDP ratio (AGIM) is a negative (-0.234) and an insignificant predictor of Agricultural sector performance in selected Francophone West African countries. Exchange rate (EXRC) is a positive (0.0008) and an insignificant predictor of Agricultural sector performance in selected Francophone West African countries.

Also, the FE model estimator in selected Francophone West African countries have a good fit as the F-statistic is statistically significant across all specifications demonstrating the joint significance of the explanatory variables.

4.5.2 Generalised Method of Moment (GMM) Regression Model Results for Francophone Countries

The GMM regression results examining the effect of ECOWAS trade liberalization scheme on agricultural sector performance in selected Francophone West African countries across all specifications is presented in Table 4.8 below.

Table 4.2: Two-Step System GMM Results for Francophone Countries

Variables	Coefficient	Probability Values
AGRPFRC L1.	1.197	0.001
ETLSFRC	-0.069	0.031
AGEXFRC	0.071	0.026
AGIMFRC	-6.756	0.101
EXRCFRC	-0.006	0.361
CONS	7.679	0.011
Number of Observations	131	
F-Cal	500.53	0.000
Number of Groups	5	
Number of Instruments	9	

AR (1)	0.028	
AR (2)	0.970	
Sargan Test	0.314	

Source: *Extract from Stata*

The ECOWAS trade liberalization scheme-agricultural sector performance association in selected Francophone West African countries is surveyed within the framework of a generalized method of moment (GMM) estimator. Table 4.8 shows the results from the heterogeneous panel regression from the GMM estimator in selected Francophone West African countries. From table 4.8, it was observed that, the model has a good fit as the F-statistic is statistically significant across all specifications demonstrating the joint significance of the explanatory variables. One thing to note here before interpreting the GMM regression coefficients is that it is important to verify the behavior of the residual terms as well as the instruments used. For the statistical inference of the estimated coefficients to be valid, the following must be satisfied:

1. Rejection of the null hypothesis of non-autocorrelation for the AR(1) test.
2. Non-rejection of the null hypothesis of non-autocorrelation for the AR(2) test.
3. Non-rejection of the null hypothesis of valid instruments for the Sargan's/Hansen's test.

A violation of these assumptions may suggest evidence of specification bias. Based on the results, the model passes these entire tests.

Also, the study found that the effect of ECOWAS trade liberalization scheme (ETLS) on Agricultural sector performance is negative (-0.069) and is statistically significant at 5 per cent level in selected Francophone West African countries; agriculture export to GDP ratio (AGEX) has a positive (0.071) effect on Agricultural sector performance in selected Francophone West African countries; the effect of agriculture import to GDP ratio (AGIM) on Agricultural sector performance in selected Francophone West African countries is negative (-6.756) and is not statistically significant at 5 per cent level; the effect of exchange rate (EXRC) on Agricultural sector performance in selected Francophone West African countries is negative (-0.006) and is not statistically significant at 5 per cent level.

5. Conclusion and Policy Recommendation

The study investigates empirically the effect of ECOWAS trade liberalization scheme on agricultural sector performance in selected Francophone ECOWAS West African countries using annual time series covering a period of 41 years, between 1980 and 2020. The study used agriculture GDP as the dependent variable and used ECOWAS trade liberalization scheme as the

main independent variable whereas agriculture exports, agriculture imports and exchange rate were used as check variables. The study used a sample of 5 Francophone ECOWAS countries. The study used descriptive statistics, correlation matrix, pooled OLS, fixed effect and random effect models as well as generalized method moment (GMM) modeling techniques for the analysis. The study shows that ECOWAS trade liberalization scheme (ETLSFRC) has a negative effect on Agricultural sector performance in all the selected Francophone West African countries; agriculture export to GDP ratio (AGEXFRC) has a positive effect on agricultural sector performance in all selected in Francophone countries; agriculture import to GDP ratio (AGIMFRC) has a negative effect on agricultural sector performance in all selected Francophone ECOWAS countries; exchange rate (EXRCFRC) has a negative effect on agricultural sector performance in Francophone countries. The study therefore concludes that ECOWAS trade liberalization scheme has not enhanced agricultural sector performance in selected Francophone West African countries within the period of study. The study therefore recommends full compliance in the removal of tariff and non-tariff barriers in line with the provisions of ETLS, implementation of (Common External Tariff CET), and adoption of a common currency by ECOWAS member countries to help mitigate negativity in exchange rate.

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