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Full-Length Research Paper

Does Foreign Trade Influence Performance of Food Supply Response in Nigeria 1981-2016: Application of Monte-Carlos Simulation

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ABSTRACT: The purpose of this study was to examine the impact of performance in foreign trade on food supply in Nigeria between 1981-2016. Annual time series data from secondary sources were analyzed using descriptive and inferential statistics such as the unit root test, Johansen co-integration test, vector error correction model (VECM), Monte-Carlo simulation, and the t-test. The Augmented Dickey-Fuller unit root test revealed that all variables were stationary at first difference, and the Johansen co-integrated test revealed one co-integrating equation using trace statistics. The result shows a slight decrease in the mean value of the log of food supply in scenario 1 when compared to the baseline scenario, with values of 29.57 and 29.47 respectively, which are significant at the 1% probability level (t < -5.667 < 000). When compared to the baseline scenario, the simulation revealed a significant increase in the mean value of the log of food supply in scenario 2 (t= 3.500 <0.01). When compared to the baseline scenario, scenario 3 showed a decrease in the mean value of log of food supply, which was significant at 1% (t= -2.158 <0.01). The study concludes that exports and imports have an asymmetric effect on food supply in both the long and short run, with lower exports and higher imports increasing food supply. Finally, the study suggests that policymakers develop export and import strategies that encourage private investment in food industries, and that the government increase agricultural spending to boost local food production.

Keywords: Foreign trade, export, import, food supply and Monte-Carlo simulation

INTRODUCTION

Foreign trade is concerned with the economic and financial relationships between nations, and it plays a vital role in coordinating socio-economic performance and opportunities for less developed countries. Foreign trade is an economic force that promotes commerce, technology, and growth, and it plays a critical role in the development of economic and social characteristics in countries all over the world (Adeleye et al., 2015). It is concerned with the investigation of the causes and consequences of international trade in goods and services, as well as the international improvement of production factors (Obadan and Okojie, 2010). Developmental economists have long recognized the importance of foreign trade in national economies' economic growth processes, as trade provides both foreign exchange earnings and market stimulus for faster growth (Omoke and Ugwanyi, 2010; Iyoha and Adamu, 2011). It also accounts for a significant portion of most countries' GDP and has long piqued the interest of policymakers and economists alike (Azeez et al., 2014).

It enables countries to sell domestically produced goods to other countries around the world (Sebastine et al., 2015). It has been regarded as a driver of economic growth, resulting in consistent improvements in human status by broadening the range of people's standards and preferences (Omoju and Adesanya, 2012). It is critical in reshaping the economic and social characteristics of countries all over the world because no country can grow without trade (Adeleye et al., 2015).

It is one of the most important and dynamic macroeconomic issues facing African economies. It has become an important issue to consider for Nigeria's economic growth and development due to its dynamism (Obiora, 2009). Nigeria, as a developing country, has been grappling with the realities of development not only politically and socially, but also economically, with the emphasis on the fact that Nigeria's economic growth is dependent on its trade with other countries (Muhammad and Benedict, 2015).

Foreign trade forecasting is based on the fact that global nations differ in terms of natural resource endowment, scale of production, growth preferences, technology, and long-term development (Omoke and Ugwanyi, 2010). Furthermore, because of these significant differences, foreign trade participation is justified for the creation of thoroughfares for nations to exchange consumer goods and services for which they lack capacity. Because of differences in resources, countries can only consume what they are capable of producing, but trade has encouraged them to consume what other countries are capable of producing (Iyoha, 2011). Despite Nigeria's abundant black oil and other mineral resources, the country's economy is still heavily reliant on the agricultural sector for national output and employment. In the last eight years, the agricultural sector has contributed an average of 38 percent to GDP, with crop production accounting for 80 percent, forestry for 3%, and fisheries for 4%. It employs about 65 percent of the adult labor force and meets the food fiber needs of Nigeria's large and growing population (Bola, 2007). Its significant contribution to national food security cannot be overstated, accounting for more than 90% of total consumption and providing the necessary foreign exchange earnings for capital development projects (Olatunji et al., 2010).

Food is the most important requirement for human survival. Nigeria aims to meet the food security and sufficiency needs of its citizens by promoting food production within its borders and supplementing with importation across borders as needed (FAO, 2015). The Nigerian government has made several efforts to encourage adequate food supply in the country through various programs and policies such as the National Fadama Development Project (NFDP), which was aimed at reducing poverty and increasing farm productivity and income of farmers, the Anchor Borrowers' program, and the Agricultural Transformation Agenda, which has the goal of transforming the agricultural sector to provide sufficient food of international standard and the Agricultural Transformation Agenda, which has the goal of transforming the agricultural sector to provide sufficient food of international standard and the Agricultural Transformation Agenda. Food accounts for more than half of a household's spending, and rising food prices have a significant impact on access to food and the ability to buy other necessities (FAO, 2013). According to experts, rising food prices have pushed 44 million people into poverty in developing countries, as a large portion of their income is spent on purchasing foods they don't have. Household consumption expenditures are a significant component that is influenced by individual household income. Garba, (2013) observed that budget constraints and needs help the household maintain a balance between consumption and saving. The Federal Government of Nigeria has made efforts to establish trade relations through the World Trade Organization (WTO), making imports and exports easier, as well as programs aimed at increasing production, which in turn increases food supply, in order to ensure supply response to foreign trade. Despite the Federal Government of Nigeria's efforts, it appears that food supply response to foreign trade is still fluctuating. As a result, it is necessary to examine Nigeria's food supply response to foreign trade and the implications for household consumption expenditure.

According to the Ricardian theory of comparative advantage, a country will benefit from trade if it focuses on producing a specific commodity with a lower opportunity cost than its trading partner (Gbosi, 2003). Other scholars in the classical school of thought, such as Adams Smith's absolute advantage theory, John Stuart Mill's theory of reciprocal demand, and Hecksher-trade Ohlim's theory, argue that foreign trade may not be able to sustain output due to uncontrollable factors such as inflation, exchange rate, interest rate, taxes, natural endowment, product prices, and product elasticity of demand.

The purpose of this research is to see if food supply response is consistent with export and import trends, and if changes in export and import have a significant impact on food supply response and, as a result, household consumption expenditure. Foreign trade is the biggest threat today to the developing countries and it is noted that economic growth is one of the major objects of foreign trade, but in recent times this has not been the case. Nigerian economy is still experiencing some elements of economic instability, such as price instability, high level of unemployment and adverse balance of payment (Ezike *et al.,* 2011). The full potentials of foreign trade have not been noticed in the economic growth of

Nigeria because some goods imported into the country are those that cause damages to local industries rendering their products inferior and neglected, thereby reducing the supply rate of such industries which later spreads to the aggregate economy.

According to Muhammad and Benedict (2015), agricultural imports volume has increased on the export side and agricultural products in total export earnings declined over the years with the depreciation of Naira value, increased export prices and lower import prices and over-valued exchange rates. These artificial cheap good imports have progressively created domestic disincentives for domestic substitutes. According to (FMARD, 2011), in 2010 alone, Nigeria spent N635 million on importation of wheat, N356 billion on rice, which is tantamount to spending about N1.0 billion per day, N217 billion on sugar and N97 billion on fish in spite of all the endowed marines, rivers and lakes of the nation.

Food constitutes a core component of several of the most widely used indicators on nutrition, health and poverty accounting for 50 percent household budget (USDA, 2011). The inability of the agricultural sector to attain self –sufficiency in food production which in turn brings about sufficiency in food supply has led to a situation of aggregate demand for exceeding aggregate supply leading to demand pull inflation in the economy (Olatunji *et al.,* 2010). It makes up the largest share of the total household expenditure in low-income countries on average, causes starvation, malnutrition, increased mortality rate and political unrest (Onwuka, 2017).

Food shortage is a serious problem facing the world and prevalent in sub-saharan Africa, caused by economic, environmental and social factors (Olaniyi, 2011; FAO, 2015), which in turn leads to increase in demand for food resulting in increase in price of food, which affects household consumption expenditures. Household expenditures are affected severely by shortage in food supply which results to inflation in prices of foods and affects individual consumption in the households (FAO, 2012). There are a number of short term effects of food shortages which have impact on children, mothers and adults as in malnutrition, hunger and related death. Long term effects of food shortage affects prices of food as a result of forces of demand and supply (FAO, 2012).

Over the years, most studies have focused either on the effect of export or import of food on the growth of the economy and effect of domestic food supply on the growth of the economy with little or no emphasis on food supply response to foreign trade in Nigeria and its implication for household consumption expenditure. For instance, Babatunde (2015) examined international trade and economic growth in Nigeria, Saheed (2014) analyzed the domestic food supply in Nigeria, Sebastine *et al.* *(*2015) examined the impact of agricultural export on the growth of the economy and Muhammad and Benedict (2015) *(*2015) analyzed the impact of international trade on the economic growth of Nigeria.

Literature review

According to Chang *et al.* (2009), the concept of comparative advantage is one of the few concepts in economics that is more than common sense. He further stated in the same article that the beauty of this theory is that it illustrates how even a country having no absolute cost advantage in any sector can benefit from trade by specializing in industries at which it is least bad (Development Policy review, 2009). According to Langdana and Murphy (2014) there are several assumptions related to the Ricardian trade model which include: there are only two countries and two commodities; there are only two factors of production, labour (L) and (K); there is perfect competition in all industries (including the factor market and the finished goods market); labor is all of the same level of skill and efficiency within each country; labor and capital are perfectly mobile within a country (and thus, always able to fill any production need within that country) but cannot shift between countries; there is free trade that involves no trade barriers or frictional transaction costs; there are no transportation costs. Also, while not explicitly stated by Ricardo, it is implied that there are no environmental or infrastructural costs; production operates with constant return to scale and constant costs; both countries have identical technology and technology is fixed, that is, there is no technological change; and each country fully utilizes all resources (labour and capital are fully employed). It is in this light that this study seeks to analyze food supply response to foreign trade in Nigeria.

METHODOLOGY

Data for this study were obtained from secondary sources. The data were obtained from Central Bank of Nigeria (CBN) publications and annual reports, National Bureau of Statistics (NBS), Federal Ministry of Agriculture and Rural Development, Food and Agriculture Organization statistics (FAOSTAT). Variables for which data were obtained include: volume of imports, volume of exports, annual household consumption expenditure, exchange rate, tariffs and annual food supply. The data for all variables cover a period of 36 years (1981 – 2016). Vector error correction model (VECM) was used to analyze influence of foreign trade on food supply prior to Monte Carlo simulation that was used to analyze different scenarios and student t-test was used to test hypotheses

in each scenario. In order to obtain more meaningful insight, logarithmic transformation of these variables was adopted. The unit root test of all variables was carried out, the Augmented Dickey Fuller (ADF) method was used to test for the presence of unit root in each variable (an indication for non-stationarity). This is because the use of data characterized by unit roots may lead to serious errors in statistical inference, and the Johansen procedure was employed to test for Co-integration in the model.

Model specification

Augmented Dickey Fuller test (ADF)

Following Oyinbo and Rekwot (2014) the Augmented Dickey Fuller (ADF) model with the constant term and trend can be specified as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \beta Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-i} + \varepsilon_t \quad (1)$$

Where: Y is the value of the variable of interest (food supply, exchange rate, import, export, household consumption expenditures, tariffs and government spending and taxes), α_0 is the constant, α_1 is the coefficient of the trend series, p is the lag order of the autoregressive process, Y_{t-1} is lagged value of order one of Y_{t-1} and ε_t is the error term.

Johansen Co integration test

A linear combination of two or more *I* (1) series may be stationary or *I*(0), in which case the series are co-integrated. The null hypothesis for the Johansen Co-integration test ($H!\ r = 0$) implies that co-integration does not exist, while the alternative hypothesis ($H!\ r > 0$) implies that it does. If the null for non-co-integration is rejected, the lagged residual from the co-integrating regression is imposed as the error correction term in a Vector Error Correction Model (VECM) given below as:

$$\nabla Y_t = \prod Y_{t-1} + \sum_{i=1}^{k-1} \tau_i \nabla Y_{t-1} + u + \varepsilon_t \quad (2)$$

Where:

$\nabla Y_t =$ First difference of a $(n \times i)$ vector of the n variables of interest,

$\prod = (n \times n)$ Coefficient matrix associated with lagged values of the endogenous dependent variables, $Y_{t-1} =$ Lagged values of Y_t, $\tau = (n \times (k-1))$ Matrix of short term coefficients,

$u = (n \times 1)$ Vector of constant and $\varepsilon_t = (n \times 1)$ Vector of White Noise Residuals

Monte Carlo simulation

The impact of various scenarios effect of food supply response on agricultural foreign trade and it implication for household consumption expenditure will be analyzed using Monte Carlo simulation, specifically, the simulation Food supply (FS) is

$$\sum^{\Sigma[f(x_i)]} = \theta N = \frac{1}{N} \sum_i^N = 1^{If(x_{it})} \quad (3)$$

Where x is a vector of foreign trade variable determinants θ is the dependent variable (FS) Food supply was simulated from the stochastic deterministic model

$$FS_{it}^{*} = \beta_{0i} + \beta_1\ Exch\ rate + \beta_2\ Govt\ sp_{t-i} + \beta_3^{*}\left[Expo_{it} + \theta_{2,It,}\right] + \beta_4^{*}\left(Import_{it} + \theta_{2,It,}\right) + \beta_5\ FOSS + \beta_6\ \ Hhe_{it} + \beta_7\ Tariffs_{it} + \ +\beta_8 Taxes_{it-1} + \zeta_{it} \quad (4)$$

$\theta_{1,It\ and}\ \ \theta_{2,It,}$ are uncertainties in measurement of the explanatory variables

ζ_{it} = exogenous white noise disturbance on the model

Given the stochastic nature of the model, the behavior of foreign trade under various scenarios was investigated.

Where;

$FOSS_{t-i_{t-i}} =$ Food supply

$Exch_{t-i} =$ Exchange rate

$Expo_{t-i} =$ Exports

$Impo_{t-i} =$ Imports

Hhe_{t-i}=Household consumption expenditure

$Tariffs_{t-i}$ = tariffs

Table 1: Unit Root test for all Variables Level First difference.

Variables	T-Statistic	P Value	T-Statistics	P value
Foss	-0.06421	0.9457	-5.552081***	0.0001
	(-3.63290)		(-3.639407)	
Export	-1.997030	0.2866	-7.758302***	0.0000
	(-3.646342)		(-3.646342)	
Import	-1.460701	0.5414	-6.88074***	0.0000
	(-3.632900)		(-3.639407)	
Exch rate	-1.563571	0.4902	-5.031536***	0.0002
	(-3.632900)		(-3.639407)	
Tariff	-1.729026	0.4081	-8.846659***	0.0000
	(-3.639407)		(-3.639407)	
HHE	-0.342524	0.9082	-6.082624***	0.0000
	(-3.632900)		(-3.639407)	
Govt. Sp	-1.021936	0.7346	-8.504972***	0.0000
	(-3.632900)		(-3.639407)	
Taxes	-0.981530		-6.724531***	0.0000
	(-3.632900)		(-3.639401)	

Note: (*****) denote rejection of null hypothesis at 1% significant or probability level. Based on Makinon (1996) one sided P-values t-critical value of the corresponding t. statistics given in parenthesis. **Foss = food supply; Exch **rate** = Exchange rate Govt **SP**= Government spending on agriculture and **HHE** = Household consumption expenditure a
Source: Author's Computation from E-views (2019).

$Govt\ sp_{t-i}$=Government spending

$Taxes_{t-i}$= Taxes

$ECM_t =$ error correction term

$u_t =$ error term

RESULTS AND DISCUSSION

Preliminary investigation prior to estimation

Unit Root Test

The preliminary investigation of the properties of variables prior to regression using Augmented Dickey–Fuller test (ADF) is presented in (Table 1). The result presented for food supply, export, import, tariffs, Government spending on agriculture, household consumption expenditure and taxes. The ADF test result indicates that all the variables were not stationary at level but stationary on first difference. The result implies that the level form of these variables exhibit random work or have multiple means of covariance or both. However, first difference of the variables is integrated or stationary. Linear combination of non-stationary variables using OLS produces spurious result leading to invalid inference. The existence of unit root in level form of the variable necessitated Co-integration test to determine whether long run relationship exists among these variables. Enger and Granger (1987) state that linear combination of non-stationary variables is often co-integrated.

Johansen Co-Integration test

Co-integration test investigation was carried out on the series properties of I (1) variables through the Johansen co-integration test to determine whether long run linear combination of non-stationary variable is stationary. This is based on the assumption that linear combination of non-stationary can be stationary (Enger and Granger, 1987). Using trace statistics, the result revealed that combination of these variables has one co-integrating equation and this means that linear combination of these variables has a single long run linear combination or relationship. However, maximum Eigen statistics criterion shows two co-integration equations, and this means that linear combination of these variables has two co-integration equations. The implication is that linear run linear combination of these variables can be modeled with OLS without the risk of spurious result. However, the trace statistics is adopted in this research for the purpose of simplicity in analysis. Thus, based on trace statistics value (66.43) which is greater than the critical value of (46.23), a long run relationship exists between food supply between exports, imports, tariffs, exchange rate, government spending on agriculture, household expenditure and taxes with one co-integrating equation (Tables 2a and b).

Lag Length selection criteria

Table 3 presents the result of lag length from six different selection criteria; AIC was chosen because of its lowest

Table 2a: Unrestricted Co-Integration Rank Test (Trace).

Hypothesized No of (ECS)	Eigen Value	Trace Statistic	0.05 Critical value	Probability **
None *	0.858285**	66.43394	46.23142	0.0001
At most 1	0.642696	34.99174	40.07757	0.1675
At most 2	0.537427	26.21233	33.87687	0.3080
At most 3	0.453969	20.57273	27.58434	0.3029
At most 4	0.281824	11.25536	21.13162	0.6218
At most 5	0.219394	8.421266	14.26460	0.3375
At most 6	0.055462	1.940034	3.841466	0.1637
At most 7	0.003489	1.230065	1.946523	0.1126

Note: ** denote rejection of null hypothesis at 5% significant level based on Mackinnon et al., (1999) P. Values
Source: Authors Computation from E-Views (2019).

Table2b: Unrestricted Co-Integration Rank Test (Maximum EigenValue).

Hypothesized No of (ELS)	Eigen Value	Max-Eigen Statistics	0.05 Critical value	Probability **
None *	0.858285**	169.8274	125.6154	0.0000
At most 1 *	0.642696**	103.3935	95.75366	0.0134
At most 2	0.537427	68.40173	69.81889	0.0645
At most 3	0.453969	42.18939	47.85613	0.1535
At most 4	0.281824	21.61666	29.79707	0.3203
At most 5	0.219394	10.36130	15.49471	0.2540
At most 6	0.055462	1.940034	3.841466	0.1637
At most 7	0.003489	1.230065	1.946523	0.1126

Note: ** denote rejection of null hypothesis at 5% significant level based on Mackinnon et al. (1999) P. Value
Source: Author's Computation from E-views (2019).

Table 3: Lag Length Selection Criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	27.110	NA	27.1619	18.5616	18.8695	18.6691
1	15.5118	21.597	26.7231	11.5839	14.0472	12.4437
2	59.3503*	16.852*	22.604*	13.7973*	16.4144*	16.4340*

* indicates lag order selected by the criterion

value 13.7973 at lag 2. Lag 2 is the appropriate lag to be in used for the model.

Impact of increase in export and decrease in import on food supply

The effect of increase in export and decrease in import is presented in (Figures 1, 2 and Table 4). Simulation in scenario 1, with 20% increase in value of the exports and 20% decrease in imports. The simulation showed slight decrease in the log of food supply with a mean of 29.47 and maximum of 30.21 which is significantly different at 1 percent probability level (t= -5.667 $\leq$0.001) when compared to the mean of log of food supply in the baseline with value 29.57. This agrees with the findings of Arene and chukwuma (2012), who found increase in export has significant influence on the growth of Nigerian economy, Tamba (2017), who also found that increase in export and decrease import affect the economic growth and Adeniyi (2012), who found that the effect of 10 percent increase in the volume index of world trade did not sustain the economy and noted that exports were greater than imports. Hypothesis 3 which states that increase in exports and decrease in imports have no significant effect on food supply was therefore rejected.

Impact of decrease in export and increase in import on food supply

The effects of decrease export and increase impact is present in (Figure 3 and Table 5) Simulation in this scenario with 20% decrease in the value of export and 20% increase in the value of import showed slight impact or effect on food supply. The mean value of the log of the dependent variable food supply was found to be 29.5 metric tons and the maximum value was 29.6 metric tons.

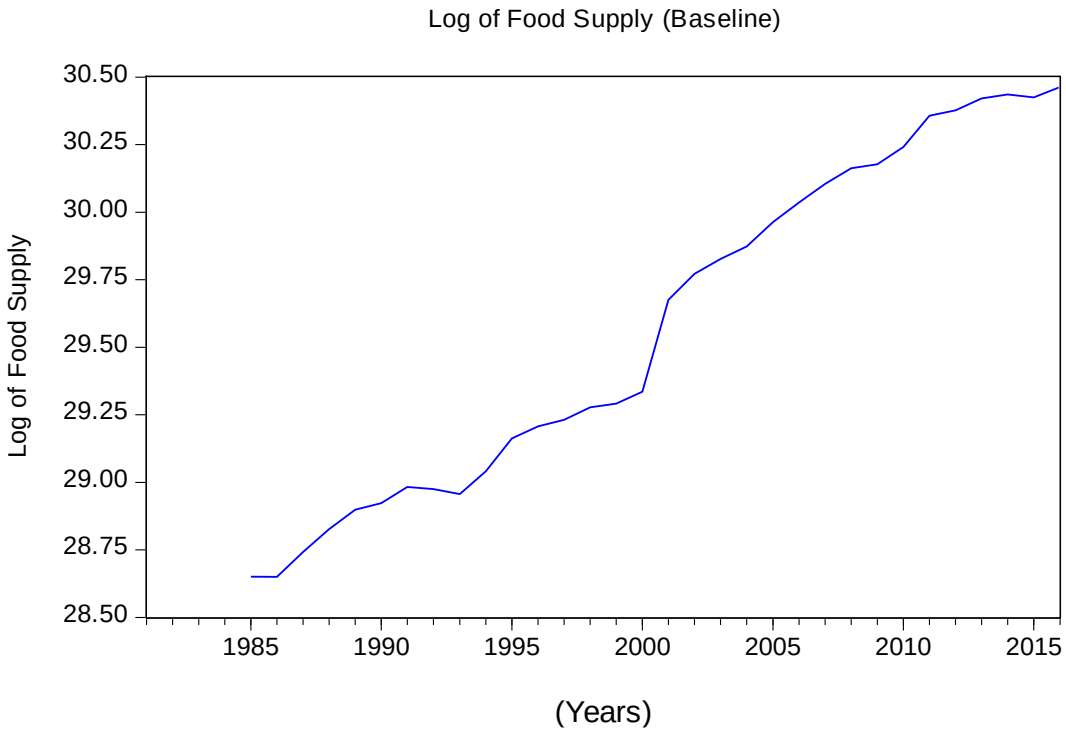

Figure 1: Baseline scenario

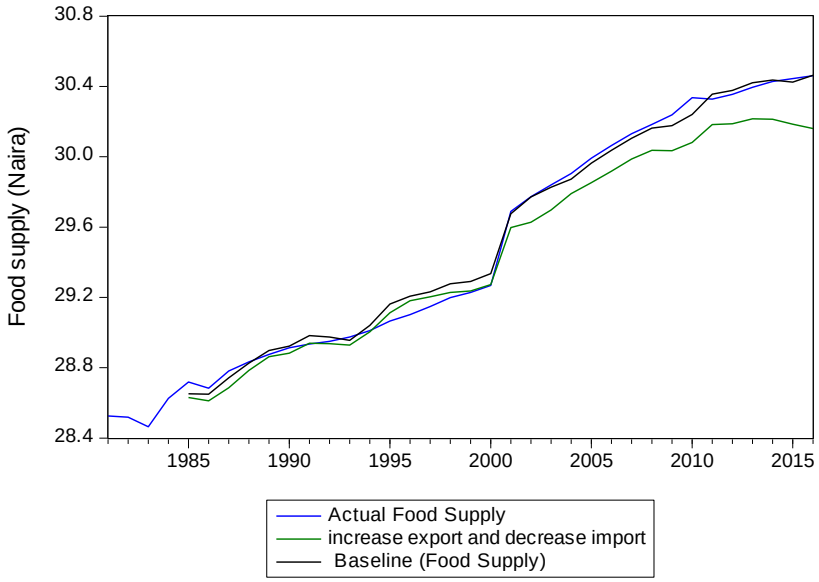

Figure 2: Simulated food supply in scenario 1

This shows slight increase in the mean value of the log of food supply when compare to the base line scenario as 29.46 and 29.55 metric tons respectively. The t-test result showed that there was a significant different in the value when compare to base line at 1% significant level (t $\leq$ 3.500 $\leq$ 000). This is invariance with Tamba (2017) who found that increase import and export affect the growth of Nigeria economy negatively, in variance with finding of Obekpa *et al.* (2018) who found increase government public expenditure increases the performance of the

Table 4: Scenario 1: Increase in Export and Decrease in Import

	Baseline	Food supply
Mean	29.57684	29.47725
Median	29.50537	29.43482
Maximum	30.46290	30.21580
Minimum	28.64945	28.61136
Std. Dev.	0.624616	0.559241
Skewness	0.047719	-0.031705
Kurtosis	1.488442	1.479687
Jarque-Bera	3.058554	3.087162
Probability	0.216692	0.213615
Sum	946.4588	943.2719
Sum Sq. Dev.	12.09451	9.695265
Observations	32	32
T = -5.667 ≤0.001		

Source: Author's Computation from E-views (2019).

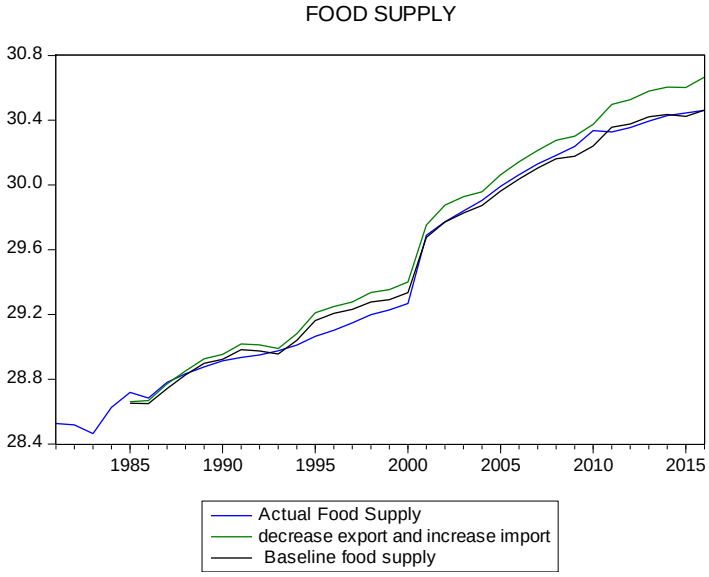

Figure 3: simulated food Supply in scenario 2

economy and agrees with the findings of Adeniyi (2012) who found the volume of world trade decrease by 10% as imports of food increases it affect the revenue of the country thereby affecting the GDP of country during this period and may lead to deflation. This leads to rejection of hypothesis 4 which states that decreases in export and increase in import have no significant effect on food supply.

Impact of increases in export and increase in import on food supply

The effect of increase in export and increase in import is presented in (Figure 4 and Table 6). Simulation result with 20% increase in value of export and 20% increase in the value of import showed the adjusted R-square values of 0.473, this explain that only 47.3% variation in the quantity of food supply is accommodated by the export and import. The simulation showed noticeable decrease in food supply when compare with the base line scenario with a mean value of log of the dependent variable food supply to be 29.57 metric tons which showed that there was significant difference in value of log of food supply between the baseline scenario and scenario 3 at 5% significant level (t= -2.158 ≤0.01). This is invariance with the finding of Arene and Chukwuma (2012) who found change in climate variables increase export of agricultural produce in Nigeria and different from the findings of Djomo (2018) who found that increase in food importation and human capital expenditure has positive on

Table 5: Scenario 2: Decreased Exports and Increased Imports.

	Baseline	Food supply
Mean	29.57684	29.66017
Median	29.50537	29.57657
Maximum	30.46290	30.66672
Minimum	28.64945	28.66121
Std. Dev.	0.624616	0.676202
Skewness	0.047719	0.074359
Kurtosis	1.488442	1.509118
Jarque-Bera	3.058554	2.993128
Sum	946.4588	949.1254
Sum Sq. Dev.	12.09451	14.17471
Observations	32	32
T ≤ 3.500 ≤ 000		

Source: Author's computation from e-views (2019).

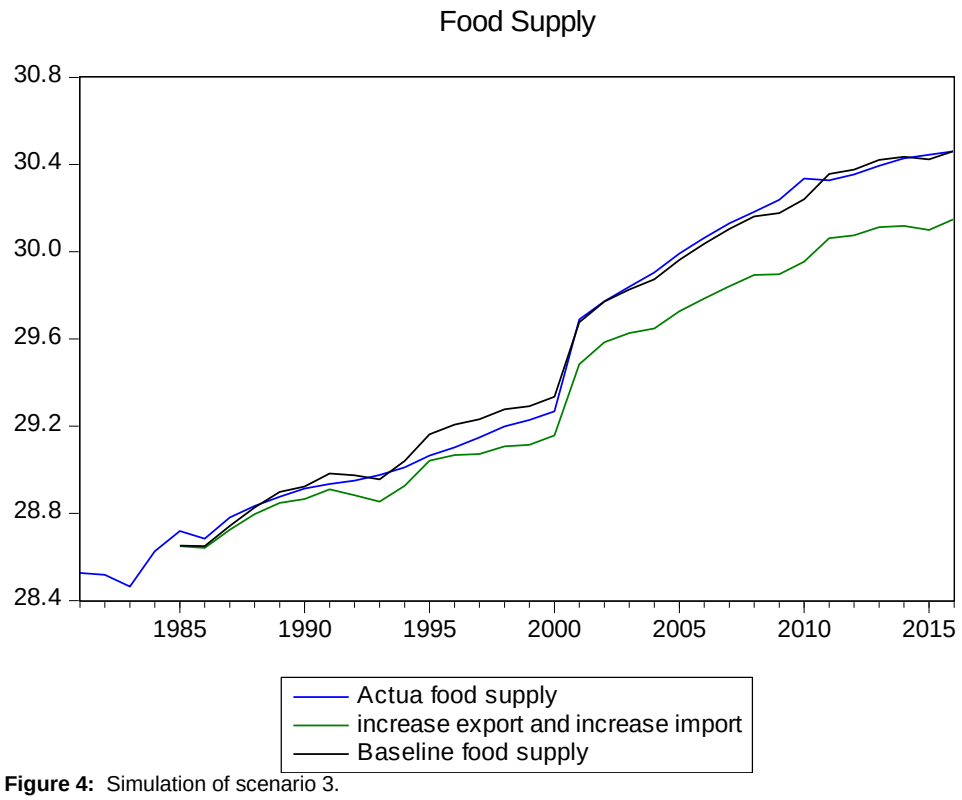

Figure 4: Simulation of scenario 3.

malnutrition. This leads to the rejection of null hypothesis 5 which states that increases in export and increase in import have no significant effect on food.

Stability diagnostics

Figure 5 presents the result for structural break of the model using the CUSUM of squares test. The CUSUM of square test line is situated between the gridlines, this implies that it lies between two standard deviation or 95% confident interval level. The graph show that the fitted model is relevant for policy direction. The residual test for heteroscedasticity with chi-square value of 89.27 and probability value of 0.78 which means the model is homoscedastic shown in appendix I. The autocorrelation test for fitted model was confirm using the Breusch-Godfrey LM test for serial correlation found in appendix II. The F statistics for Breusch-Godfrey LM test is 0.65 and its probability value 0.88. This implies that the estimated

Table 6: Scenario 3: Increase in Export and Increase in Import.

	Baseline	Food supply
Mean	29.57684	29.39741
Median	29.50537	29.32089
Maximum	30.46290	30.15022
Minimum	28.64945	28.64081
Std. Dev.	0.624616	0.524539
Skewness	0.047719	0.084219
Kurtosis	1.488442	1.438757
Jarque-Bera	3.058554	3.287803
Probability	0.216692	0.193225
Sum	946.4588	940.7171
Sum Sq. Dev.	12.09451	8.529361
Observations	32	32
T = -2.158 ≤0.01		

Source: Author's Computation from E-views (2019)

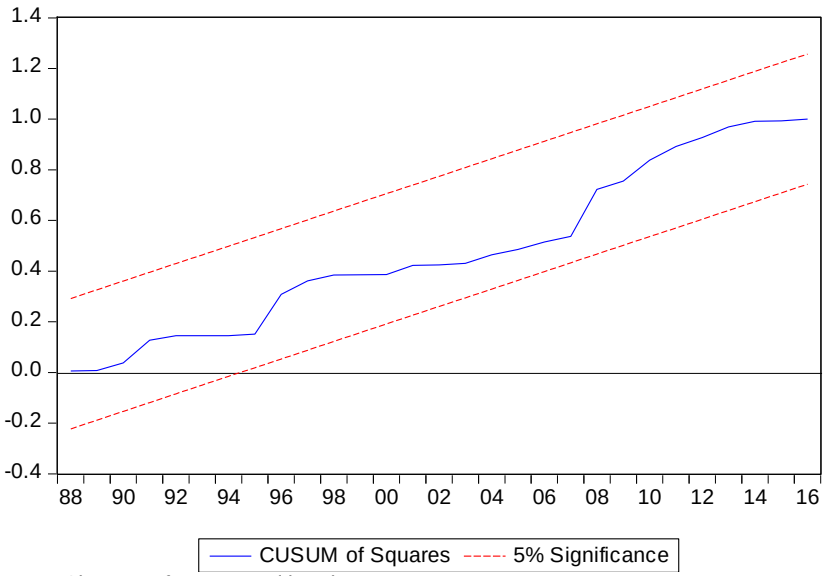

Figure 5: Chow test for structural break.

model is not suffering from serial correlation. Under the null hypothesis that the residuals are normally distributed. From the regression model, the joint Jarque-Berra 86.16 (0.060) which is a proxy for stochastic error does follow a normally distributed shown on (Table 6).

Conclusion

This study was carried out to analyze the performance of foreign trade on food supply in Nigeria. The impact of increased exports and decreased imports led to decreased food supply in the period under review. Also, the decreased exports and increased imports increased food supply during the period under review while increases in both exports and imports decreased food supply in Nigeria in the period under review. However, the study is limited in the availability of data for food supply as well as the lumping together of food product.

Recommendations

It is therefore recommended that import tariffs incentives should be provided to attract food industries to import food since food import augment food supply in the

country and encourage trade between Nigeria and other countries. Exchange rate should be reevaluated to encourage local producers to exports foods where they shall have premium for their produce. Government should impose a stringent policy such that her spending on agriculture will be access by farmers to boost local production making food readily available locally.

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APPENDIX I

LM Test for serial correlation

Lags	LM-Stat	Prob
1	56.89304	0.0147
2	48.22952	0.0836
3	42.87054	0.2002
4	22.39860	0.9628
5	24.35763	0.9299
6	38.07831	0.3750
7	43.07941	0.1942
8	41.30128	0.2501
9	54.63812	0.0240
10	38.27091	0.3668
11	14.95029	0.9992

Probs from chi-square with 36 df.

APPENDIX II

Component	**Skewness**	**Chi-sq**	**Df**	**Prob.**
1	0.600895	2.226624	1	0.1356
2	0.675860	2.816852	1	0.0933
3	1.401666	12.11545	1	0.0005
4	-1.039436	6.662628	1	0.0098
5	-0.209031	0.269446	1	0.6037
6	-3.225417	64.15378	1	0.0000
Joint		88.24479	6	0.060

Component	Kurtosis	Chi-sq	Df	Prob.
1	4.006477	1.561702	1	0.2114
2	6.858014	22.94659	1	0.0000
3	3.914560	1.289482	1	0.2561
4	6.524707	19.15299	1	0.0000
5	2.879426	0.022413	1	0.8810
6	17.11648	307.2156	1	0.0000
Joint		352.1887	6	0.0600

Component	Jarque-Bera	Df	Prob.
1	3.788326	2	0.1504
2	25.76344	2	0.0000
3	13.40494	2	0.0012
4	25.81561	2	0.0000
5	0.291858	2	0.8642
6	371.3694	2	0.0000
Joint	86.1623	12	0.0600

APPENDIX III

Residual Heteroskedasticity test

Dependent	R-squared	F(14,22)	Prob.	Chi-sq(14)	Prob.
res1*res1	0.348676	0.841239	0.6232	12.90101	0.5343
res2*res2	0.106568	0.187439	0.9989	3.943013	0.9958
res3*res3	0.687282	3.453645	0.0046	25.42945	0.0306
res4*res4	0.356460	0.870421	0.5969	13.18901	0.5117
res5*res5	0.848849	8.825010	0.0000	31.40743	0.0049
res6*res6	0.843719	8.483741	0.0000	31.21762	0.0052
res2*res1	0.136583	0.248582	0.9951	5.053558	0.9851
res3*res1	0.692984	3.546969	0.0040	25.64042	0.0287
res3*res2	0.472374	1.406870	0.2298	17.47783	0.2316
res4*res1	0.356337	0.869957	0.5973	13.18448	0.5121
res4*res2	0.436027	1.214924	0.3315	16.13298	0.3053
res4*res3	0.878107	11.32045	0.0000	32.48996	0.0034
res5*res1	0.343783	0.823248	0.6396	12.71995	0.5487
res5*res2	0.262096	0.558155	0.8688	9.697540	0.7839
res5*res3	0.757455	4.907483	0.0005	28.02583	0.0141
res5*res4	0.620233	2.566448	0.0232	22.94862	0.0611
res6*res1	0.305278	0.690524	0.7602	11.29528	0.6627
res6*res2	0.178670	0.341844	0.9788	6.610790	0.9487
res6*res3	0.761012	5.003924	0.0004	28.15745	0.0136
res6*res4	0.661936	3.076893	0.0090	24.49165	0.0399
res6*res5	0.857885	9.486048	0.0000	31.74176	0.0044