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ANALYZING THE EFFECTS OF FOOD IMPORTS ON FOOD PRODUCTION AND BALANCE OF PAYMENTS IN NIGERIA

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Abstract

Research background: Past measures to increase food production in Nigeria, were not effective enough to curb food imports and increase food production thus leading to a deficit balance of payment for the country and a total neglect of the agricultural sector.
Purpose: This study analyzes the effects of food imports on food production and Balance of Payments (BOP) in Nigeria from 1960 to 2020.
Research methodology: The Auto Regressive Distributed Lag (ARDL) bound cointegration test procedure is utilized.
Results: The empirical results show that food imports adversely affect food production both in the long and the short run. While for the BOP equations, food importation positively affected the country's balance of payments in the long run. The short run error-correction term coefficients are signed negatively for both the food production and BOP equations. The results show that the gap between the equilibrium values and the actual value of the dependent variables are corrected with speed of adjustment equal to 40% and 85% annually. The stability test result on the food production equation showed that the null hypothesis of no stable residuals in both the short and long run are rejected, while the estimated model is not effective with stable recursive residuals for the BOP equation.

Novelty: The study therefore recommends that efforts should be geared towards boosting the country's food production by encouraging foreign investors' participation in the agricultural sector.

Keywords: food-imports, food-production, BOP, ADRL, Nigeria

JEL Classification: D24, N57, Q17

Introduction

Recent studies on international food trade shows that it has played a crucial role in maintaining food security and the enhancement of economic development, yet it has led to many ecological problems. Environmental degradation includes water and air pollution, deforestation as well as bio diversity loss, especially in food exporting economies (Dou, Silva, Yang, Liu, 2018). Agriculture has continued to be among the sectors of the Nigerian economy contributing to growth, even though over the years it has suffered from neglect, misdirected government policies and total lack of basic infrastructure (Nwagbo, 2000). According to Onwuka (2014), about 33% of the total GDP in the year 2013 came from the agricultural sector.

Nigerian food production growth was estimated to be around 3.7% in 2013; this was lower than the total food demand growth rate for the country which was estimated at 6.5% in 2013 respectively. As Nigeria continued to witness rapid population growth and slow agricultural growth, the country moved from being self-sufficient in food production, to becoming over dependent on food imports since the 1980s (Onwuka, 2014).

The US international trade administration report (2021) noted that Nigeria requires about $10 billion of imports annually to meet up with its short falls on food production. The Nigerian agricultural sector in recent times has been affected by sporadic flooding, conflicts between farmers and herdsmen as well as Boko Haram insurgencies that have disrupted food production. Food inflation rose in the first quarter of 2021 to 22.95% due to continuous banditry, and kidnapping especially in the country's agricultural belt. Another pressure on the escalating food inflation is the continuous devaluation of the Nigerian currency, the naira which had been devalued several times in 2021. Figure 1 shows Nigerian food production from 1960 to 2020.

In the 1960s, imports played a small role in the Nigerian economy, as agriculture was the largest exporting sector thus contributing the largest share of the GDP. Also, upon the discovery of oil, petroleum export started dominating the country's exports while the agricultural sector

declined drastically, leading to total neglect (Olalokun, 1984). Equally, the share of imports started rising, thus from an initial import value of N750 million in 1970, the volume of imports rose astronomically to N1.9 trillion in 2000. Furthermore, total food imports in the 1970s was N58.5 million but it equally rose to a total amount of N261 billion in 2003 (The Central Bank of Nigeria (CBN), 2004).

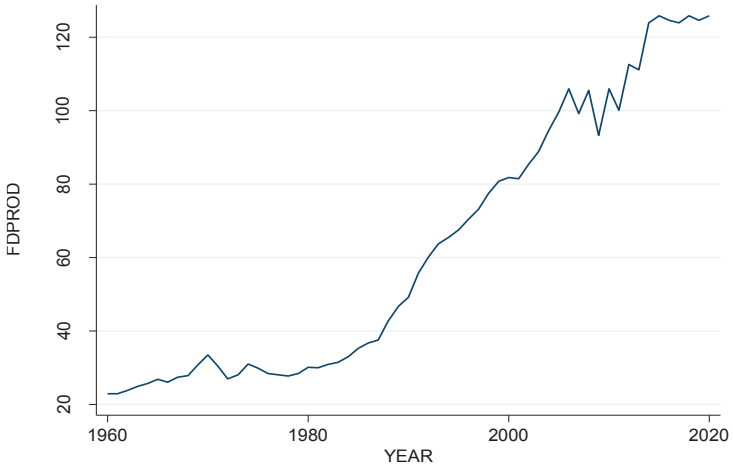


Figure 1. Food production in Nigeria from 1960 to 2020

Source: data from World Development indicators 2020.

For example, Akpokodje, Lançon and Erenstein (2001) noted that in 1970, Nigeria only spent about $100,000 on the import of rice, but by 1999 the figure had risen to $259 million. Despite measures taken by the current Nigerian government to restrict food imports, the total amount the country has been spending on imports has continued to increase. The National bureau of statistics (NBS) report (2019) noted that expenditures on food imports increased from $2.9 billion in 2015 to $4.1 billion in 2017. In 2018 the figure rose in an astronomical manner to $22 billion on food imports. However, in 2019, according to the NBS (2019), the figure dropped to $1.9 billion in 2019. Figure 2 shows Nigerian food imports from 1960 to 2020.

Nigeria experienced surplus Balance of Payments (BOP) between 1970 and 1975. In 1976 and 1977, the country witnessed a BOP deficit. There was an improvement between 1978 and 1980 in which a surplus of N2, 402.2 million was recorded. In 1981, there was a major decline in Nigeria's BOP as it recorded a deficit of N3, 020.8 million and this downward trend continued for 8 years, leading to a deficit of N20, 795 million in 1988. However, in 1989, Nigeria experienced a break in the string of deficits by recording a surplus of N22, 993.5 million.

The cycle of deficit continued from1990 to 1999, with the exception of a low surplus in 1997. There was a tremendous improvement in 2000 with a surplus of N314, 139.2 million from the N326, 634.3 million deficit in1999.

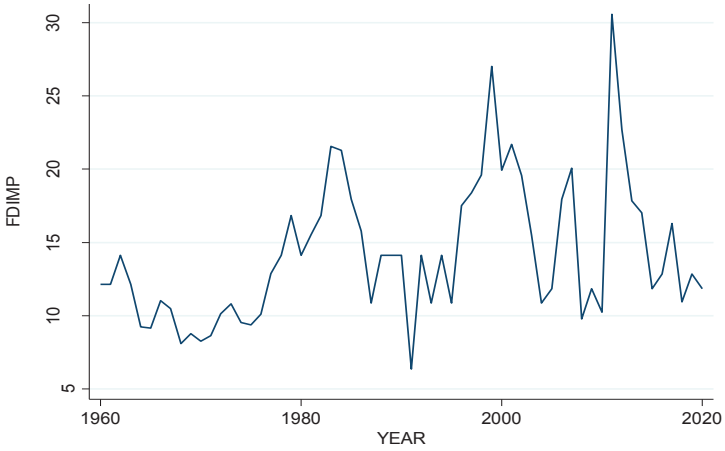


Figure 2. Food imports in Nigeria from 1960 to 2020

Source: data from World Development indicators 2020.

Between 2001 and 2003 the BOP continued the downward trend, but with a little lift in 2004. From 2006 till 2010, there was a very devastating deficit, leading to a record of N –3,913,279.36 billion in 2009. The Country experienced a deficit of N2, 957.78 billion in 2012 and N3, 143.8 billion ($20.2 billion) in 2013 (The Central Bank of Nigeria (CBN), 2015). The BOP for 2017, was $10.48 billion from $2.714 billion in 2016. The data recorded the highest value of $36.5529 billion in 2005 and a record low of $–16.019 billion in 2015. However, as at the 3rd Quarter of 2018, the Nigerian economy recorded a deficit of $5.54 billion (The World Bank Report, 2017). Figure 3 shows the country's balance of payments from 1960 to 2020.

It is evidence that past measures to increase food production were not effective to curb food imports and increase food production thus leading to a deficit balance of payments for the country. In Nigeria, food imports still account for 12 percent of food consumed in the country in 1990, which increased to about 14.5 percent in 1999 (Yusuf, Falusi, 2000), and has since continued to increase. The resultant effect of neglect in the agricultural sector led to a fall of Nigeria's food self-sufficiency ratio to 54% in 1986 from the 98% it was in 1960s. Between 1990 and 1996, about 18% of the country's population was adjudged to be critically food insecure in 1990; the figure increased to 36% in 1992 and 40.7% in 1996 respectively (Tiri, Ojoko, Aruwako, 2014).

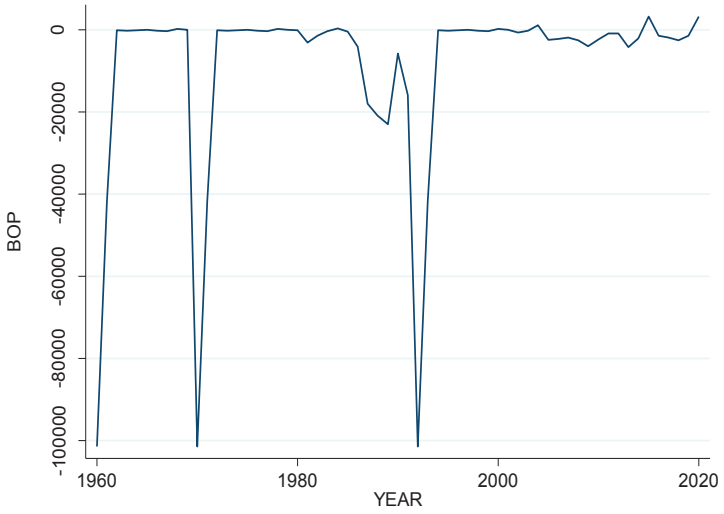


Figure 3. Nigeria's BOP from 1960 to 2020

Source: Central Bank of Nigeria statistical bulletin 2020.

Despite the fact that Africa possesses the most arable and fertile lands for agricultural production, the World food programme report (2019) noted that over 25% of the Sub-Saharan African population are undernourished compared to those Asia and Pacific regions with about 16%. The report further noted that about 821 million of the global population do not have access to enough quality food; out of this figure, 50% of them are from Sub-Saharan Africa. Though there has been a decrease in the number of people without access to enough food in other parts of the world, the trend in Africa is the opposite, and there are many conditions which have led to this which include, bad governance and corruption (Nzoyisenga, 2021).

Equally, Vaughan, Afolami, Oyekale and Ayegbokiki (2014) were of the view that over reliance on imported food is damaging to the growth of the country's agricultural production. When an economy imports food that it has a comparative advantage in producing leads to a total deterioration of the local economy. Of equal note is that food imports become more harmful in an economy with a high corruption index. The main reason being that invoices are diverted into the personal accounts of corrupt officials, leading to items not being supplied (Vaughan et al., 2014).

As a result of escalating food prices, especially locally grown staple foods, the consumers' purchasing power was weakened, thus forcing consumers to resort to cheaper imported commodities. For instance, in the first quarter of 2021, the country experienced a 47% increase in wheat imports. This was the result of an in increase in garri and rice which are the country's staple

foods (The International Trade Administration, 2021). Given the precarious balance of payment of the country, food imports have constituted a huge drain to the country's foreign exchange earnings over time (Yusuf, Falusi, 2000). The question this study has attempted to answer is therefore stated as follows: how have food imports affected the country's food production and balance of payments? The objective of this study is therefore to analyze the effects of food imports on food production and balance of payments in Nigeria. The null hypothesis guiding the study is therefore stated as follows: H0: There are no effects of food imports on food production and balance of payments in Nigeria.

1. Literature review

In studying Nigeria's food production according to Shimada (1999), there are ways by which it can be evaluated. Firstly, it is observed that the country's food production has enough productivity to supply domestic demand and as such, any occurrence of food shortages are merely a temporary phenomenon. Secondly, a limitation of the country's food production would reveal the structural problems inherent in the food production system (Shimada, 1999). The recognition that Nigeria as a country was able to increase its production in order to meet the growing demand appeared as an attitude to leave food production to individual producers, and this is a negligent attitude in food production policy (Famoriyo, 1972).

When there was starvation in the eastern part of the country immediately after the civil war, and draught that occurred in northern Nigeria in 1972 to 1974, it was a shock to the entire nation. However, the shock was quickly absorbed as income from oil exports enabled the country to import food from abroad (Shimada, 1999). Also, Muroi (1989) in a study of increased Food Production in Nigeria noted that recorded food shortages in the northern part of the country in the 1970s were as a result of the crude farming methods prevailing at that time. It was as a result of this limitations that the Federal Government established in the River Basin Development Schemes. Equally, Essang (1973) observed that the greatest obstacles to increased food production in the southern part of Nigeria was the shortage of land.

This was exacerbated by rapid population growth immediately after the country gained independence. It resulted that in some regions where the demand for food could not be resolved through the expansion of arable land, farmers were encouraged to continue the cultivation of existing fields with shorter fallow periods. The implication of this was that it resulted in the destruction of soil fertility, this led to soil erosion and stagnation of food production (Shimada, 1999). As revenue started to decline and the country's dependence on the importation of foods

to ameliorate recorded food shortages were considered insecure, government policy changed from that of a sector of neglect to the encouragement of active participation in the agricultural sector (Shimada, 1999).

There are competing opinions existing that are geared towards tackling limitations in the traditional farming methods of the country. Among the opinions includes that of introducing high yield breeds to farmers and the improvement the traditional methods of farming. A measure taken by the Federal Government to ameliorate these measures was the introduction of fertilizers, improved breeds and pesticides through the National Accelerated Food production Project (NAFPP) in 1974. The country introduced the Agricultural Development Projects (ADP) in 1975 and the Operation Feed the Nation (OFN) in 1976. In 1986, the government introduced the Structural Adjustment Programme (SAP). The effect on Nigeria's agricultural production became the center of a debate, because the policy's adoption was aimed towards the liberalization and deregulation of the market. Such policies as subsidy cuts relating to food production, removal of regulations in the sector, are believed to impact positively on cash crop production as well as food production.

Further, empirical studies conducted by Okijie and Effiong (2021) on the impact of agricultural productivity on food imports in Nigeria from 1981 to 2019 using the fully modified OLS regression procedure shows a negative and significant impact of agricultural production on food imports. Nzoyisenga (2021) examines the impact of food import dependency on food security in Sub-Saharan Africa. The results show that food imports did not reduce food security. Okunola, Nathaniel and Festus (2018) on the population growth effect on food production in Nigeria from 1982 to 2016 applying ARDL cointegration model procedures indicate a positive and significant relationship between population growth and food production in the short and long run. Loden, Meierding and Van der Vink (2017) evaluate the effects of food imports and food aid dependence on climate change in 47 African countries. The results indicate that countries depending much on foreign cereal import displays lower the risk of civil unrest during wetter than normal years. Jing et al. (2017) assessed the damage effect on the domestic environment of the global soybean trade applying a meta-analysis of 168 countries across six continents. The study shows that international food trade leads to the environmental pollution of importing countries contrary to the conventional wisdom that only exporting countries suffer from environmental pollution.

Kiawu and Jones (2016) evaluated remittances and food aid effects on West African food demand. Utilizing the Central Bureau of Statistics model for evaluation, the results indicate that oil grains and other agricultural products are highly price elastic, while vegetables and other

dairy products are least responsive to changes in price. The findings show that food aid did not influence food imports while remittances determine food imports. Astou (2015) analyses the effect of food imports on the food security of Nigeria and Senegal using a correlation analysis. The results show that there are significant correlations between food imports and food security for both countries. Gilani (2015) analyses the impact of agricultural imports and exports on agricultural productivity in Pakistan from the period 1980 to 2010 using the Pairwise Granger Causality test procedure. The study results show that there exists a bidirectional causality between agricultural exports and agricultural productivity. The results also indicate no direction of causality between agricultural imports and agricultural production.

2. Research methodology

To fully develop an agricultural economy Gelinas (1998) stated that the basic tools are to adopt some sort of protectionism from imports, in order for domestic food production to yield benefits. According to the author, these sorts of laws place an embargo on the importation of food for about fifty years or more. The most advanced economies have adopted this sort of protection mechanism in order to safeguard their local food production. Among such countries include the United Kingdom that established the Corn Laws in 1660 and the laws were not repealed until 1846. Belgium's food imports began only around 1870, Germany around 1890 and Japan in 1925. These countries were well justified in adopting this sort of protection mechanism in order to ensure food security (Gelinas, 1998).

Data sources

The data on food production, food imports, exchange rate, broad money supply and consumer price index were sourced from the World Development Indicators covering the periods from 1960 to 2020. While data on the balance of payments was sourced from the Central Bank of Nigeria (CBN) statistical bulletin 2020.

Model specification

The data on food production, balance of payment are utilized as the on dependent variables. While the data, food imports, exchange rate, broad money supply (MS), trade openness and consumer price index were utilized as the independent variables. The study developed two models to capture the effects of food imports on food production and BOP in Nigeria. The functional form of the models is therefore specified as follows:

For the food production equation:

$$FDPROD = F(FDIMP, MS, EXCH, OPEN, CPI) \quad (1)$$

and for the BOP equation:

$$BOP = F(FDIMP, MS, EXCH) \quad (2)$$

The variables are defined as follows:

FDPROD – Total value of food production,

BOP – Balance of payments,

FDIMP – Total value of food importation,

EXCH – Exchange rate,

MS – Broad money supply,

OPEN – Trade openness,

CPI – Consumer price index.

With the assumption of a linear relationship between the two dependent variables and the independent variables in the equation, the models are therefore specified as follows:

For the food production function:

$$FDPROD = \alpha_0 + \alpha_1 FDIMP + \alpha_2 MS + \alpha_3 EXCH + \alpha_4 OPEN + \alpha_5 CPI + \mu_t \quad (3)$$

and for the BOP function:

$$BOP = \beta_0 + \beta_1 FDIMP + \beta_2 MS + \beta_3 EXCH + \nu_t \quad (4)$$

where:

α_0 and β_0 – the constant terms,

α_s and β_s – model parameters for estimation,

μ_t and ν_t – the error terms.

For statistical reasons, we further transform the equations into logarithms as follows.

For the food production equation:

$$\begin{aligned} LOG(FDPROD) = {} & \lambda_0 + \lambda_1 LOG(FDIMP) + \lambda_2 MS + \lambda_3 LOG(EXCH) + \\ & + \lambda_4 OPEN + \lambda_5 LOG(CPI) + \nu_t \end{aligned} \quad (5)$$

2.1. Estimation Procedures

Unit root test

The Augmented Dickey Fuller (ADF) test technique for the stationarity test procedure was used. Equally, the Auto Regressive Distributed Lag (ARDL) bound cointegration test procedure is utilized and based on the assumption that the variables under consideration are integrated of the order zero or order one. One of the advantages of the ARDL estimation over other well-known procedures advocated by Engle and Granger(1987), as well as the Johansen and Juselius (1990), and Johansen (1998) maximum likelihood estimation procedure is that it is free from pretesting the unit root and can be utilized whether the under consideration is integrated of order zero or one. The null hypothesis guiding the test is stated as follows: H_0: $\beta = 0$ (β has a unit root); H_1: $\beta < 0$ (for an alternative hypothesis). Pesaran, Shin and Smith (2001) noted that in order to avoid a spurious regression, a variable cannot be integrated of order two. An appropriate lag length is provided while estimating an ARDL test procedure. For a small sample, an appropriate criterion to adopt includes, the Akaike information criterion (AIC) and the Schwarz criterion (SC) even though the SC criterion is considered superior to AIC. For the two developed models for this study, ARDL equations are therefore stated as follows:

For the Food production equation:

$$\Delta LOG(FDPROD)_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta LOG(FDPROD)_{t-1} + \sum_{i=0}^{n} \beta_{2i} \Delta LOG(FDIMP)_{1t-1} +$$

$$+ \sum_{i=0}^{n} \beta_{3i} \Delta MS_{2t-1} + \sum_{i=0}^{n} \beta_{4i} \Delta LOG(EXCH)_{3t-1} + \sum_{i=0}^{n} \beta_{5i} \Delta OPEN_{4t-1} + + \sum_{i=0}^{n} \beta_{6i} \Delta LOG(CPI)_{5t-1} +$$

$$+ \sum_{i=0}^{n} \delta_1 LOG(FDPROD)_{t-1} + \delta_2 LOG(FDIMP)_{t-1} + \delta_3 MS_{t-1} + \delta_4 LOG(EXCH)_{t-1} +$$

$$+ \delta_5 OPEN_{t-1} + \delta_6 LOG(CPI)_{t-1} + \varepsilon_t \tag{6}$$

For the BOP equation:

$$\Delta BOP_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta BOP_{t-1} + \sum_{i=0}^{n} \alpha_{2i} \Delta FDIMP_{1t-1} + \sum_{i=0}^{n} \alpha_{3i} \Delta MS_{2t-1} + \sum_{i=0}^{n} \alpha_{4i} \Delta EXCH_{3t-1}$$

$$+ \sum_{i=0}^{n} \gamma_1 BOP_{t-1} + \gamma_2 FDIMP_{t-1} + \gamma_3 MS_{t-1} + \gamma_4 EXCH_{t-1} + \pi_t \tag{7}$$

where:

Δ – Difference operators,

δ, γ – parameter estimates,

ε_t, π_t – Stochastic terms.

In the process of conducting an ARDL bound cointegration test, the Ordinary Least Square (OLS) is estimated to establish the existence of the long run relationship between the variables under study. The test is performed using the F-Statistic test procedure for the statistical significance of the lagged variables. The technique involves stating a null hypothesis of no cointegration between the variables in line with Pesaran et al. (2001) procedure. For this study, the null hypothesis of no cointegration for both the food production and BOP equations are stated as follows: H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ and H_0: $\beta_1 = \beta_2 = \beta_3 = 0$.

The bound cointegration test procedure is conducted and based on the assumption that if the F-statistic is greater than the upper critical bound, then H_0 is rejected and the conclusion is that the variables under study are cointegrated. If, however, the F-statistic is greater than lower critical bound and lesser than the upper critical bound, then any decision becomes inconclusive. An error correction term is therefore estimated if the null hypothesis is rejected (Narayan, Narayan, 2006). The vector error correction model for the food production and BOP equations are therefore stated as follows:

$$\Delta LOG(FDPROD)_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} LOG(FDPROD)_{t-1} + \sum_{i=0}^{n} \alpha_{2i} \Delta LOG(FDIMP)_{1t-1} + \sum_{i=0}^{n} \alpha_{3i} \Delta MS_{2t-1} +$$

$$+ \sum_{i=0}^{n} \alpha_{4i} \Delta LOG(EXCH)_{3t-1} + \sum_{i=0}^{n} \alpha_{5i} \Delta OPEN_{4t-1} + \sum_{i=0}^{n} \alpha_{6i} \Delta LOG(CPI)_{5t-1} + \lambda \text{ECM}(-1) + \mu_t \quad (8)$$

$$\Delta BOP_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} BOP_{t-1} + \sum_{i=0}^{n} \beta_{2i} \Delta FDIMP_{1t-1} + \sum_{i=0}^{n} \beta_{3i} \Delta MS_{2t-1} +$$

$$+ \sum_{i=0}^{n} \beta_{4i} \Delta EXCH_{3t-1} + \delta \text{ECM}(-1) + \nu_t \quad (9)$$

where:

ECM(–1) – The error correction terms.

λ, δ – the error coefficients,

Diagnostic and Stability tests

In order to ascertain the robustness of the estimated output, diagnostics and stability test procedures are conducted. Among the tests conducted include, a serial correlation test, a heteroscedasticity test, as well as the Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) tests to ascertain if the ARDL estimated results are stable.

3. Data/Result analysis

In this section, the generated data results are analyzed. The descriptive statistics of the variables used in the study are shown in Table 1. The result indicates that six of the variables have positive mean values, while one of the BOP variables shows a negative mean value with 61 observations. The highest standard deviation is recorded by BOP while the least standard deviation is recorded by OPEN. The probabilities of the Jarque-Bera test of normality for the variables shows that seven of the variables under consideration are normally distributed statistically. In order to ascertain the time series properties of the variables under study, a stationarity test procedure was therefore conducted. In this study, the Augmented Dickey Fuller (ADF) unit root test is adopted and the results are shown in Table 2.

Table 1. The Descriptive statistics of the variables

	FDPROD	BOP	FDIMP	MS	EXCH	OPEN	CPI
Mean	62.44311	–8956.481	14.21551	22.99732	172.316800	8.58E+09	40.660070
Std. Dev.	36.27044	23408.35	4.799202	19.72270	130.148000	1.24E+10	62.839410
Skewness	0.486185	–3.210508	1.043400	1.318703	1.319918	1.636045	1.590803
Kurtosis	1.713985	12.58203	4.157545	5.233260	3.749135	4.630732	4.462778
Jarque-Bera	6.606649	338.1554	14.47389	30.356040	19.13859	33.97157	31.166760
Probability	0.036761	0.000000	0.000720	0.000000	0.000070	0.000000	0.000000
Observations	61	61	61	61	61	61	61

Source: authors' own computation from Eviews 9 results.

From the stationarity test results in Table 2, the results showed that the variables of, BOP, FDIMP, EXCH and MS are stationary at level I(0), at 5% significant levels. Three other variables, FDPROD, CPI and OPEN are stationary at first difference I(1), at 5% significant levels in the ADF test procedure respectively. In this case, an ARDL model procedure is conducted since

there is a mix order of stationarity among the variables. An ARDL bound test was performed using an automatic lag selection based on the Akaike info criterion (AIC). The maximum lag length of 4 were specified for both the food production and BOP equations. The Bound test results in Table 3 show that the F-statistic values for the two equations are greater than the critical values at both 10% and 5% significant values respectively. Therefore, the null hypothesis of no cointegration for the equation are rejected, hence the ARDL model estimation determines both the short and long run estimated coefficients respectively. Thus, there is a long run relation between the variables under consideration.

Table 2. The stationarity test results

Variable	Level difference	Prob.	Order of integration	First difference	Prob.	Order of integration
FDPROD	0.297103	0.9762		–3.602292	0.0086**	I(1)
BOP	–6.310514	0.0000**	I(0)			
FDIMP	–4.037099	0.0024**	I(0)			
CPI	–0.818956	0.8062		–3.278338	0.0204**	I(1)
EXCH	–3.492480	0.0116**	I(0)			
OPEN	–2.165803	0.2207		–6.744475	0.0000**	I(1)
MS	–4.895639	0.0001**	I(0)			

Note: * , ** and *** denote 1%,5% and 10% critical values respectively.

Source: authors' own computation from Eviews 9 results.

Table 3. The ARDL Bound test results

ARDL Bound test for the Food production equation			ARDL Bound test for the BOP equation		
Test Statistic	Value	k	Test Statistic	Value	k
F-statistic	3.909515	5	F-statistic	9.868769	3
ARDL critical value bounds			ARDL critical value bounds		
	10%	5%		10%	5%
Lower bound	2.26	2.62	Lower bound	2.72	3.23
Upper bound	3.35	3.79	Upper bound	3.77	4.35

Source: authors' own computation from Eviews 9 results.

The long run estimated results for the production equation in Table 4 indicate negative coefficients for LOG(FDIMP), MS, and LOG(EXCH), and are significant statistically. The negative coefficient of the food import variables implies that a one percent increase in the rate of food imports reduces the domestic food production by 17%. The result conform to the findings of Salem and Majaverian (2013) on the effect of food imports in Iran showed that

food imports indicates a negative effect on rural household food production. While Zakari and Ying (2013) noted that food imports and food aid coefficients show no significant effect on domestic food production in Nigeria. Also, a study by Okijie and Effiong (2021) on the impact of agricultural productivity on food imports in Nigeria shows a negative and significant impact of agricultural production on food imports.

Equally, a study conducted by Gilani (2015) for Pakistan shows that there exists no direction of causality between agricultural imports and agricultural production. The coefficient of an OPEN indicate positive sign is significant statistically. The results show that the coefficient of the consumer prices index, LOG(CPI) is positive and significant statistically. The results show that all things been equal, a one percent increase in consumer prices will lead to 20% increases in food production in the long run.

Table 4. The Long run estimates for the food production equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(FDIMP)	–0.174987	0.052777	–3.315602	0.0018
MS	–0.003214	0.001145	–2.807691	0.0072
LOG(EXCH)	–0.047321	0.026419	–1.791197	0.0797
OPEN	0.000000	0.000000	1.051145	0.2986
LOG(CPI)	0.207115	0.006771	30.587993	0.0000
C	4.485851	0.157465	28.487987	0.0000

Source: authors' own computation from Eviews 9 results.

The short run ARDL estimated results in Table 5, for the food production equation shows that the coefficient of the dependent variable, LOG(FDPROD(–2) is signed positively, and is statistically significant. It appears that the lag value of food production did contribute to food production growth in Nigeria in the short run. The coefficient of food imports FDIMP, indicates a negative sign and is significant statistically. This implies that food imports adversely affected food production in Nigeria during the period under review in the short run. It implies that a one percent increase in food imports would reduce local food production by 0.7 percent

However, this finding is in contrast to the study by Mabuza, Hendrik, Ortmann and Sithole (2009) on the impact of food aid on maize production in Swaziland, that received food aid does not lower domestic maize prices and has no negative effect on domestic production. For the broad money supply, D(MS(–1), the coefficient is positive and significant statistically in the short run. The coefficient of exchange rate, DLOG(EXCH) is signed negatively and insignificant statistically. The coefficient of the other variables in the equation which include, trade openness,

OPEN, indicates a positive sign and is insignificant statistically, while the consumer prices DLOG(CPI), indicate positive signs and is significant statistically. For a one percent increase in the rate of consumer prices, it results in an increase in the food production by 0.08 percent in the short run. The coefficient of the error correction term is signed negatively as expected with –0.402461 and is significant statistically. This implies that there is cointegration and there exists a long run relationship among the variables under study. Hence the gap between the equilibrium values and the actual value of the dependent variable is corrected with a speed of adjustment equal to 40% annually.

Table 5. The short run estimated results for the food production equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(FDPROD(–2))	0.226819	0.105782	2.144212	0.0372
DLOG(FDIMP)	–0.070425	0.023926	–2.943464	0.0050
D(MS(–1))	0.001278	0.000320	3.998509	0.0002
DLOG(EXCH)	–0.019045	0.011413	–1.668742	0.1018
D(OPEN)	0.000000	0.000000	1.037330	0.3049
DLOG(CPI)	0.083356	0.015551	5.360243	0.0000
ECM(–1)	–0.402461	0.075392	–5.338276	0.0000

R-squared	0.448053	Adjusted R-squared	0.330618
S.E. of regression	0.045410	Sum squared resid	0.096916
Log likelihood	103.1379	F-statistic	3.815312
Prob(F-statistic)	0.000811	Durbin-Watson stat	2. 006072

Source: authors' own computation from Eviews 9 results.

Statistically, the coefficient of determination R-squared (R^2) and adjusted R^2 indicate 0.448053 (44%) and 0.330618 (33) respectively. The results imply that independent variables explain the dependent variable to the tune of 33%. The probability of the F-statistic results show that the entire regression is adequate statistically. While the Durbin-Watson statistics with a value of (2.006072), indicates no serial correlation among the variables under consideration.

The diagnostic test result in Table 6 for the food production equation showed that the Breusch-Godfrey Serial Correlation test results indicate no serial correlation, the Normality test result indicates that the error term are normally distributed; while the Breusch-Pagan-Godfrey Heteroscedasticity test results show that the error term of the variables are homoscedastic

Table 6. Serial Correlation, Normality and Heteroscedasticity tests for the food production equation

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.621640	Prob. F(2,45)	0.541600
Obs*R-squared	1.559366	Prob. Chi-Square(2)	0.458600
Normality test			
Jarque-Bera	0.850962	Probability	0.653456
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.855909	Prob. F(10,47)	0.076400
Obs*R-squared	16.419190	Prob. Chi-Square(10)	0.088200
Scaled explained SS	11.373480	Prob. Chi-Square(10)	0.329200

Source: authors' own computation from Eviews 9 results.

The stability test results in Figures 4 and 5 for the food production equation show that the critical bounds within the lines in the CUSUM and CUSUMSQ tests estimates are straight and are therefore significant statistically at the 5% level. Thus, the null hypothesis of no stable residuals in both the short and long run are therefore rejected.

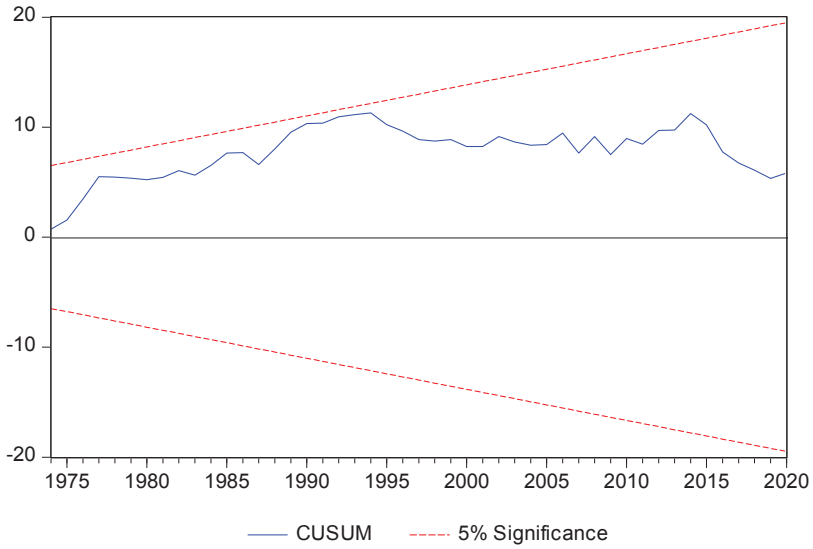


Figure 4. The CUSUM test result for the food production equation

Source: authors' own computation from Eviews 9 results.

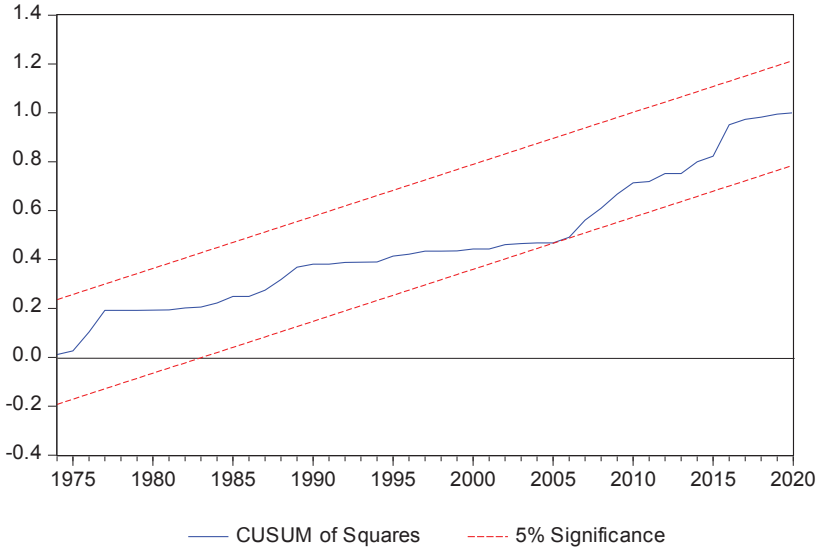


Figure 5. The CUSUMSQ test result for the food production equation

Source: authors' own computation from Eviews 9 results.

The long run estimated results in Table 7 for the balance of payments equation indicate that the coefficient of food importation FDIMP is positive and significant statistically. The result implies that food imports positively affected the country's balance of payments in the long run. The coefficient of exchange rate is positive and insignificant statistically. The coefficient of the broad money supply shows negative signs and is significant statistically. This shows that a percent increase in the money supply will result in a balance of payments disequilibrium in the long run.

Table 7. The Long run estimates for the BOP equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDIMP	1,240.981149	629.501241	1.971372	0.0540
MS	–282.472200	151.243573	–1.867664	0.0674
EXCH	15.641301	22.029495	0.710016	0.4809
C	–20,853.261657	10,688.050028	–1.951082	0.0564

Source: authors' own computation from Eviews 9 results.

The short run results for the BOP equation in Table 8 indicates that the coefficient of the lag value of the dependent variable BOP shows a positive sign and is significant statistically.

It shows that a one percent increase in lag values of the BOP would increase the current value by 20%. The coefficients of the independent variable, D(FDIMP) indicates a positive sign and is insignificant statistically. The result conforms with the findings of Vaughan et.al (2014) that the country experienced a precarious balance of payments deficit, with food import bills about five times that of exports during the periods. The coefficient of D(MS) shows a negative sign and is significant statistically. Thus, a one per cent increase in the money supply would lead to a balance of payment disequilibrium by –241.7. The coefficient of D(EXCH) indicates a positive sign and is insignificant statistically.

The short run error correction coefficient indicates a negative sign and is significant statistically with a value of –0.855825 as expected. Thus, a cointegration relationship exists between the variables under study; and also, the result shows that both the actual and the equilibrium values are corrected with a speed of adjustment equal to 85% annually.

Table 8. the short run estimated results for the BOP equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BOP(-1))	0.203957	0.106995	1.906238	0.0622
D(FDIMP)	130.817803	572.507553	0.228500	0.8202
D(MS)	–241.746690	122.911653	–1.966833	0.0545
D(EXCH)	13.386212	19.045517	0.702854	0.4853
ECMq(-1)	–0.855825	0.131886	–6.489132	0.0000
R-squared	0.438268	Adjusted R-squared	0.373453	
S.E. of regression	18199.66	Sum squared resid	1.72E+10	
Log likelihood	–658.7321	F-statistic	6.761803	
Prob(F-statistic)	0.000025	Durbin-Watson stat	1.930953	

Source: authors' own computation from Eviews 9 results.

Statistically, the (R^2) and adjusted R^2 indicate 0.438268 (43%) and 0.373453 (37) respectively. Thus, the independent variables explain the dependent variable to the tune of 37%. The probability of the F-statistic results shows that the entire regression is adequate statistically. While the Durbin-Watson statistics with a value of (1.930953), indicates no serial correlation among the variables under consideration. The diagnostic test result in Table 9 for the balance of payments equation shows that there exists no serial correlation, the Heteroscedasticity test results show that the error term of the variables are homoscedastic.

Table 9. The Serial Correlation and Heteroscedasticity tests for the BOP equation

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.328081	Prob. F(2,50)	0.7218
Obs*R-squared	0.764241	Prob. Chi-Square(2)	0.6824
Heteroscedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	2.318382	Prob. F(6,52)	0.0466
Obs*R-squared	12.451880	Prob. Chi-Square(6)	0.0526
Scaled explained SS	78.856120	Prob. Chi-Square(6)	0.0000

Source: authors' own computation from Eviews 9 results.

The stability test results for the BOP equation in Figures 6 and 7 show that the critical bounds is within the straight lines for the CUSUM test, and for the CUSUMSQ test results, the bound deviated from the straight line but continued within the bounds in the long run. This indicates some instability in the BOP equation. Thus, the null hypothesis of non-stability for the CUSUMSQ tests cannot be rejected, which implies that the estimated model is not effective with stable recursive residuals. However, since the CUSUMSQ plot returned back within the critical bound, it implies that the deviation was just transitory.

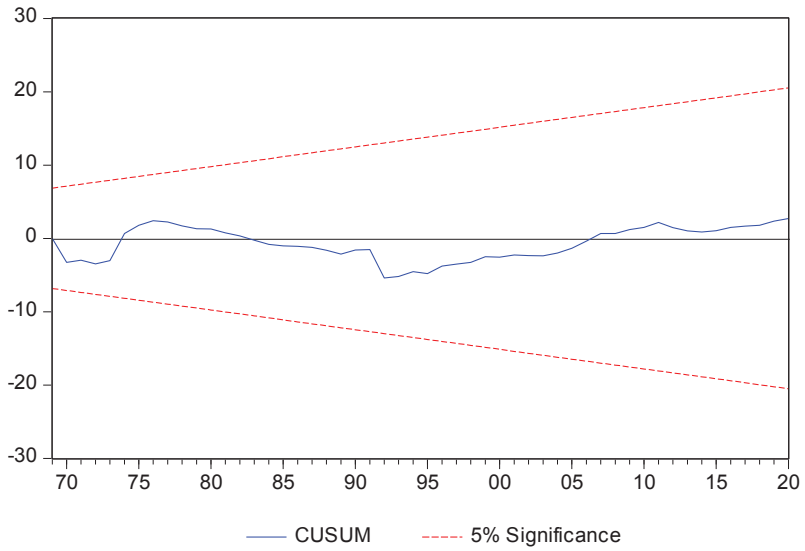


Figure 6. The CUSUM test result for the BOP equation

Source: authors' own computation from Eviews 9 results.

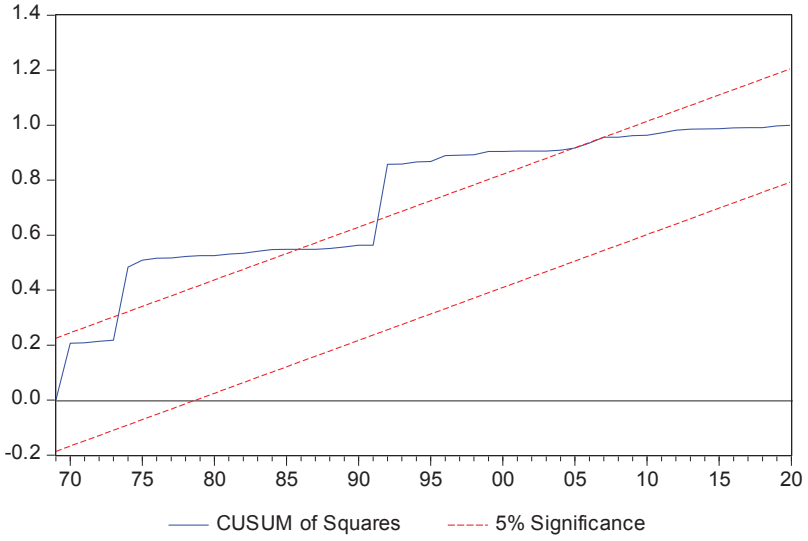


Figure 7. The CUSUMSQ test result for the BOP equation

Source: authors' own computation from Eviews 9 results.

Conclusions

This study evaluated the effect of food imports on food production and balance of payments in Nigeria, covering the period from 1960 to 2020. The study answered the question: does government consumption expenditures affect the current state of Nigeria? The ADRL model technique was employed for evaluation and the empirical results showed that food imports adversely affected food production in Nigeria in both the short run and long run during the period under review. The results equally showed that food imports affected the BOP positively in both the short and long run. The error correction results show that the gap between the equilibrium values and the actual value of the dependent variables are corrected with the speed of adjustment equal to 40% and 85% annually and respectively. The stability test results on the food production equation showed that the null hypothesis of no stable residuals in both the short and long run are rejected, while the estimated model is not effective with stable recursive residuals for the BOP equation.

The study therefore recommends that the Federal Government should create a condusive environemnt for intensive agricultural production to take off by providing grants to the population. There is equally a need to encourage foreign investors into the agricultural sector by

reforming land ownership laws in the country. Investors should equally be given easy access to procure fertile arable land in the country, this will in turn boost food production.

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