



## The Impact of Trade Openness on Trade and Tax Revenues in Nigeria (1981-2018)

Abaneme, Arthur Anyalewechi<sup>1\*</sup> and Onakoya, Adegbemi<sup>1</sup>

<sup>1</sup>Department of Economics, Babcock University, Ilishan - Remo, Nigeria.

### **Authors' contributions**

*This work was carried out in collaboration between both authors. Author AAA designed, performed the statistical analysis, and wrote the draft of the manuscript. Author OA supervised the writing of the entire work. Both authors read and approved the final manuscript.*

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### **ABSTRACT**

The challenge to provide enough resources to fund infrastructure development has been the bane of most developing countries like Nigeria. The appropriate economic and trade policies to deploy to increase revenue generating capacity of the government become compelling. This study examined the impact of trade openness on trade and tax revenue in Nigeria between 1981 and 2018. The study employed Augmented Dickey Fuller and Phillip Peron tests to conduct the stationarity tests. Akaike Information Criterion and Final Predictor Error provided the best lag lengths. Johansen cointegration test was used to determine the long run relationship. The study employed Vector Error Correction Model for the regression analysis while T- test and F test were also done to confirm the statistical significance of the variables and the models. For autocorrelation problem, Breusch-Godfrey serial correlation LM test were conducted and other post- estimation tests were also used. The result of the study showed that trade openness was negatively related with total tax revenue and with trade tax revenue (CED). The results indicate that a unit increase in trade openness leads to 11.58% decrease in trade revenue from CED and 13.69% decrease in total revenue. Trade openness as a policy to increase tax revenue was not beneficial to the country. Trade openness should be adopted with manufacturing and productive sector orientation in mind. In addition, tariff rates should be reviewed, and the tax structure should be transparent, and judicious use of tax resources should be implemented by government.

\*Corresponding author: E-mail: [arthurlewechi@yahoo.com](mailto:arthurlewechi@yahoo.com);

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## 1. INTRODUCTION

It has been argued extensively by economists that reduction or removal of tariffs and barriers to trade such as import duties reduces tax revenue generation of most developing economies. It is further contended by some opponents that removal of barriers to trade lowers import prices, and in addition reduces the array of taxes charged at importation, thus reducing the tax revenue that would have accrued to the government [1]. It is also widely argued by proponents that open economies grow faster compared to closed ones, and that economic transactions between different nations bring along with it benefits to countries that participate in it. International agencies like World Bank, World Trade Organisation and International Monetary Fund have encouraged developing and low-income countries to open up their economies by removing all international trade impeding policies and tariffs so as to facilitate free trade. Trade openness is the measure of the extent of freedom that exists in an economy for trade between countries. The contentions among economists of various era is how, what, when and why nations should embrace trade [2]. The aim of this study was to examine the impact of trade openness on total tax and trade tax revenues in Nigeria between 1981 and 2018, so as to provide insight into how effective or otherwise trade policy had been both in the short and long run.

The tax structure in developing countries like Nigeria is weak and therefore, not able to generate sufficient funds required for government public spending. This, [3] agrees that the expectation was that trade liberalisation would increase investment and income by broadening the tax base. There is broad consensus among many authors that trade liberalisation has effect on taxation by cutting into trade tax revenue. Governments are therefore compelled to move towards more efficient but harder to collect taxes [4]. Trade tax revenues in developing countries have become less important over the last twenty years because of reductions in tariff, but these taxes remain a crucial source of government financing, where they represent generally the fifth, and often more, of total tax revenues [5]. Over the past two decades, trade liberalisation agreements that occurred in low-income countries produced a loss of tax revenue that corresponds to 2.5% of GDP, namely one-sixth

of their total tax revenues [4]. For high or middle-income countries, the losses were less pronounced but even so significant. Equally, [6] agree that import tariff and export duties (taxes on international trade) are administratively convenient sources of tax revenue. Trade tax is only one of the sources, though major source of revenue to most developing countries because of its relatively ease of collection. Liberalisation intended to increase trading volume can both increase and decrease tax revenue from trade [7]. In the same vein, [8] indicate that considering the structural characteristics of less developed economies (LDC) economies, it is imperative to be cautious in presuming that what currently works in developed countries can easily be transferred to LDCs. Trade tax is dominant revenue base in Nigeria after oil export, and empirical studies showed a significant negative relationship of trade openness on tax performance in Nigeria [9]. However, the study did not indicate the tax handles responsible for the negative impact, and the dynamic relationship of the variables. Equally, [10] contend that the impact of economic partnership agreement showed substantial loss of import tax revenue to ECOWAS due to free trade agreement with European Union. It is a general knowledge that economic theory did not provide a definite conclusion about the effect of trade openness on trade tax revenue in either the short-run or long-run. Trade openness measures the relative skewness of trade to GDP  $[(X+M)/GDP]$  also known as trade share. The level of skewness is what has been used to describe the openness of that economy. Openness to trade in the form of converting quantitative restrictions to tariffs may initially lead to an increase in revenue from the trade tax [11]. Then, more openness in the form of tariff cuts can cause loss of trade tax revenue.

Studies on the impact of trade openness on tax revenue in Nigeria so far have not shown a definite result of short run benefits or long run losses so as to define specific policy mix needed to improve the revenue generation from trade openness. This study will show the effect both in the short and long run. It is paradoxical that despite implementing trade and economic reform policies, revenue performance shows that Nigeria is experiencing lower tax revenue performance [9], and this affects the government ability to fund infrastructure development projects, however, the study did not show

through which tax handle trade openness impacts total tax revenue. Nigeria is the 8<sup>th</sup> largest oil producing country in the world, 32<sup>nd</sup> largest economy in the world [12]. The country is one of the economies with great demand for goods and services with import dependence of over 80 percent. Yet, she is still grappling with poor tax collection even with huge trade relations with other countries. The tax income of the government is low and contributes less than 10% of the GDP.

## **2. LITERATURE REVIEW**

### **2.1 Theoretical Review**

The theories of trade have evolved over time. From the mercantilist perception of wealth as finite and therefore restrictive to imports, to [13] believe in absolute advantage as the basis for trade. Each nation's intrinsic capacity to produce more commodity than its competitors encourages more goods, and eventually trade is beneficial to all. For [14] comparative theory advocates that countries should concentrate on production of goods and services for which its opportunity cost is less. Ricardian model implies that as trade becomes more open, a country specializes in producing goods in which it has a comparative productivity advantage, which arises due to differences in technologies or natural resources and not in factor endowments, increasing its welfare gains and benefits from trade [15]. Government income through trade is presumably increased where trade between nations are not hindered. However, in reality, the experiences of nations are varied, especially as it has not resolved the problem of tax revenue for most developing countries. The [13] or canons of taxation indicate a good tax system to be predictable, convenient, efficient and fair. Good as this principle looks, the effect is not reflected in the revenue profile of most developing countries due to structural deficiencies, lack of transparency in tax administration, poor tax structure and other related problems. The informal sector in LDCs are seldom taxed because their activities are not captured in the economy's main stream [1].

Tax theory developed by supply-side economist, Arthur Laffer [16] depicts the relationship between tax rates and tax revenue that government receives. It states that a single tax rate exists that maximises the amount of revenue that government obtains from taxation. The curve illustrates the concept of taxable income

elasticity (taxable income changes as a result of changes in the rate of taxation). The curve is usually used to describe the behaviour of individual income rates levied by government. The Laffer Curve illustrates two effects of tax revenue - arithmetic and economic effects. The arithmetic effect is the resulting impact on revenue from an increase or decrease in tax rate. for instance, if tax rate increases, the corresponding increase in tax revenue is the arithmetic effect, and vice versa. The economic effect is the impact of the increase or decrease of the tax rate on output and employment. This is because tax rates act as incentives (disincentives) created to increase (decrease) work, output or employment. The economic effect implies that reducing tax rates will motivate people to work more and produce more, leading to more revenue, raising tax rates produces opposite effect.

### **2.2 Empirical Review**

#### **2.2.1 Evidence from developed countries**

The impact of trade openness on output as [17] using POLS showed that market size and trade openness are significant factors to explain FDI in Canada. Thus, the level of openness affects the inflow of inward FDI into Canada. However, the panel study by [18] using OLS estimation on Nineteen developed countries covering 30 years (1980 to 2010) showed a contrary and mixed result. The result showed that trade openness is not direct and strongly linked with economic growth in the long-run.

#### **2.2.2 Evidence from emerging market economies**

The work by [19] using ARDL bound testing investigated the relationship between economic growth, trade openness, urbanization, foreign aid and tax revenues over the period of 1980-2015 in Pakistan. Trade openness was inversely linked with tax revenue performance. In addition, economic growth raises tax revenues but trade openness declines it. Similarly, [3] adopting descriptive statistics in the study of the impact of trade liberalization and revenue mobilization in Sudan covering thirty-three years (1970-2002), showed that reform and reduction of the average tax rates in the economy did not have substantial impact on revenue generation, rather, revenue loss through tax evasion was substantial and growing over time, implying that tax reforms through rate reduction alone may not be enough

to improve tax receipts. However, [11] found a contrary result. Using unrestricted Cointegrating and VECM to estimate the static and dynamic effects found that trade openness positively affected trade tax revenue both in the long run and short run. The study opines that trade openness had positive effect on trade tax revenue. The evidence suggests that the variable that influenced tax revenue significantly was trade openness, although the study did not show the impact of trade openness on other types of taxes. There is a broad agreement among authors that trade liberalization has a modernizing effect on taxation, by cutting into trade tax revenues, it forces governments of all stripes to move towards more efficient, but harder to collect taxes [4; 20].

There is need for strengthening the tax structure of developing countries as key to harnessing benefits of trade openness. According to [21] study using panel regression analysis reveals that developing countries differ in tax matters because of their peculiar structural composition. This simply means that their long-term development depends on the strengthening of the revenue collection efforts of the government. Equally, [22] supports the existence of a long-run relationship between economic growth, capital stock, labour, and trade openness. It found that capital and openness to trade have positive impacts on economic growth. And that there is strong complementarity between trade openness and capital formation in promoting economic growth. This positive impact on growth also translates to increase in tax revenue. This view was however contradicted by [23]. The study adopted OLS estimation technique using Eighty-two (82) countries indicated that trade openness has not contributed to growth, rather it has caused negative balance of payment. It contends that trade liberalization agreements have caused reduction of export earning in developing countries, and consequently has affected tax revenue negatively.

The study by [24] using VECM and Granger causality test examined the impact of tax revenue performance, trade liberalization on macroeconomic variables in Sub-Saharan Africa between 2005 and 2014 for twenty-two SSA countries. The findings show that inflation rate, interest rate, trade openness and unemployment rate had a positive relationship with tax performance while exchange rate does not. Secondly, trade liberalization showed a short run relationship with tax revenue performance

although not statistically significant unlike exchange and interest rates. The study also observed a uni-directional causation; tax revenue is affected by interest rate, inflation rate, exchange rate, trade openness and unemployment. Agreeing with positive relationship between tax revenue and trade openness for developed and emerging economies, [25] using GMM regression found out that there exists a trade-off between greater degree of trade openness and the revenue collected by government. Using a panel of 83 countries covering 22 years period (1990-2012), the result of the dynamic panel estimation shows that trade liberalization is accompanied by more tax revenue. The variables that affect trade liberalization are GDP, exchange rate, agriculture and population. This evaluation needs to be qualified as empirical evidence from developed countries show contrasting scenario [18].

### **2.2.3 Evidence from Nigeria**

The work by [26] investigated the effect of macroeconomic variables on tax revenue from 1987 to 2016 using OLS estimation technique. They found a significantly positive effect of exchange rate and real gross domestic product on tax revenue performance. Inflation rate had negative but insignificant effect on tax revenue performance within the time frame. This agrees with the result of [27] examination of the contribution of trade liberalization to tax revenue in Nigeria between 1970 and 2009, and whether trade liberalisation is a predominant factor in tax revenue in Nigeria. The result showed that trade liberalisation, gross domestic product, public debt and labor force had positive effect on trade tax revenue while exchange rate had a negative effect on trade tax revenue.

However, this result was contradicted by [28], indicating that trade tax had fallen from one-third to one-quarter of total tax revenue between 1980s and 2005. In the same vein, [9] on trade openness and tax revenue performance in Nigeria (1987 to 2016) using OLS regression technique agree that trade openness is negatively related and significant with tax revenue performance, such that 1% increase in trade openness results in over N67.323million loss of tax revenue, thus attributing the reason to higher import duty rates in Nigeria compared to other countries. However, these studies did not indicate the effect of trade openness on other tax components and which tax revenue handle accounted for the impacts.

### 3. METHODOLOGY

The methodology adopted by this study focused on data that enabled a robust analysis on the relationship between trade openness and tax revenue in Nigeria and the macroeconomic variables that are critical in achieving a robust trade policy.

#### 3.1 Research Design

The research design is empirical based on ex-post analysis. This is because the study is focused on the facts that have occurred. The research is focused on the relationship between trade openness and total tax revenue and the impact trade openness has on trade tax revenue (CED) and the effect of other variables - exchange rate, inflation, foreign direct investment, unemployment and GDP on tax revenue. [29] avers that ex-post research is appropriate for estimation of relationships that have already taken place.

#### 3.2 Model Specification

The model used in this research work is based on the assumption that total tax revenue is a derivative of trade openness. Adopting the approach by [1] and [9].

The functional form is indicated as

$$TTR = f(TOP). \quad 1$$

Where TTR = Total tax revenue  
TOP = Trade openness

Assuming linearity in relationship among the variables, and introducing tax handles into the model, equation 1 is transformed into an econometric form as:

$$TTR_t = \beta_0 + \beta_1 TOP_t + \varepsilon_t \quad 2$$

Where  
TTR<sub>t</sub> = Total tax revenue, direct tax revenue, other indirect tax revenue and trade tax revenue (Focus is on total tax revenue and trade tax revenue)

$\beta_0$  = intercept of the model shows the state of tax revenue if there is no trade openness

$\beta_1$  = slope of the model shows the impact of each explanatory variable on the dependent variable, and 't' = serves as the time period.

$\varepsilon_t$  = error term which represents factors that affect tax revenue but which were not implicitly included in the model.

The variables included in the model are real gross domestic product (RGDP), real exchange rate (REER), foreign direct investment (FDI), unemployment rate (UNEMP), inflationary rate (INF) and trade openness (TOP). Hence the econometric equation becomes:

$$\ln TTR_t = \beta_0 + \beta_1 TOP_t + \beta_2 INF_t + \beta_3 UNEMP_t + \beta_4 \ln REER_t + \beta_5 \ln FDI_t + \beta_6 \ln RGDP_t + \varepsilon_t \quad 3$$

$$\ln CED = \beta_0 + \beta_1 TOP_t + \beta_2 INF_t + \beta_3 UNEMP_t + \beta_4 \ln REER_t + \beta_5 \ln FDI_t + \beta_6 \ln RGDP_t + \varepsilon_t \quad 4$$

Where;

TTR<sub>t</sub> = Total tax revenue

CED = Customs and excise duty ( the same as trade tax revenue)

$\beta_0$  = Intercept

TOP<sub>t</sub> = Trade openness

INF<sub>t</sub> = Inflationary rate

UNEMP<sub>t</sub> = Unemployment rate

REER<sub>t</sub> = Real exchange rate

FDI<sub>t</sub> = Foreign direct investment

RGDP<sub>t</sub> = Real gross domestic product

#### 3.3 Data and Data Sources

The data used in this study comprise of total tax revenue and customs & excise duty (trade tax) revenue (dependent variables), inflation rate, unemployment rate, real gross domestic product, foreign direct investment and trade openness (independent variable). The variables considered in the study are believed to be critical in line with the aim of the study, and each of them have direct bearing with either the dependent or independent variables. The measure of trade openness is reflected by trade share showing the ratio of import and export to GDP, the study used trade share as dummy for trade openness [(Import+Export)/GDP]. The data were sourced from Central Bank of Nigeria Statistical Bulletin, World Bank Economic Indicators and Nigerian National Bureau of Statistics covering 1981 to 2018. The data sources indicated are the most credible sources for any reliable investigation of this nature.

#### 3.4 Estimation Technique

Estimation technique was based on the result of the unit root test and it favoured vector error

correction model (VECM) as the appropriate estimation technique. Unit root test was conducted for stationarity of the variables using Augmented Dickey Fuller (ADF) and Philip Peron (PP) test. Johansen co-integration test was conducted to ascertain the presence of long-run relationship between the dependent and independent variables. Causality test was done using Toda Yamamoto to determine the causality among the variables.

In order to confirm the robustness of the model, some post-estimation tests were conducted: Breusch-Godfrey LM test to check for the presence of autocorrelation. The problem of error terms of successive periods being correlated is a major challenge in time series study. The study also did heteroscedasticity test deploying Breusch-Pagan to check if the variables are unequal across the range of values, and Normality test using Jacque-Bera test.

## 4. EMPIRICAL FINDINGS

### 4.1 Stationarity Test Results

The result of stationarity test is shown in Table 2. The test results using Augmented Dickey Fuller (ADF) and Phillip Perron (PP) techniques confirmed the stationarity of the variables at the first difference since the absolute test statistics are greater than the absolute 5% critical values at constant intercept.

### 4.2 Optimal Lag Length Selection

The selection of an optimal lag length was very essential before carrying out a Johansen co-integration test because it is very sensitive. Five criteria were assessed and tested at 5% level of significance. They are Sequential Modified LR test statistic (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ). In line with [30] recommendation, AIC and FPE criterion were chosen because they are superior to other criteria in their ability to minimize under estimation while maximizing the chance of recovering the true length for less than 120 observations.

## 4.3 Estimation Results

### 4.3.1 Co-integration test results

The co-integration test was applied using Johansen Co-integration test. There are two types of tests which were considered under the Johansen test and they are the Eigen value and Trace statistic test. The null hypothesis states that there is no co-integration among the variables while the alternative hypothesis states that there is co-integration among the variables. The decision criteria based upon this test is that if the Trace statistic and maximum Eigen value is greater than the critical value, then reject the null hypothesis and accept the alternative hypothesis but if the Trace statistic and maximum Eigenvalue is lower than the critical value then do not reject the null hypothesis but reject the alternative hypothesis.

**Johansen Co-integration test based on Trace and Eigenvalue Statistics:** Table 2 below illustrate the results after carrying out the Johansen co-integration test based on Trace statistic and Max-Eigen statistic. From the results of co-integration equations based on the two statistics, there is a long run relationship among the variables. The series were co-integrated because the Trace and Max-Eigen statistic are greater than their respective critical values at the 5% level of significance. In effect, the Johansen co-integration test confirmed the long run relationship amongst the variables.

$$\text{LNTR} = 545.79 - 0.025\text{INF} + 0.804\text{LNFDI} + 0.205\text{LNREER} + 2.69\text{LNRGDP} - 13.694\text{TOP} + 0.142\text{UNEMP} \quad (5)$$

$$\text{LNCED} = 81.79 - 0.002\text{INF} + 0.680\text{LNFDI} + 0.248\text{LNREER} + 3.18\text{LNRGDP} - 11.58\text{TOP} + 0.070\text{UNEMP} \quad (6)$$

Regression equations 5 and 6 showed that trade openness has negative impact on total tax revenue and trade tax. Other variables have different effects on tax revenue. The F- statistics showed that the variables were statistically significant in the model as the F-cal is greater than F-tab. the R-squared also showed that the explanatory variables accounted for substantial variation in the dependent variable, therefore the regression line brought good fit to the observed data.

**Table 1. Results of augmented dickey fuller (ADF) and Philip Peron (PP) test Results**

Variables	5% Critical value	Equation specification	ADF /PP at levels	ADF at first difference	PP at first difference	Order of integration (ADF & PP)
INF	-3.54	trend/intercept	< -3.5	-5.52	-10.33	1(1)
LNFDI	-3.54	trend/intercept	< -3.5	-9.34	-9.86	1(1)
LNREER	-3.54	trend/intercept	< -3.5	-4.59	-4.42	1(1)
LNRGDP	-3.54	trend/intercept	< -3.5	-3.73	-3.73	1(1)
LNTAXR	-3.54	trend/intercept	< -3.5	-7.45	-8.36	1(1)
TOP	-3.54	trend/intercept	< -3.5	-4.66	-4.60	1(1)
UNEMP	-3.54	trend/intercept	< -3.5	-4.90	-4.77	1(1)

Source: Author's computation (2020) using E-Views 10

**Table 2. Panel A: Total tax revenue**

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 critical value	Prob**	Max-Eigen statistic	0.05 critical value	Prob **
None *	0.83	215.53	125.62	0.00	62.91	46.23	0.00
At most 1 *	0.83	152.55	95.75	0.00	61.65	40.08	0.00
At most 2 *	0.74	90.91	69.82	0.00	46.95	33.88	0.00
At most 3	0.43	43.96	47.86	0.11	19.65	27.58	0.37
At most 4	0.29	24.31	29.80	0.19	11.90	21.13	0.56
At most 5	0.22	12.40	15.49	0.14	8.86	14.26	0.30
At most 6	0.10	3.55	3.84	0.06	3.55	3.84	0.06
<b>Panel B: Custom and Excise Duty</b>							
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob**	Max-Eigen statistic	0.05 critical value	Prob **
None *	0.89	203.72	125.62	0.00	77.83	46.23	0.00
At most 1 *	0.73	125.89	95.75	0.00	46.46	40.07	0.01
At most 2 *	0.55	79.43	69.82	0.01	28.04	33.88	0.21
At most 3 *	0.45	51.39	47.86	0.02	20.80	27.58	0.29
At most 4 *	0.39	30.59	29.80	0.04	17.53	21.13	0.15
At most 5	0.24	13.06	15.49	0.11	9.72	14.26	0.23
At most 6	0.09	3.34	3.84	0.07	3.34	3.84	0.07

Source: Author's computation (2020) using E-views 10.0. The result was normalized after conducting the Johansen regression co-integration test by multiplying the equation with the minus (-) sign. The Johansen Co-integration test long run estimated result is presented in Table 3 and equations 5 & 6.

**Table 3. Result of long-run cointegration estimation**

<b>Panel A: Total Tax Revenue</b>			
Variable	Co-Efficient	Standard Error	T-Statistic
INF	-0.025	0.002	-10.58
LNFDI	0.804	0.021	36.93
LNREER	0.205	0.058	3.534
LNRGDP	2.690	0.244	10.99
TOP	-13.694	0.832	-16.44
UNEMP	0.142	0.009	14.43
C	545.97		
R-squared: 0.67638. Adjusted R-squared: 0.563008. F-statistic: 6.152422			
LNTAXR = 545.97 - 0.025INF + 0.804LNFDI + 0.205LNREER + 2.69LNRGDP - 13.694TOP + 0.142UNEMP			
<b>Panel B: Custom and Excise Duty</b>			
Variable	Coefficients	Standard Error	T-Statistic
INF	-0.002912	<b>0.002</b>	<b>-1.319</b>
LNFDI	0.680	0.020	33.49
LNREER	0.248460	0.05469	4.54337
LNRGDP	3.180290	0.22488	14.1422
TOP	-11.58979	0.78994	-14.6717
UNEMP	0.070143	0.00946	7.41333
C	81.79		
R-squared: 0.884920. Adjusted R-squared: 0.794067. F-statistic: 9.740171			
LNCED = 81.79 - 0.002INF + 0.680LNFDI + 0.248LNREER + 3.18LNRGDP - 11.58TOP + 0.070UNEMP			

Source: Author's computation (2020) using E-views 10



#### **4.3.2 Vector Error Correction Model (VECM) to determine the Short Run Relationship of Variables**

Since each of the t-statistics calculated values was less than the corresponding tabulated values as shown in Table 4, there exists short run relationship between each of the dependent variables and tax revenue. Trade openness has negative and insignificant effect on tax revenue, customs and excise duty revenue had positive but insignificant effect on company income tax. The speed of adjustments also varied; whilst 48.98% of disequilibrium of the previous year converge to the current year for tax revenue, customs and excise duties showed 137%.

#### **4.3.3 T-Statistics test**

This test was carried out to determine the statistical significance of each of the variables.

#### **4.4 Post Estimation Tests**

##### **4.4.1 Breusch-godfrey serial correlation Im test**

This serial correlation test was used to check for the serial relationship between the variables. The results of Breusch-Godfrey serial correlation LM test is presented in Table 6. The results show the prob. (chi-square) having values of 0.6373 and 0.8821 which are greater than the 5% level of significance indicating that there is no serial correlation.

##### **4.4.2 White's Heteroscedasticity test**

The test helps to ascertain whether the variance of the error term is constant. The results in Table 7 showed prob. (chi-square) having values of 0.3937 and which are greater than the 5% level of significance, thus indicating that the variance of the error term is constant that is, there is homoscedasticity.

##### **4.5.3 Normality test**

The test was used to know if the residuals are normally distributed. The probability value is greater than 0.05 at 5% significant level showing that the means were normally distributed.

##### **4.5.4 Stability test**

**CUSUM Tests:** The cumulative sum (CUSUM) of recursive residuals and the CUSUM of square

(CUSUMSQ) tests are applied to assess the parameter stability. The CUSUM test identifies systematic changes in the regression coefficients, while the CUSUMSQ test detects sudden changes from the constancy of the regression coefficients. There are two important lines in the graph above. The red lines represent 5% significant level while the blue line represents CUSUM stability line. If the blue line is in-between the two red lines, the model is stable. But if the CUSUM blue line is above or below the two red lines, the model is not stable. From Figs 3 and 4 CUSUM stability line is in-between the red lines and this means that the model is stable. There is stability in the coefficients over the period of study. The CUSUMSQ test on tax revenue also shows that the model is stable and the coefficient is constant.

## **5. DISCUSSION OF FINDINGS**

The coefficient of trade openness is negative and insignificant on total tax revenue in the short run but negative and statistically significant in the long run as shown in Table 3. It has positive and insignificant effect on customs and excise duty revenue in the short-run, however it has negative and statistically significant effect in the long run. The implication of this result is that as trade openness ratio increases, tax revenue collection will increase on a decreasing rate, and the difference might not be noticeable initially (short-run), but over time (long-run), the impact will become obvious. This is the situation of most African countries presently especially Nigeria, and this result is in conformity with [9] and [8].

The impact of other variables like real gross domestic product (RGDP), real exchange rate (REER), inflation rate (INF), foreign direct investment (FDI) and unemployment (UNEMP) on tax revenue and on trade tax were varied as expected. These macroeconomic factors exert considerable influence on revenue collections. RGDP, FDI, and REER were all positively related to total revenue and CED. This implies that economic growth enhanced by exchange rate and foreign direct investment will translate to increase in tax revenue collection, and this effect is significant in the long-run. This is in consonance with literature and reports by [31] and [32], which have shown that economic growth brings about increase in tax revenue through job creation and increase in PCI of the citizens [12]. But unemployment rate showed a positive relationship with total tax revenue and CED. This result though contradictory and

Table 4. Showing vector error correction model result

<b>Panel A: Total Tax Revenue</b>							
Error Correction:	D(LNTAX)	D(INF)	D(LNFDI)	D(LNREER)	D(LNRGD)	D(TOP)	D(UNEMP)
CointEq1	- 0.49	-32.43	0.49	0.38	-0.01	-0.07	2.68
Standard error	(0.40)	(14.3)	(0.60)	(0.49)	(0.04)	(0.06)	(3.86)
t-statistics calculated	[ 3.22]	[-2.27]	[ 0.83]	[ 0.78]	[-0.44]	[-1.29]	[ 0.69]
t-statistics tabulated		2.04	2.04	2.04	2.04	2.04	2.04
<b>Panel B: Custom and Excise Duty</b>							
Error Correction	D(LNCED)	D(INF)	D(LNFDI)	D(LNREER)	D(LNRGDP)	D(TOP)	D(UNEMP)
CointEq1	-1.37	-20.04	0.15	-0.30	0.05	-0.04	-0.97
Standard error	(0.29)	(13.49)	(0.53)	(0.41)	(0.03)	(0.05)	(3.26)
t-statistics calculated	[-4.60]	[-1.49]	[ 0.28]	[-0.73]	[ 1.74]	[-0.79]	[-0.29]
t-statistics tabulated		2.04	2.04	2.04	2.04	2.04	2.04

Table 5. T-Statistics test result

<b>Panel A: Total Tax Revenue</b>						
Variables	T-statistics		T-tabulated	Decision Rule		
	Short run	Long run		Short run	Long run	
INF	-2.265	-10.58	2.04	Significant	Significant	
LNFDI	0.826	36.93	2.04	Insignificant	Significant	
LNREER	0.777	3.534	2.04	Insignificant	Significant	
LNRGDP	-0.438	10.99	2.04	Insignificant	Significant	
TOP	-1.293	-16.44	2.04	Insignificant	Significant	
UNEMP	0.694	14.43	2.04	Insignificant	Significant	
<b>Panel B: Custom and Excise Duty</b>						
Variables	T-statistics		T-tabulated	Decision		
	Short run	Long run		Short run	Long run	
INF	-1.48584	-1.319	2.04	Insignificant	Insignificant	
LNFDI	0.28361	33.49	2.04	Insignificant	Significant	
LNREER	0.72850	4.54337	2.04	Insignificant	Significant	
LNRGDP	1.74316	14.1422	2.04	Insignificant	Significant	
TOP	0.79231	-14.6717	2.04	Insignificant	Significant	
UNEMP	0.29696	7.41333	2.04	Insignificant	Significant	

surprising reflects the trend of unemployment rate in Nigeria and validates the overall result of the study that trade openness had been hurting to the economy. The country has witnessed growth in GDP with loss of jobs. The growth in GDP is nominal and artificial. The economy became systemic trading instead of productive

oriented, such that increase in GDP does not translate to increase in employment. Consequently, the economy experienced a jobless growth, which further validates the position of this study that increase in tax revenue that is sustaining is one based on growth in employment through the manufacturing sector.

**Table 6 Breusch-godfrey serial correlation LM test result**

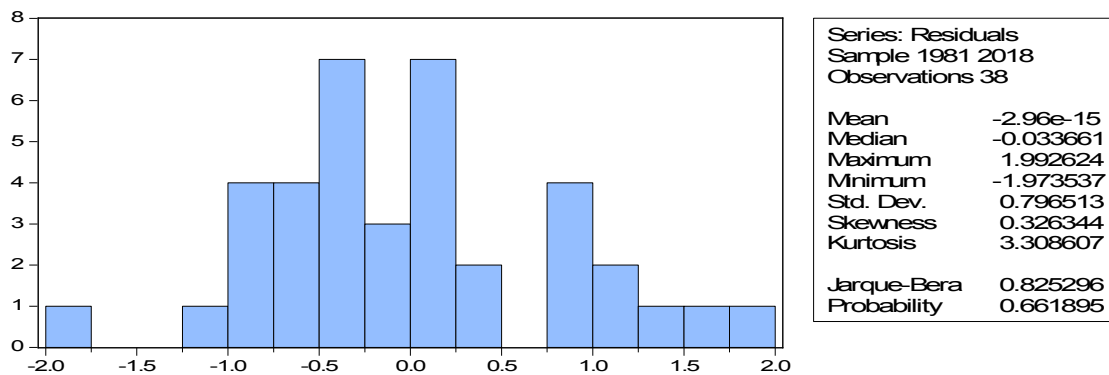
Variable	LRE* stat	Df	Prob.	Rao F-stat	df	Prob.
Tax Revenue	47.72879	49	0.5247	0.900451	(49, 34.9)	0.6373
Custom and Excise	39.72716	49	0.8250	0.693947	(49, 34.9)	0.8821

Source: Author's computation (2020) using E-views 9.0

**Table 7. Heteroscedasticity test result**

Variable	Chi-sq	Df	Prob
Total tax revenue	850.4255	840	0.3937
Custom and Excise duty	856.1894	840	0.3414

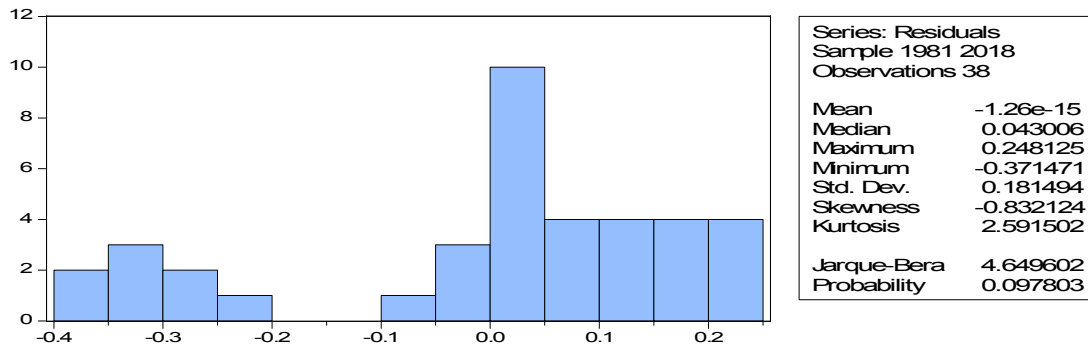
Source: Author's computation (2020) using E-views 10.0



**Fig. 1. Total tax revenue using Jarque-Bera Normality Test**

Source: Author's computation (2020) using E-views 10.0

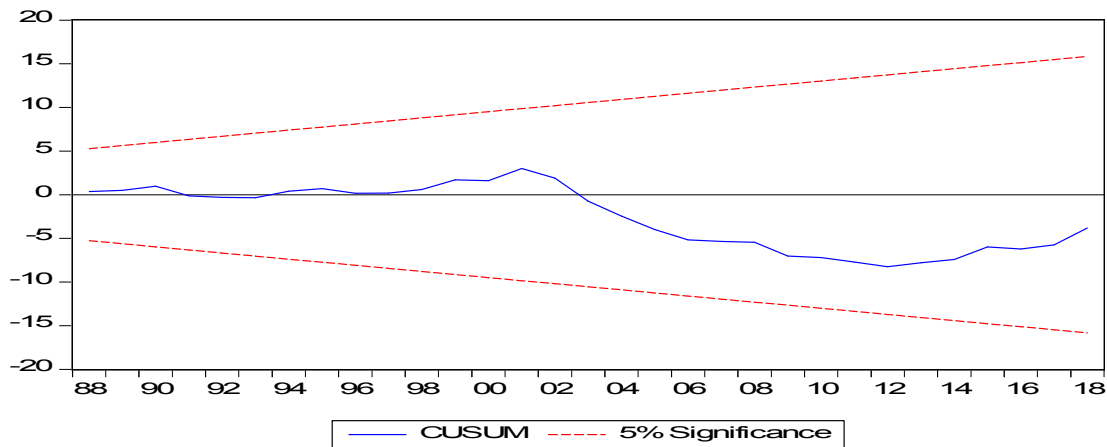
**Custom and Excise Duty**



**Fig. 2. Custom and excise duty using jacque- bera normality test**

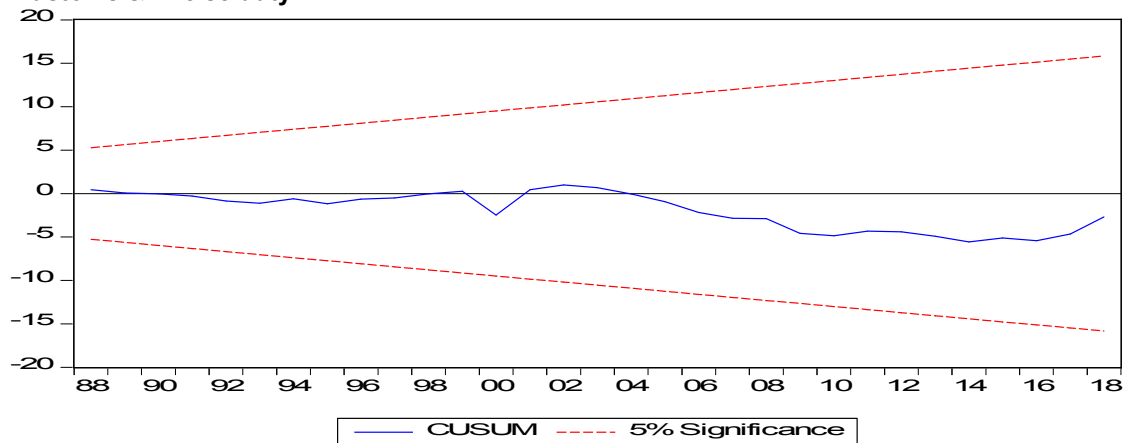
Author's computation (2020) using E-views 10.0

**Tax Revenue**



**Fig. 3. CUSUM stability test result**

**Customs & Excise duty**



**Fig. 4. Custom and Excise Duty stability test result**

Inflation rate had been volatile and had negative and significant effect on total tax revenue in the short-run and long-run. However, on trade tax, it was negative and insignificant in both short run and long run. The implication is that inflation has a significant moderating influence on revenue collection as it affects the disposable income of the household and the profit earnings of corporate entities. A unit increase in inflation rate leads to a 2% decrease in total tax revenue, thus, the impact of a higher inflation figure on the revenue earning of the economy is monumental. This result is in tandem with the study by [1]. Inflation has negative and insignificant effect on trade tax revenue because the economy is import dependent. The increase in price increases the value of imports and consequently

the value of tax. The demand for imported goods is fairly inelastic in Nigeria.

The study also reported a long-run relationship among the variables. The implication as reflected in the tax revenue showed that Inflation affects RGDP and FDI, and this impact is transmitted to tax revenue through either loss of jobs or increase in unemployment rate. Secondly, the result of the impact is also manifested by changes in corporate income and per capita income, and consequently on the demand and purchase ability of the economy. Exchange rate has direct impact on the variables as well. Changes in real exchange rate can affect the inflation rate considerably and thus push the economy to an uneven keel. This is in agreement

with results by [33] and [27]. This was the experience of Nigeria in 1986 when SAP was introduced and the Naira was depreciated following exchange rate deregulation. The same thing was also experienced in 2015 following depreciation of Naira by the incoming administration. Both scenarios caused a spike in inflationary rate and consequently affected all other economic variables validating the result that the variables are jointly significant in their effect on tax revenue in general.

## **6. CONCLUSIONS AND RECOMMENDATIONS**

The purpose of the study was to examine the impact of trade openness on tax revenue in Nigeria between 1981 and 2018. The revenue profile of the federal government over the years is based mainly on oil. The non-oil revenue contributes minimally to the federation account. Over the years, different countries have adopted different economic policies to address the dwindling revenue resources, especially those economies that are mono-product based like Nigeria. Nigeria, like most developing nations in Africa adopted freer trade policy arising from globalization as a sure way of expanding her economic base and increasing revenue for the country. It is therefore important to establish the impact of trade openness on different revenue sources of the government.

The results of the investigation have shown that though Nigeria has adopted a more open trade policy in the last 38 years, compared to pre - 1980 period, the revenue from taxes (non-oil) has not improved, there has also not been improvement in employment to generate more tax revenue. The increase in economic activities had not resulted in creation of jobs, therefore, the improvement in welfare of citizens that trade openness ought to induce has majorly been lacking.

The Nigerian economy just like other developing economies do not have a developed tax structure that can replace trade tax with other indirect and direct taxes. Therefore, trade openness reduces the ability of the government to rein in required revenue through trade tax due to reduction in tariffs and elimination of other non-tariff impediments.

The cointegration result showed negative and significant long run effect of trade openness on total tax and trade tax revenues. The short-run

relationship among the variables indicate that there is dynamic adjustment to convergence in the long run, although, trade openness and unemployment rate showed contrasting relationship with tax revenue expectations. Empirical results show trade openness is negatively related with tax revenue. The other variables such as REER, RGDP and FDI have positive and significant effect on trade tax revenue in the long run. It is worrisome that unemployment rate is positively related to tax revenue and trade tax, indicating a paradox and contradiction of basic economic theory. The implication is a clear policy mis-match showing a jobless growth which is an indication of import trading economy.

Trade openness as a policy had not resulted in expansion of the productive capacity of the economy which would have engendered increase in employment and consequent increase in tax revenue. Trade openness as the empirical result showed is not a beneficial economic and trade policy. It requires fundamental changes both in the tax structure and accompanying macroeconomic variables. Trade openness will be beneficial if it encourages productive sector for manufactured goods, that way, there will be improved competition of domestic produced goods, it will generate employment and reduce the dumping of imported goods which the present arrangement encourages because of the disadvantage the economy faces due to infrastructural deficiency.

The international trade policy of government should not be completely based on advanced economies template. It is therefore imperative to domesticate policy with structure realities since the trade openness has a negative effect on tax and trade tax revenues. Consequently, trade openness is to be adopted with manufacturing and productive sector orientation in mind. Tariff rates should be reviewed to ensure that no import tariff is below the maximizing tax rate to avoid negative impact on trade tax revenue. This is important more so, as the tax structure is poor.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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