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Trade Openness and Economic Performance: Empirical Evidence from Nigeria

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Abstract
With the advent of recession which eventually led to the debt crisis in 1986, Nigeria embarked on trade openness polcies in an attempt to jump-start the economy. This paper examines the relationship between trade openness and economic performance in Nigeria since 1986. The results of recent studies have been mixed. Our period of analysis focused on the trade liberalization (post-SAP) era in Nigeria ranging from 1986 to 2015. The Johansen cointegration and VECM techniques were adopted to ascertain whether a long run and short run causal relationship exist among the variables in the model. Annual data were obtained from the World Bank's *World Development Indicators*. Our findings suggest that there is a long run relationship among variables in the study, meaning the variables (economic growth, trade openness, private capital by depository institutions, government expenditure, and capital formation) will tend to move closer together in the long run. However, the results did not validate the existence of a long run causal relationship running from the explanatory variables to economic growth. Also, the results did not show any short run causal relationship running from each of the explanatory variable, including trade openness, to economic growth for Nigeria. As such, the suggestion therefore is that trade openness could be beneficial to the Nigeria economy on the condition that economic policies enacted need to, first, focus on in-ward looking developing strategies to enable factors that would eventually complement sustainable growth.
Keywords: Trade Openness, Economic Growth, Johansen Cointegration, Vector error-correction model, Nigeria

1. Introduction

Many economists view trade openness as a valuable component in the quest for an economy to generate sustainable economic growth. For developing economies, in particular, the adoption of trade liberalization policies by eliminating tariffs and non-tariff barriers would lead to increased economic activities and several other opportunities, such as increased foreign capital inflow and job growth for its citizenry (Edwards, 1993). In essence, sustainable economic growth would be the ultimate result of a trade openness economic policy through the specialization in producing comparative-advantaged goods and services. In testing the trade openness and growth linkage, many studies have found a significantly positive link between the two variables, particularly for developed economies. Debate remains, though, among these authors whether the positive linkage is unidirectional or bidirectional. Is the positive linkage growth-led or openness-led? Some economists have argued that growth via trade openness policies is a lot easier to attain for developed economies because of their significant advantage in the development of all the enabling factors, such as technology, energy, finance, infrastructure, telecommunications and human capital (Kim and Lin, 2009). Not surprising, a significant number of the existing literature supports the positive linkage of trade openness-growth particularly for developed economies (Frankel and Romer 1999; Winters, 2004; Madsen, 2009). In the case of developing countries, however, the road to economic growth via trade openness is a lot tougher to navigate because of the lack of necessary development in key sectors of their economies. The lack of enabling factors such as adequate infrastructures, financial system, and human capital, to mention a few, would work against any anticipated growth via trade openness policies. The suggestion is that the lack of such factors would impede developing economies to benefit fully, if at all, from embarking on trade openness policies (Chang, Kaltani and Loaya, 2009; Winters and Masters, 2013).

Of recent, there have been great interests by economists to look into the trade openness-growth nexus drawing empirical evidence from developing economies in light of the various major challenges confronting these economies. Would trade openness policies still lead to economic growth despite not having such amenities as a strong financial system and adequate infrastructure? Various empirical studies have examined this issue from the developing countries perspective. The findings are mixed. On the one hand, most authors found a positive impact on growth due to trade openness policies (Nduka, 2013; Keho, 2017; Gries, Kraft and Meierrieks, 2009; Chang and Mendy, 2012; Liu, Song and Romilly, 1997; Olaifa, Subair and Biala, 2013; Ude and Agodi, 2015). Based on their findings, the general belief is that the promotion of trade liberalization policies, such as tariffs reduction/elimination, would generate additional economic activities and improvements in the standard of living with an eventual growth in the economy.

On the other hand, several authors found no positive relationship between trade openness and growth (Herzer, 2013; Hye and Lau, 2015; Zahonogo, 2016; Sunday and Ganiyu, 2015, Akpan and Atan, 2016). In the case of Sub-Saharan African countries, for example, Akpan and Atan (2016) found that trade openness has a negative impact on economic growth in the long run. Few studies found only weak support between trade openness and growth suggesting that openness is not the only major factor that would generate growth in the long run (Zahonogo, 2016; Sunday and Ganiyu, 2015).

The purpose of this paper is to add to the existing literature by examining the causal relationship between trade openness and economic growth with the use of Nigerian data. Nigerian policymakers embarked on very aggressive trade liberalization policies in 1986 to get out of the recession then, with encouragement from the International Monetary Fund (IMF) and World Bank. The Trade liberalization policy is generally referred to in Nigeria as SAP - Structural Adjustment Programs. Existing empirical studies that focus on investigating the trade openness-growth nexus using post-SAP era data for Nigeria are very scanty. We will conduct our analysis for the period from 1986 to 2015. The organization of the rest of the paper is as follows: Section 2 presents a brief discussion on trade openness policy implemented in 1986 and its impact on the Nigerian economy. Section 3 presents the methodology and data used for the study. Section 4 outlines the empirical findings for the period of the study. Finally, section 5 provides the conclusion and recommendations for Nigerian policymakers going forward.

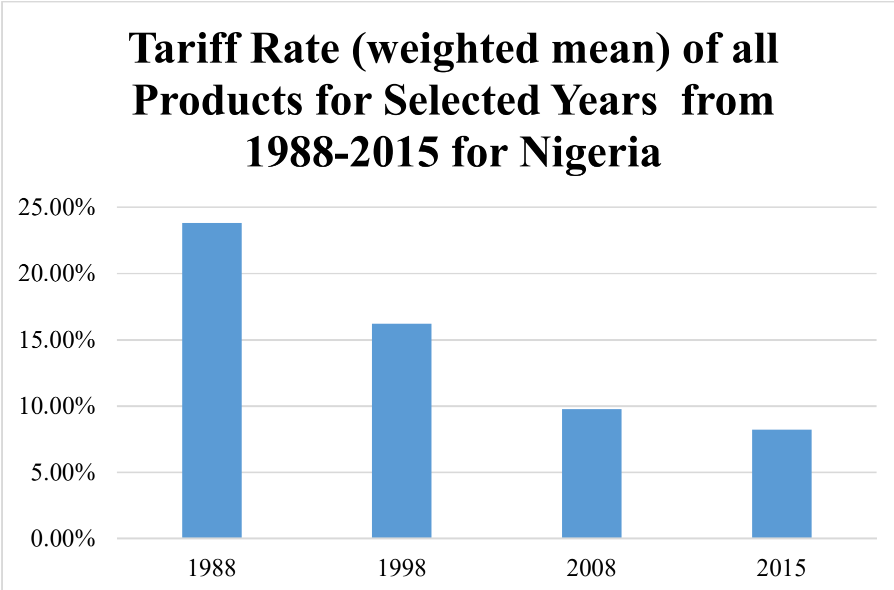
2. Brief Discussion on Trade Openness and the Performance of the Nigerian Economy

In the early 1980s, Nigeria experienced a boom in its revenue from oil exports. The real gross domestic product grew by 59% from 1970 to 1980, which led to aggressive implementations of several major public projects in the country with the hope that the oil prices would continue to remain high. Commitments were made to invest in inward oriented government-sponsored development projects that would enable and promote growth in the economy, especially in the industrial and transportation sectors. The oil sector provided the funds as Nigeria enjoyed a windfall of foreign reserves. The average annual real price (2017=100) of crude oil rose dramatically from $25.97 per barrel in 1973 to $111.30 in 1980, representing over 300% jump in foreign reserves acquisition from the sale of crude oil within a seven-year period. According to the World Bank, oil revenue minus production cost of oil as a percent of GDP for Nigeria increased from 6.8% in 1970 to 32.3% in 1985. With this influx of additional foreign reserves, Nigerian policymakers made no concrete plan in the case of a rainy day when possibly the reserves would dry out. Nigeria continued to conduct business as usual with the hope that oil prices would remain high and bringing with it more hard currencies.

Unfortunately, with the advent of the recession in 1986, Nigeria external debts began to pile up, due to a severe drop in foreign reserves earnings. The price of crude dropped to as low as $13.53 per barrel in 1986, making its contributions to GDP a mere 18% when compared to its contribution of 32.3% a year prior. External creditors began demanding to get paid. Nigerian economic performance began to take a nose dive. The stress on the economy and the increased external debt incurred led to the trade openness policies via SAP programs, encouraged by the IMF and World Bank as a condition to get the mounting external debts restructured. In essence, the SAP programs required Nigeria to implement several aspects of "free trade" policies, including most importantly, the reduction of tariffs which had been used to protect infant industries. The argument was that with the reduction or elimination of such trade barrier, trade will expand as consumers would now be encouraged to purchase more goods and services due to competition from abroad that would eventually drive down prices. The protected infant industries also stand to benefit as the individual companies would be encouraged to be more competitive and, in so doing, would increase its production efficiency through resource utilization. Figure 1 below presents the tariffs implemented for selected years in Nigeria from 1988 to 2015.

Tariff rate for all products decreased from a high of approximately 23.8% in 1988 to as low as 8.22% in 2015. This reduction, which represents a significant part of the trade openness policy implemented in 1986, was expected to trigger economic growth by infusing new economic activities in an already sluggish economy. It appears, however, that the positive impact did not materialize in the long run. In the post-SAP era, between 1986 and 2017, the average GDP per capita growth rate only grew at 1.58% annually, which is not, at all, impressive even when compared to 2.32% annual growth rate in the pre-SAP era between 1961 to 1985 (World Bank: *World Development Indicators*). The question remains whether trade openness policy is effective in enhancing growth particularly for developing economies, like Nigeria.

Figure 1



Year
Source: World Bank: *World Development Indicators (Online), last updated 7/25/2018.*

3. Methodology and Data

3.1 Model Specification

In specifying the model for this study, we recognize that trade openness-growth nexus is not necessarily a straight-line connection. Even though trade openness variable theoretically is argued to be impactful to economic growth, other enabling variables would be effective in supporting the relevancy of such trade openness policies in stimulating economic growth, especially in developing economies (Zahonogo, 2016). This paper applies the Johansen cointegration method and Granger-causality test to the Vector Error Correction Model (VECM) framework to evaluate the relationship between trade openness and growth with some controlling variable, which we believe, have an important influence on growth. The controlling variables included in our framework are private credit by depository institutions, total capital formation and government expenditure in Nigeria. The model specification is as follow:

$$RGDP = f(TO, PC, GEXP, CAPF) \quad (1)$$

RGDP represents the real gross domestic product (2010=100) for Nigeria which is the proxy for overall economic performance in Nigeria for the period of study. TO is the trade openness as a %GDP; PC is the private credit by depository institutions as a %GDP; GEXP is the government expenditure as a %GDP, and CAPF is the gross capital formation as a %GDP. An empirical review of this model, using annual data drawn from Nigeria, will allow for the evaluation of the existence of a long run relationship between trade openness and growth while simultaneously evaluating the contribution of each of the controlling variables on economic growth in Nigeria. If we can show that a long run relationship exists among the variables in the model, then the Granger-causality in the framework of the VECM would be used to determine whether a causal relationship exists between trade openness and growth.

3.2 Unit Root Test

The unit root test is essential to determine if all series in the model are stationary at the same order. It has been shown that the use of non-stationary data series, I(1), to conduct empirical testing would lead to misleading results. (see, Nelson and Plosser, 1982). To avoid this pitfall, we will first need to pretest each variable to determine its order of integration. There are several approaches to ascertain the order of integration, of which the commonly used is the Augmented-Dickey Fuller (ADF) test (Dickey and Fuller, 1979). The ADF test performs the null hypothesis of a unit root for a time series to determine if a unit root exists. If we fail to reject the null, then the series is non-stationary. The general ADF test model used to determine whether unit root exists in the data series is expressed as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \beta Y_{t-1} + \sum_{i=1}^{n} \delta_i \Delta Y_{t-i} + \varepsilon_t \qquad (2)$$

Y_t represents each of the data series in Equation 1 above. Δ is the first difference operator, α_0 is constant, α_1 is the coefficient of the time trend, ε_t is the error term, and n represents the number of lags, which is chosen to ensure the errors are uncorrelated and determined by following the suggestion of Akaike Information Criterion (AIC). In this case, for the period of analysis for the study of equation 1, the suggested optimal number of lags is 2. The null hypothesis of the existence of unit root in the variable series is tested against the alternative hypothesis of no unit root. Where the null hypothesis cannot be rejected, then we can surmise that unit root exists and conclude that the series is non-stationary. The next step is to get the first-difference of the nonstationary data. The process is performed for each of the series in equation 1 above. If we can show that the series is stationary after first-differencing for all series, I(1), then we have, in essence, met the precondition for the use of Johansen cointegration technique, which requires that all series in the model be stationary of the same order.

3.3 Johansen Co-integration Method

After satisfying the precondition of having data series to be stationary after first-differencing, the Johansen co-integration method allows for further testing to determine if a long run relationship exists among them (Johansen and Juselius 1990). The Johansen model used to perform such a test can be expressed in the *p*-dimensional vector autoregressive (VAR) model as follows (see Chang, Liu and Caudill 2004):

$$Y_t = u + B_1 Y_{t-1} + B_2 Y_{t-2} + \ \dots + B_k Y_{t-k} + \varepsilon_t,\ t = 1, 2, \dots, T, \qquad (3)$$

where Y_t represents the *p* number of variables that have been determined to be I(1) and $\varepsilon_i, \dots, \varepsilon_t$ are *i.i.d.* $N_p(0,\Omega)$. After first differencing the levels, Equation 3 can then be re-specified in the long run error correction framework as follows:

$$\Delta Y_t = u + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \dots + \Gamma_{k-1} \Delta Y_{t-k+1} - \Pi Y_{t-1} + \varepsilon_t, \qquad (4)$$

where $\Gamma_i = B_1 + \dots + B_i - I$ for $i = 1, 2, \dots, k-1$ and $\Pi = I - B_1 - \dots - B_k$.

The Johansen method examines the rank of Π matrix, which indicates the number of independent and stationary linear combinations of *p* variables. If $0 < rank(\Pi) = r < p$, then Π information matrix can be decomposed as

$\Pi = \alpha\beta`$, where α and β are (p x r) matrices. Each column of the matrix α represents the coefficients on one of the error correction terms (or "speed of adjustments" parameters). Each column of the matrix β contains the parameters of one of the co-integrating relationship among p-variables. In order to test the number of co-integrating vectors among the p-variables, the Johansen method relies on the relationship between the rank of Π matrix and its eigenvalues. It identifies the number of distinct co-integrating vectors by testing the significance of the eigenvalues of the matrix. The test for the number of eigenvalues that are significantly different from "1" can be conducted using two test statistics: the trace (λ_{trace}) and the maximum eigenvalue (λ_{max}) statistics. The trace statistic is defined as:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i), \qquad (5)$$

where λ_{trace} is the estimated values of the eigenvalues obtained from the estimated matrix and T is the number of usable observations. The trace test statistic is used to test the null hypothesis of the number of distinct co-integrating vectors that is less than or equal to r against the alternative. The maximum eigenvalue statistics is computed as:

$$\lambda_{max}(r,\ r+1) = -T \ln(1 - \hat{\lambda}_{r+1}), \qquad (6)$$

This statistics is used to test the null of the number of co-integrating vectors that is r against the alternative of r+1. When the appropriate values of r are identified, these statistics are simply referred to as λ_{trace} and λ_{max}. In practice, the maximum eigenvalue test is considered superior to the trace test when the sample size is large. After corroborating that the variables in Equation 1 are cointegrated, then one can proceed to the Johansen estimation procedure, which is a maximum likelihood approach in which all unknown parameters in the VECMs are estimated simultaneously. The next step is to apply Granger causality tests to the VECMs to ascertain whether a Granger causal relationship exists among the variables in the model.

3.4 Granger Causality with VECMs

With the presence of cointegration in the model, the VECM allows for the testing of whether a short run and long run causal relationship exist among the variables in the model given that the variables are integrated of the same order and cointegrated. However, the cointegration among variables does not necessarily mean a smooth movement of the variable series together towards equilibrium. The error correction model allows for the determination of whether a variable is on an equilibrium path and the rate of its movement to get there. However, with the advent of white noise in the model, equilibrium may not be achieved. An error may exist that prevents the movement of variables towards equilibrium. The VECM, which also shows the speed of adjustment at which a variable would move towards equilibrium, can be expressed, generally, as follows (see, Engle and Granger, 1987):

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{n} \Delta Y_{t-i} + \sum_{i=1}^{n} \delta_i \Delta X_{t-i} + \varphi ECT_{t-1} + \epsilon_t \quad (7)$$

Y is the dependent (target) variable, and X represents the independent (explanatory) variables in equation 1. ECT is the error correction term which, in essence, is the OLS residuals obtained from equation 1. The coefficient of ECT, φ, is the dependent variable's speed of adjustment to equilibrium after changes occur in the explanatory variables. We expect the coefficient to be statistically significant with a negative sign. That means, in the case of the existence of dis-equilibrium in one direction, the negative sign of φ suggest the model would eventually be pulled back in the opposite direction to allow for equilibrium in the long run. Also, the short run dynamics are ascertained by evaluating the coefficients of the explanatory variables in equation 1. If we find the p-value of each coefficient to be statistically significant, we can reject the null hypothesis and conclude that there is a short run Granger causality running from each of the explanatory variables to the dependent variable.

3.5 Data

With the advent of the 1986 recession, Nigeria enacted its first major trade liberalization policy in 1986 with the urging of the IMF and the World Bank. As such, in conducting this study, we utilized annual time series data for the post-SAP period, ranging from 1986 to 2015 for Nigeria in an attempt to evaluate the effectiveness of the policy. The data were obtained from the World Bank's *World Development Indicators*. All data series were converted into natural logarithms.

4. Empirical Results

4.1 Unit Root Test Results

The results of ADF unit root tests are presented in Table 1 (with constant only) and Table 2 (with constant and trend). The null hypothesis that each variables series in our model has a unit root cannot be rejected in their level. In essence, we can then surmise that the data series are non-stationary. However, after first-differencing, the results show that we can reject the null hypothesis that each series has a unit root at the 1% level of significance which means we can conclude that all data series are stationary. Therefore, this satisfies the precondition necessary to use the Johansen cointegration technique to determine whether there is a long run relationship among the variables in equation 1 above.

Table 1: Augmented Dickey-Fuller Unit Root Test Results (with constant only)

Variables	ADF statistic Level	ADF statistic First Difference	Critical values	P-Values	Order of integration
log RGDP	0.18	-5.68*	-3.69	0.0001	I(1)
log TO	-2.30	-7.75*	-3.69	0.0001	I(1)
log PC	-2.38	-4.76*	-3.71	0.0008	I(1)
log GEXP	-2.89	-6.19*	-3.69	0.0001	I(1)
log CAPF	-1.82	-5.83*	-3.70	0.0001	I(1)

* denotes 1% level of significance

Table 2: Augmented Dickey-Fuller Unit Root Test Results (with constant and trend)

Variables	ADF statistic Level	ADF statistic First Difference	Critical values	P-Value	Order of integration
log RGDP	-2.03	-5.85*	-4.32	0.0003	I(1)
log TO	-2.46	-9.15*	-4.32	0.0001	I(1)
log PC	-4.26	-4.65*	-4.36	0.0052	I(1)
log GEXP	-2.86	-6.07*	-4.32	0.0002	I(1)
log CAPF	-1.87	-6.04*	-4.34	0.0002	I(1)

* denotes 1% level of significance

4.2 Johansen Cointegration Test Results

The results of the cointegration are presented in Table 3 below.

Table 3: Johansen cointegration Test Results

Null Hypothesis Num. of CE(s)	Alternative Hypothesis Num. of CE(s)	Test Statistic	95% Critical Value	P- value
λ_{trace} tests				
r = 0	r > 0	86.29	69.82	0.00
r ≤ 1	r > 1	41.56	47.86	0.17
r ≤ 2	r > 2	18.74	29.80	0.51
λ_{max} tests				
r = 0	r = 0	44.71	33.88	0.00
r = 1	r = 2	22.84	27.58	0.18
r = 2	r = 3	13.01	21.13	0.45

Based on Trace statistics, the null hypothesis of no cointegration among the variables is clearly rejected, given that the test statistic of 86.29 is greater than the 5 percent critical value of 69.82. Next, we can use the lambda Trace statistic to test the null of r ≤ against the alternative of two or three cointegrating vectors. Since the test statistic of 41.56 is less than the critical value at the 5 percent significance level, the lambda statistic indicates no more than one cointegrating vector.

A similar observation emerges when we examine the lamda Max-Eigen statistics. The null hypothesis of no cointegrating vectors (r = 0) against the specific alternative r = 1is clearly rejected. The test of the null hypothesis r =1 against the specific alternative r =2 cannot be rejected. The implication of these test statistics, therefore, is that there is a long run relationship among variables in our model suggesting the variables will tend to move closer together in the long run. That means, in this case, we can say that TO, PC, GEXP, CAPF and RGDP would not drift too far apart over time. Now, with the presence of cointegration established, we will proceed to estimate the VECM regression coefficients.

4.3 VECM Test Results

As mentioned earlier, VECM shows the speed at which the system will move to equilibrium after a temporary disturbance in any one of the explanatory variables. We can also assess both the long run causality and short run dynamics among the variables. The results of the VECM test, which allows ascertaining the normalized cointegrating coefficients, is presented in Table 4.

The result shows that if the vector correction model system is pulled away from equilibrium in the short run, it would eventually revert to equilibrium evidenced by the negative sign of the coefficient of the error correction term in Table 4. But, the speed at which it would revert to equilibrium is not found to be significant at the 5% level. As such, we cannot reject the null hypothesis that there is no long run Granger causality among the variables in our model. Also, the results show that we cannot reject the null hypothesis that there is no short run Granger causality between trade openness and economic growth.

Table 4: Vector Error Correction Model Results

Tabe 4: Vector Error Correction Model Results

Dependent Variable: ΔlnRGDP$_t$

Variables	Coefficient	Standard Error	t-statistics	P-Value
ΔlnRGDP$_{t-i}$	-0.114	0.234	-0.486	0.632
ΔlnTO$_{t-i}$	-0.124	0.213	-0.570	0.569
ΔlnPSC$_{t-i}$	-0.023	0.182	-0.126	0.901
ΔlnGE$_{t-i}$	-0.001	0.175	-0.007	0.994
ΔlnCF$_{t-i}$	0.188	0.262	0.717	0.481
ECT_{t-i}	-0.028	0.058	-0.476	0.639
Constant	0.121	0.057	2.112	0.047

5. Conclusion and Recommendations

This study examines the causal relationship between trade openness and economic growth within the context of the Nigerian economy, using both Johansen and VECM techniques. As a reaction to the recession experienced in the mid-1980s, Nigeria embarked on a major trade liberalization policy (popularly referred to as SAP) in 1986. A major outcome of the SAP policy was the reduction of tariffs on imported goods, hoping that trade with the outside world would be enhanced significantly enough to lead the economy back to growth. This paper focused on the post-SAP period from 1986-2015. The model adopted for the study included some control variables such as private capital by depository institutions, government expenditure, and capital formation, which we believe could exert some influence on economic growth.

Using the Johansen technique, we found that there is a long run relationship among the variables in our model. However, the VECM suggests no long run causality between trade openness and the explanatory variables, including trade openness. Also, it also suggests that there is no short run causality between trade openness and economic growth. Our findings are consistent with Chang, Kaltani and Loaya, 2005, Zahonogo, 2016; Sunday and Ganiyu, 2015, supporting the idea that, first, developing economies, such as Nigeria, needs to focus on inward-looking development strategies to boost the enabling factors, such as infrastructure, energy, etc. Such actions should help developing economies to attain the full benefits of any out-ward looking economic strategies (e.g., tariffs relaxation policies, etc.) implemented towards, hopefully, eventual sustainable economic growth.

While this study focussed on trade oppenness impact on the Nigerian economy as a whole, it is recommended that future reseach should focus on oppenness impact on the performance specific sectors (manufacturing, fianacial, agricultural, etc,) of the economy and extended to similar developing economies.

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