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On the Determinants of Economic Openness in Nigeria

Charles Okechukwu Aronu[1*], Lucky Oghenechovwe Arhovwon[1], John Obatarhe Emunefe[2], Godspower Onyekachukwu Ekwueme[3] and Nkechi Udochukwu Otty[4]

[1]Department of Statistics, Chukwuemeka Odumegwu Ojukwu University, Anambra State, Nigeria.
[2]Department of General Studies, Mathematics and Statistics Unit, Petroleum Training Institute, Effurun, Delta State, Nigeria.
[3]Department of Industrial Production Engineering, Nnamdi Azikiwe University, Awka, Nigeria.
[4]Department of Environmental Health Sciences, School of Health Technology, Federal University of Technology Owerri, Imo State, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Authors COA and LOA designed the study and performed the statistical analysis. Authors JOE and NUO managed the literature searches. Author GOE wrote the introduction. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Economic openness has been identified as a tool that provides countries with an avenue to explore advances on technology, creation of exchanges through the reallocation of resources especially from less efficient to efficient producer, and economic growth. This study examined the short-run and long-run impact of economic determinants such as foreign direct investment, unemployment rate and percentage of the urban population on economic openness in Nigeria.
Place and Duration of Study: The study employed a secondary source of data collection obtained from the Central Bank of Nigeria (CBN), Statistical Bulletin and National Bureau of Statistics (NBS) Annual Publication. The data comprises of variables such as economic openness which is proxy by trade openness, foreign direct investment, unemployment rate and percentage of the urban population from 2006 - 2019.

**Corresponding author: E-mail: padre4baya@gmail.com, amaro4baya@yahoo.com;*

Methodology: The impacts of the economic determinants considered in this study were examined using the Autoregressive Distributed Lag (ARDL) co-integration technique and the error correction parameterization of the ARDL model. The R-3.6.3 programming package was used to perform the analysis.

Results: The outcome of the study revealed that the appropriate ARDL model for estimating economic openness was the ARDL (1,1,1,1) selected based on the Schwarz Bayesian Criterion. Also, the error correction model identified the sizable speed of adjustment by 30.0% of disequilibrium correction yearly for reaching the long-run equilibrium steady-state position. It was found that the lag of the Unemployment Rate (UNER) and the percentage of the urban population have a significant short-term effect on economic openness. Also, the distribution of economic openness was found to be stable over the observed period. Also, it was found that the relationship amongst the variables was independent except for the relationship between the percentage of the Urban Population (PUP) and Foreign Direct Investment (FDI) which was found to be is unidirectional.

Conclusion: The outcome of this study suggested the urgent need for policymakers to implement policies such as the "ease of doing business" of the federal government of Nigeria which is anticipated to make foreign direct investment more attractive and in turn is expected to boost economic growth and thereby impact positively on urbanization in Nigeria.

Keywords: ARDL model; co-integration; error correction; economic openness; unemployment rate.

1. INTRODUCTION

The nexus between the determinants of economic growth and economic openness remains one of the main problems in both the theoretical and the political context. This issue has received even more attention in recent years, given the persistent and widespread differences in economic performance between countries, particularly among developing countries as a result of the increasing integration of international trade. However, most economists argue that the benefits of commercial opening have remained controversial and this has paved the way for the topic to be among the increasingly discussed issues in the international political and academic discourse.

While trade is seen as an important determinant of income and growth, with theoretically well-documented channels for the transmission of well-being through trade, the effects of trade policy are theoretically less known or somewhat ambiguous. Trade integration gives room for a more efficient allocation of resources through economies of scale and scope as well as increased competition. It facilitates the dissemination of knowledge and the transfer of technology, which affect all costs and productivity models which in turn promotes technological progress and lead to greater efficiency. Despite this, theoretical propositions relating to market failures and coordination, including the need for investment coordination, the emerging industry argument, indivisibilities and risks associated with investments in (new) technologies, technological interdependencies and complementarities, as well as its tacit elements, which hinder its dissemination and transfer of knowledge. These have given rise to targeted State intervention, mainly through trade policy and the protection of strategic sectors. This means that although trade and in particular export-led growth is generally seen as an important determinant of the growth process, trade policy is the subject of much controversy.

Previous studies on economic openness argue that measuring trade openness has always been a challenging task [1]. Hence, the reason attributed to why most of the previous empirical studies based on cross-section country growth comparison failed to provide a satisfactory openness measure. The findings from the literature revealed that study by [2] defined economic openness as the percentage ratio of export and import while some other studies measured economic/trade openness as either the volume of exports or import as a percentage of gross domestic product or sum of imports and exports as a percentage of gross domestic product which appears to be one dimensional [3,4,5,6]. However, studies such as [7] and [1] argued that the true measure of economic openness should be the sum of export and import divided by gross domestic product. Hence, the present study seeks to identify the short-run and long-run impact of economic determinants such as Foreign Direct Investment (FDI), Unemployment Rate (UNER) and the

percentage of the urban population on economic openness as defined by [7] and [1].

2. LITERATURE REVIEW

The theory of trade openness and economic growth has been the subject of a large number of theoretical and empirical studies. Hence, the relevant literature on trade openness and some macroeconomic determinants were reviewed in this section.

A study by Gwartney et al. [8] stated that openness can encourage countries to put in place strong institutions and policies so that they can be competitive in creating an enabling environment for trade and investment. Clearly, in a globalized world, no investor would be in favour of investing in a country characterized by hostility towards commercial investors, monetary instability, legal uncertainty, high taxes and poor public services.

Speaking on measures of trade openness and policy, [9] in his study grouped the measures of trade openness into seven groups which comprise of; the outcome-based measure of trade ratios (trade as a GDP ratio); adjusted trade flows (also outcome-based); price based (measures based on price outcomes); non-tariff barriers (incidence-based); composite indices (combining tariff and non-tariff indicators with other economic and political indicators) and informal and qualitative measures. The classification of the trade openness measures by [9] indicates that the first three are outcome-based and takes consideration of the trade flows and price levels, while other the measures are attributed to trade restrictions. In their contribution, [10] argue that trade openness provides the opportunity for technology transaction, investments and goods beyond national borders, leading to the creation of exchanges through the reallocation of resources from less efficient to efficient producers. Finding by Baharom et al. [11] revealed trade openness is positively associated and a statistically significant determinant of growth, both in the short run and the long run. Further findings revealed that foreign direct investment is positively associated in the short run and negatively associated in the long run, both significantly. Also, the exchange rate was found to be significant in the short run as well as in the long run.

A study by Adhikary [3] focused on the association amongst foreign direct investment (FDI), trade openness, capital formation, and economic growth rates in Bangladesh over a period 1986 to 2008 using time series analysis. The outcome of the study showed the presence of a strong long-run association between GDP growth rates and the explanatory variables with unifacial casual flows. Another study by Khalid et al. [5] examined the degree of association between trade openness and economic growth. The study employed the autoregressive distributed lag model in analyzing the data. The finding of the study showed that trade openness has a long run linear association with economic growth. Also, Granger Causality tests revealed that a change in trade openness impacts at long-run economic growth through the interaction with the gross capital formation in the case of China. Another study by Siyakiya [6] examined the impact of trade openness on national productivity for selected African countries over the period 1980 – 2014. The study used a pooled ordinary least square technique for analyzing the data obtained for the study. The results of the study found that trade openness has a positive impact on manufacturing and service value-added. Furthermore, it was found that capital contributes positively to both overall and sectoral value-added while labour productivity was found to harm all except service value-added.

A study by Keho [12] examined the extent of the relationship between trade openness and economic growth of Cote d'Ivoire. He noted that there has been a mixed and inconclusive investigation on the theory of trade openness which can be attributed to the omission of the role of capital stock and labour in the trade-growth relationship. The study used the Autoregressive Distributed Lag bounds test to examine the presence of co-integration in the variables while the Toda and Yamamoto Granger causality test was used to determine the level of causality amongst the variables. The findings revealed that trade openness has a short and long-run positive impact on economic growth. Also, it was revealed that a positive and strong complementary relationship exists between trade openness and capital formation in promoting economic growth. On the impact of economic openness on growth, Tahir et al. [13] opined that trade openness plays a significant role in the general growth of most countries. Their study focused on examining the impact of macroeconomic determinants on the trade openness of countries. The finding of the study showed that macroeconomic determinants such as investment both in physical and human capital

and per capita gross domestic product (GDP) positively impact on trade openness. The further result revealed that macroeconomic determinants such as the size of the labour force and currency exchange rate have a negative significant impact on trade openness.

The study by Mbogela [1] noted that trade openness for an African country offers the opportunity to explore new knowledge, ideas and capital. These include vital elements for innovation and increased productivity. Hence, [1] considered the determinants of trade openness in African countries. In examining these determinants of trade openness for African countries, the study adopts an openness equation that was estimated using the panel data approach for 49 African countries in Africa from 1989 to 2009. The study results identified population size, per capita income and economic position as the most important factors to favour trade openness in the African countries under study. The study, however, extends the model by including some important variables such as export from mining, agricultural production (measured as a proportion of countries' GDP), and the multiplicative dummy variables that measure the magnitude effect of location effect on African regional blocks (i.e. East, Central, South, West and North Africa) since they were found to impact on exports from African countries.

3. MATERIALS AND METHODOLOGY

3.1 Data Collection

The study employed a secondary source of data collection obtained from the Central Bank of Nigeria (CBN), Statistical Bulletin for various years and National Bureau of Statistics Annual Publication for various years. The data comprises of variables such as economic openness which is proxy by trade openness, foreign direct investment, unemployment rate and percentage of the urban population.

3.2 Method of Data Analysis

In practice, most macroeconomic variables indexed by a time parameter are usually found to be non-stationary. The distribution of a time series dataset is said to be stationary if its mean and variance are independent of time over the observed period, while the value of the covariance between two time periods depends only on the gap between the periods and not the actual time at which this covariance is considered [14]. Suppose one or both of the aforementioned conditions are not satisfied, the process can be said to be non-stationary. The stationarity of a time series data can be examined using any of the following tools: the Augmented Dickey-Fuller (ADF) test, Phillips-Perron test, or the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test, and Phillips-Perron tests. The present study shall employ the ADF test the stationarity status of the data obtained for the study.

3.2.1 The augmented dickey-fuller (ADF) test

The augmented Dickey-Fuller test is used for testing whether the unit root exists in a time series sample data. The augmented Dickey-Fuller statistic, used in the test is a negative number. The more negative it is, the stronger the rejections of the hypothesis that there is a unit root at some level of confidence. One classical procedure for testing for unit root is to test using augmented Dickey-Fuller and with intercept. If the test statistic < critical values (i.e. less than the negative value) reject Ho: No unit root. Otherwise, choose first difference and continue with until you reject Ho. The amount of differencing required to reject Ho=order of integration=number of unit-roots.

The restrictive and the general ADF models are written as (1) and (2) respectively:

$$\Delta y_t = p_1 y_{t-1} + \sum_{j=1}^{k} \alpha_j \, \Delta y_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta y_t = \alpha_0 + p_1 y_{t-1} + \sum_{j=1}^{k} \alpha_j \, \Delta y_{t-1} + \varepsilon_t \quad (2)$$

Where Δ is the first difference operator ε_t is random error term that is independent and identically distributed (iid) k = no of lagged differences, p and α are parameters to be estimated, and y = the variable of interest.

The unit root test is then carried out under the null hypothesis p = 0 against the alternative hypothesis of p < 0. The decision rule is to compare the calculated ADF statistics against the critical values from Fuller's table. If the test statistic is less than the critical value, then the null hypothesis is not rejected and this indicates that the series is non-stationary or not integrated of order zero. The p-value of the test can also be

compared to the level of significance in determining whether the series is stationary or non-stationary. Note that when a variable is stationary without differencing, it is said to be integrated of order zero while when a variable is stationary only after first difference, it is said to be integrated of order one.

3.2.2 Cointegration test

Cointegration relates to the existence of stationary linear combinations of integrated variables. Cointegration implies the existence of long-run equilibrium and a common stochastic trend. It can be very useful in separating short and long-run relationship among variables and equally helps in improving long-run forecast accuracy. Suppose variables of interest have a unit root which is integrated of the same order, then the method of Cointegration to be used in examining the long-run relationship can be Engle- Granger approach or the Johansen-Juselius approach [14]. However, Engle-Granger, when the variables are integrated of different order the appropriate method to employ is the autoregressive distributed lag (ARDL) approach. However, the present study employed the ARDL approach to examine the long-run relationship of the variables since the variables were integrated of order (I(1) and I(0)).

3.2.3 The autoregressive distributed lag (ARDL) cointegration approach

Criterion such as the Final Prediction Error (FPE) criterion, Akaike Information Criterion (AIC), or Schwarz Bayesian Criterion (SBC) is used to select the best lag length (p) when estimating the ARDL model while ensuring that the errors are white noise. A time-series sequence of identically distributed and independent random variables with constant mean and variance is referred to as white noise. However, the ARDL model is usually specified and estimated when the appropriate lag length has been determined. The generalized form of the ARDL (m, n; p) model with p exogenous variables can be expressed as:

$$y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i y_{t-1} + \sum_{j=1}^{p} \sum_{i=1}^{n} \beta_{ij}\, x_{jt-1} + \varepsilon_t \quad (3)$$

where, $\varepsilon_t \sim iid(0,\sigma^2)$.

However, equation (3) can be expressed using the lag operator $L^n_{Z_t} = Z_{t-n}$ as

$$\alpha(L) y_t = \alpha_0 + \sum_{j=1}^{p} \beta_j(L)\, x_{ij} + \varepsilon_t \quad (4)$$

Where,

$$\alpha(L) = 1 - \sum_{i=1}^{m} \alpha_i L^i, \text{ and } \beta(L) = \sum_{j=1}^{n} \beta_{ji} L^i \quad (5)$$

The ARDL model specification as employed to the variables of the present study is given as follows: Four ARDL models were specified and estimated in the present study. The first was between Trade Openness (TO) (trade openness was considered as a proxy for economic openness in the present study) and foreign direct investment (FDI), the second was between the Trade Openness (TO) and unemployment rate (UNER), the third was between Trade Openness (TO) and percentage of the urban population (PUP), while the fourth was between Trade Openness (TO) and both FDI, UNER and PUP. The ARDL specification of the relationship between TO, FDI, UNER, and PUP is given as

$$E_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i E_{t-i} + \sum_{i=1}^{n} \psi_i F_{t-i} + \sum_{i=1}^{k} \beta_i U_{t-i} + \sum_{i=1}^{z} \varphi_i P_{t-i} + \varepsilon_t \quad (6)$$

Where, E represents Trade Openness (TO); F represents foreign direct investment (FDI); U represents unemployment rate (UNER); P represents percentage of the urban population (POP); m, n, k, and z are lag length of TO, FDI, UNER and POP; ε represents white noise error terms; while α, ψ, β, and φ are drift component.

The individual influence of the cointegrated variables can only be separated with an error correction mechanism through an error correction model (ECM) as shown below.

The ECM specification as applied in the presented study considered the relationship between the TO and FDI, TO and UNER, and TO and POP. Hence, the error correction model can be expressed as:

$$E_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i E_{t-i} + \sum_{i=1}^{n} \psi_i F_{t-i} + \sum_{i=1}^{k} \beta_i U_i + \sum_{i=1}^{z} \varphi_i P_i + \lambda ECT_{t-1} + \varepsilon_t \quad (7)$$

Where, $\lambda = (1 - \sum_{i=1}^{m} \delta_i)$ represents the speed of adjustment parameter with a negative sign,

$\mathrm{ECT} = (y_{t-i} - \theta X_t)$, represents error correction term which is extracted from the regression residuals of the long run equation,

$\theta = \frac{\sum_{i=0}^{m} \beta_i}{\alpha}$, represents the long run parameter, and

α, ψ , β, and φ are the short run dynamic coefficients of the model adjustment long run equilibrium

3.2.4 Granger causality

Testing causality among variables is very important and this is because in most cases correlation does not imply causality. Also, there always exist the possibilities of ignoring common factors in practice. The causal relationship among variables might disappear when the previously ignored common causes are considered.

Granger causality test assumes that the information useful for the prediction of the respective variables is contained solely in the time series data of the variables [15]. Causality can refer to a test to measure the ability to predict future values of one-time series using previous values from another time series. A time series X is said to Granger-cause Y if it can be shown, usually through a series of F-tests on lagged values of X (and with lagged values of Y also included), that those X values provide statistically significant information about future values of Y.

The Granger causality test considers the following pair of regression model:

$$Y_t = \sum_{i=1}^{n} \alpha_i X_{t-i} + \sum_{j=1}^{n} \beta_j Y_{t-i} + u_{1t} \quad (8)$$

$$X_t = \sum_{i=1}^{n} \lambda_i X_{t-i} + \sum_{j=1}^{n} \delta_j Y_{t-i} + u_{2t} \quad (9)$$

Where, u_{1t} and u_{2t} represent the disturbances are assumed to be uncorrelated. Also, equation (8) maintains that current Y is related to past values of itself as well as that of X, and (9) posits a similar behavior for X. The F test statistic presented below as equation (10) is used to make inference:

The null hypothesis can be states as

$$\mathrm{H}_0 : \sum_{i=1}^{n} \alpha_i = 0 \text{ (lagged X term does not belong in the regression)}$$

$$F = \frac{(RSS_R - RSS_{UR})/m}{RSS_{UR}/(n-k)} \quad (10)$$

Equation (10) follows the F distribution with m and (n-k) degree of freedom. Where m is the number of lagged X terms, n is the number of observation, and k is the number of parameters estimated in the unrestricted regression. The restricted residual sum of squares (RSS_R) was obtained by regressing the current Y on all lagged Y terms and other variables if any, but excluding the lagged X variables in the regression. The unrestricted residual sum of squares (RSS_{UR}) is obtained by running the regression including the lagged X terms. The decision rule is to reject the null hypothesis when the computed F value exceeds the critical F value at the chosen level of significance.

3.2.5 Measure of economic openness

However, economic openness which is proxy by trade openness refers to the outward or inward orientation of the economy of a given country. Outward orientation refers to economies that significantly benefit from trade opportunities with other countries.

Trade openness in the present study was measured in line with the argument by Marelli and Signorelli [7] and Mbogela [1] as

Trade openness = (Volume of Export + Volume of Import) / Real Gross Domestic Product (11)

3.3 Data Presentation

This section presents in Table 1 the distribution of trade openness (TO), foreign direct invest (FDI), unemployment rate (UNER) and percentage of the urban population (PUP) from 2006 – 2019.

Table 1. Table showing macroeconomic variables and percentage of the urban population

Year	RGDP (Billion USD)	Export Goods (Billion USD)	Import Goods (Billion USD)	Trade openness	FDI (Billion USD)	UNER (%)	% of Urban Population
2006	286.47	57.001	22.184	0.276416379	4.85	12.3	39.943
2007	262.22	66.039	28.291	0.359736099	6.03	14.7	40.819
2008	330.26	85.771	39.844	0.380351844	8.19	14.9	41.702
2009	297.46	56.167	30.779	0.292294762	8.55	19.7	42.588
2010	369.06	79.618	49.52	0.349910584	6.02	21.4	43.48
2011	414.1	99.052	66.223	0.39911857	8.84	23.9	44.362
2012	460.95	96.123	56.933	0.33204469	7.06	27.4	45.234
2013	514.97	97.818	55.3	0.297333825	5.56	24.7	46.094
2014	568.5	82.595	61.593	0.253628848	4.65	25.1	46.942
2015	493.84	45.887	52.334	0.198892354	3.13	17.4	47.776
2016	405.44	34.704	35.239	0.172511346	4.44	12.1	48.68
2017	376.36	42.35	36.248	0.208837283	3.49	18.8	49.52
2018	397.47	45.893	41.422	0.219676957	1.9	23.1	50.3
2019	123.4	56.5	82.65	1.127633712	3.08	23.1	51.2

Source: CBN Statistical Bulletin and National Bureau of Statistics Annual report for various years

4. DATA ANALYSIS AND RESULTS

Table 2 shows the descriptive analysis of the variables based on the data presented in Table 1. The result obtained in Table 2 showed that the mean-to-median ratio of each variable was approximately one. The standard deviation was found to be low when compared to the mean, showing a small coefficient of variation. The numeric of skewness was found to be negatively skewed for the unemployment rate (UNER) and percentage of the urban population (PUP) with skewness values of -0.25 and -0.02 respectively. While variables trade openness (TO) and foreign direct investment (FDI) showed positive skewness with corresponding values of 10.04 and 1.96 respectively.

The variables considered in the present study were tested for normality using the Anderson-Darling test for normality. The null hypothesis that the variable is normally distributed was evaluated at 5% significance level. The null hypothesis was accepted in each if and only if the p-value of the test statistic is greater than the significant level, otherwise reject the null hypotheses. The result obtained in Table 3 indicates that variables FDI, UNER and PUP were normally distributed while variable TO, was found to be normally distributed and fit for parametric analysis after transformation (taking the logarithm of the variable).

In order to make sure one is not carrying out a spurious regression, the variables employed were subjected to a stationarity test. For this purpose, the Augmented Dickey-Fuller (ADF) test was used to test the stationarity of the data. The result of the unit root test on the variables using the Augmented Dickey-Fuller test statistic obtained in Table 4 found that the series TO, FDI and UNER were integrated of order one (I(1))

Table 2. Table showing the descriptive analysis of the variables

Test Measures	TO	FDI	UNER	PUP
Mean	0.347742	5.413571	19.90000	45.61714
Median	0.294814	5.205000	20.55000	45.66400
Maximum	1.127634	8.840000	27.40000	51.20000
Minimum	0.172511	1.900000	12.10000	39.94300
Std. Dev.	0.235412	2.171850	4.986135	3.620092
Skewness	2.811979	0.161697	-0.251217	-0.025866
Kurtosis	10.03786	1.958199	1.786720	1.787759
Coefficient of variation	67.70	40.12	25.06	7.94
Sum	4.868387	75.79000	278.6000	638.6400
Observations	14	14	14	14

Source: Authors Analysis

Table 3. Summary result of the anderson-darling test for normality of the variables

Variables	Anderson-Darling Test Statistic	*p*-value	Decision
TO	2.085	0.00	Not normally distributed
FDI	0.232	0.753	Normally distributed
UNER	0.334	0.456	Normally distributed
PUP	0.169	0.917	Normally distributed
LOG(TO)	0.686	0.06	Normally distributed

Source: Authors Analysis

Table 4. Result of Augmented Dickey-Fuller unit root test for the variables

Series	Level No Trend	With Trend	First Difference No Trend	With Trend	Order of integration
LOG(TO)	-1.382054	-2.557592	-5.554455*	-5.500873*	I(1)
FDI	-1.187690	-3.184180	-3.555759*	-4.254606*	I(1)
UNER	-2.323278	-3.166606	-4.652544*	-6.840254*	I(1)
PUP	-4.002531*	-0.409101*	-	-	I(0)
		Critical values			
1%	-3.592462	-5.124875	-4.297073	-4.022135	
5%	-2.931404	-3.933364	-3.212696	-3.933364	

Source: Results computed by authors

while series PUP was integrated of order zero (I(0)). Hence, they are stationary over time and can be used to make a forecast for future behaviour of the process.

Note: The critical values are taken from Mackinnon (1996) one-sided p-values. The null hypothesis is based on the series having unit root. Asterisks (*) denote statistical significance at a 5% level and the variable have a constant and linear trend.

The result obtained in Table 4 should that the variables are integrated of different orders, this justifies the use of the autoregressive distributed lag (ARDL) approach in determining the long or short-run relationship among the variables.

The ARDL Model for economic openness (TO) against FDI, UNER and PUP is presented by performing the ARDL bound test to determine whether the level relationship is present amongst the variables considered in the ARDL model. The result in Table 5 shows the estimates of the ADRL model describing the relationship that exists between economic openness (TO) against FDI, UNER and PUP. The result of the ARDL bound test for co-integration presented in Table 5 found a calculated F-statistic value of 5.0928 which was above the upper bounds critical value of 4.35 assuming a 5% significance level. This result indicates the rejection of the null hypothesis of no cointegrating relationship amongst the variables of the ARDL model. Hence, the findings imply that economic openness is cointegrated with foreign direct investment (FDI), unemployment rate (UNER) and percentage of the urban population (PUP). Also, the result further implies that there exists a long-run relationship amongst the variables.

Table 5. Result of test for the existence of level relationship amongst the variables in the ARDL

Number of regressors	Value of statistic K=3
Computed F-statistic	5.0928
5% critical value	
Lower bound value	3.23
Upper bound value	4.35

The critical bound values were extracted from Pesaran et al. [16]

The result obtained in Table 5 revealed that there exist a long-run relationship amongst the variables of the ARDL model, it is then appropriate to obtain the estimates of the ARDL long-run coefficient for the model and also obtain the estimates of the error correction model (ECM). The result of the long-run estimates is presented in Table 6 while the result obtained in Table 7 presents the estimates of the corresponding ECM. The long-run coefficients and the error correction model estimates are also provided in Tables 6 and 7. ARDL (1,1,1,1) means that both the dependent variable (TO) and each of the independent variable (FDI, UNER and PUP) has a lag of one. The result of the long-run relationship between economic openness (TO), FDI, UNER, and PUP obtained in Table 6 show that the coefficients of FDI and PUP have a positive insignificant impact on economic openness while the unemployment rate has a negative insignificant impact on economic openness since their p-values are all greater than 0.05. This result indicates that FDI, UNER, and PUP have an insignificant long-run effect on economic openness.

The result obtained in Table 7 showed that the error correction coefficient of -0.3004 (p-value = 0.0255) is significant and indicates that the system corrects its previous period disequilibrium at a speed of 30.0% annually. A further result showed that lag of log(TO) and foreign direct investment (FDI) has an insignificant short-term effect on economic openness (TO) with a coefficient of 1.3674 and -0.0871 respectively and corresponding p-values of 0.4198 and 0.2133 while lag of unemployment rate (UNER) and percentage of the urban population has a significant short-term effect on economic openness with coefficients of 0.0456 and 5.5167 respectively with corresponding significant *p*-values of 0.033 and 0.0257 at 5% significant level.

The result of the diagnostic tests for economic openness (TO) against FDI, UNER, and PUP ARDL model presented in Table 8 found a strong adequate R-square value 81.3%. The model was found to be free from serial correlation with the Lagrange multiplier test value of 4.8180 (p-value = 0.0796). Also, the recursive estimation of the errors indicates that the regression coefficients are stable over the observed period. This is because the Cumulative Sum (CUSUM) plot based on the recursive residuals given in Fig. 1 does not show evidence of statistically significant breaks. Hence, the distribution of the CUSUM plot shows the stability of economic openness.

Table 6. Estimated long-run coefficients: ARDL(1, 1, 1, 1) selected by Schwarz Bayesian Criterion (SIC)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	0.269674	0.507848	0.531012	0.6181
UNER	-0.032617	0.097026	-0.336162	0.7504
PUP	0.041426	0.126496	0.327485	0.7566
Constant	3.846289	8.364147	0.459854	0.6649

Source: Authors Analysis

Table 7. Error correction representation of the selected ARDL model: ARDL(1, 1, 1, 1) selected by Schwarz Bayesian Criterion

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOG(TO)(-1))	1.367413	1.579253	0.865861	0.4198
D(FDI(-1))	-0.087134	0.061119	-1.425641	0.2133
D(UNER(-1))	0.045642	0.015650	2.916473	0.0331
D(PUP(-1))	5.516790	1.758179	3.137786	0.0257
ECM(-1)	-0.300369	0.315938	3.146674	0.0255

Source: Authors Analysis

Table 8. Summary of diagnostic tests for economic openness (TO) against FDI, UNER, and PUP ARDL model

Test Statistic	Test value (*p*-value)
R-squared	0.813496
Adjusted R-squared	0.552391
Breusch-Godfrey Serial Correlation LM Test	4.818005 (0.0796)

Source: Authors Analysis

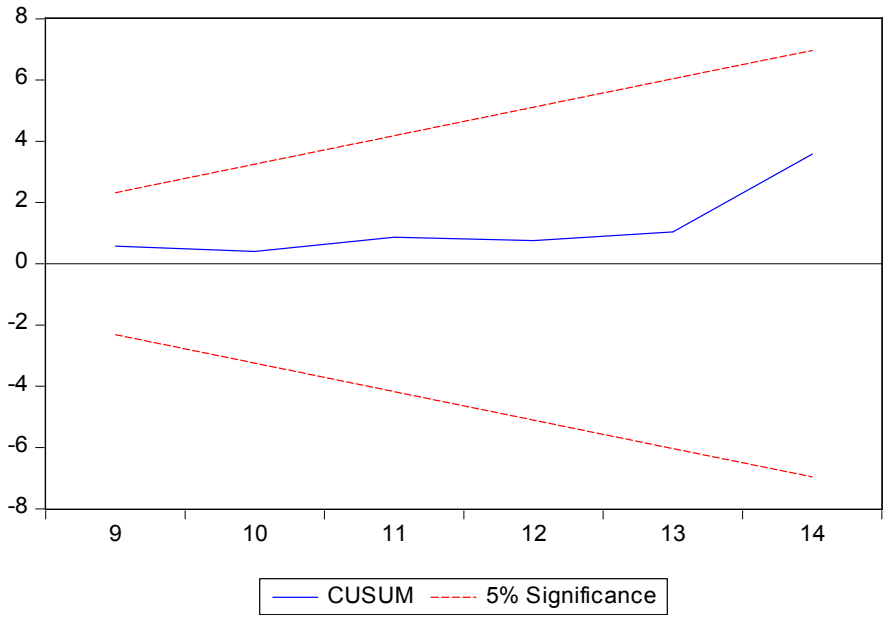

Fig. 1. CUSUM test for stability of economic openness (TO)

The result obtained in Table 9 shows the summary result of the causality test amongst the variables considered in the present study. Also, the result presented in Table 10 shows the direction of causality based on the result obtained in Table 9. The findings revealed that the relationship amongst the variable are independent or have no direction except for the relationship between the percentage of the urban population (PUP) and foreign direct investment (FDI) which was found to be is unidirectional.

Table 9. Result of granger causality tests amongst the variables

Null Hypothesis	F-Statistic	*p*-value
FDI does not Granger Cause LOG(TO)	0.50707	0.6228
LOG(TO) does not Granger Cause FDI	2.53107	0.1489
PUP does not Granger Cause LOG(TO)	1.63938	0.2606
LOG(TO) does not Granger Cause PUP	0.69108	0.5322
UNER does not Granger Cause LOG(TO)	0.80293	0.4854
LOG(TO) does not Granger Cause UNER	0.21064	0.8150
PUP does not Granger Cause FDI	6.21759	0.0280*
FDI does not Granger Cause PUP	0.01047	0.9896
UNER does not Granger Cause FDI	0.98156	0.4210
FDI does not Granger Cause UNER	0.44260	0.6592
UNER does not Granger Cause PUP	1.39621	0.3088
PUP does not Granger Cause UNER	1.71302	0.2480

*Note: * represents 5% level of significance*

Table 10. Direction wise causality between the variables

Variables	Direction
FDI and LOG(TO)	No direction /Independent
PUP and LOG(TO)	No direction /Independent
UNER and LOG(TO)	No direction /Independent
PUP and FDI	Unidirectional
UNER and FDI	No direction /Independent
UNER and PUP	No direction /Independent

5. CONCLUSION

Economic theory indicates that the more a country has freedom of international trade, the more it can benefit from openness in terms of higher production and higher incomes. However, economic openness has been identified as a platform that helps in the promotion of entrepreneurial and innovativeness activities based on the fact that there will be a strong desire for efficient production and competitiveness in the international market. This study examines the determinants of economic openness in Nigeria from 2006-2019. The findings of the study revealed the existence of a long-run relationship amongst the variables of the ARDL model, hence the need to obtain the estimates of the ARDL long-run coefficient for the model and also to obtain the estimates of the error correction model (ECM). The study revealed that the appropriate ARDL model was the ARDL (1,1,1,1) which was selected by the Schwarz Bayesian Criterion. The obtained ARDL(1,1,1, 1) model shows that it is appropriate for both the dependent variable (TO) and each of the independent variables (FDI, UNER and PUP) to be at lag one. It was found that foreign direct investment, unemployment rate, and percentage of the urban population have an insignificant long-run effect on economic openness.

Based on the result of the error correction model, it was found that the system corrects its previous period disequilibrium at a speed of 30.0% annually. This outcome implies that the model identified the sizable speed of adjustment by 30.0% of disequilibrium correction yearly for attaining the long-run equilibrium steady-state position. Also, findings showed that the lag of the dependent variable (log(TO)) and foreign direct investment (FDI) has an insignificant short-term effect on economic openness while the lag of unemployment rate (UNER) and percentage of the urban population has a significant short-term effect on economic openness which is in line with findings by Mbogela [1] who argued that factors such as population size, per capita income and economic position impact on trade openness in the African countries. Also, the model was found to be free from serial correlation and adequate for the estimation of economic openness. The distribution of economic openness was found to be stable over the observed period. Also, it was found that the relationship amongst the variables are independent or have no direction except for the relationship between the percentage of the urban population (PUP) and foreign direct investment (FDI) which was found to be is unidirectional.

The outcome of the present study showed that the relationship between the percentage of the urban population and foreign direct investment is unidirectional. This calls for the urgent need for policymakers to implement policies such as the "ease of doing business" of the federal government of Nigeria which is anticipated to make foreign direct investment more attractive and in turn is expected to boost economic growth and thereby impact positively on urbanization in Nigeria.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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