

# Is Trade Liberalization the Oil for Poverty Reduction in Nigeria? Evidence from African Continental Free Trade Agreement (AfCFTA)

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**How to cite this paper:** Adegioriola, A. E., & Ben-Obi, O. A. (2024). Is Trade Liberalization the Oil for Poverty Reduction in Nigeria? Evidence from African Continental Free Trade Agreement (AfCFTA). *American Journal of Industrial and Business Management*, 14, 127-147.

<https://doi.org/10.4236/ajibm.2024.142006>

**Received:** December 30, 2023

**Accepted:** February 6, 2024

**Published:** February 9, 2024

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## Abstract

This paper examined the relationship between trade liberalization and poverty reduction in Nigeria using quarterly data from 2000 to 2022. The Augmented Dickey-Fuller test and Johansen co-integration test were used to determine the stationarity of the time series data. The research used the Error Correction Model (ECM) due to the stationarity status of the data. The findings show that important variables (capital importation, trade openness, foreign portfolio investment, foreign direct investment and poverty index) converge over the long term, demonstrating the presence of a long-term link between them. ECM is within the acceptable range of less than unity and has the anticipated negative sign. Specifically, trade openness, capital importation and foreign portfolio investment have positive impact on poverty level. The impact is significant for capital importation and foreign portfolio investment while trade openness has insignificant impact on poverty level. Foreign direct investment has negative and insignificant impact on poverty level while exchange rate has positive and significant impact on poverty level. It is therefore recommended that government should enact trade policies that will make international trade favourable to Nigeria and beneficial to the citizenry. The Government should ensure that values are added to primary products being exported in order to gain more from trade liberalization. The Government should improve on the ease of doing business to attract and sustain more foreign investors in critical sectors of the economy that have capacity to increase output, income and reduce poverty.

## Keywords

Liberalization, Nigeria, Poverty, Trade

## 1. Introduction

Trade has always been seen as an engine or catalyst of growth. Globalization in the 1990s opened many opportunities around the world for increased trade, foreign investment and new technologies. Trade proponents and trade organizations have over the years advocated for trade liberalization across the world, especially, among African countries. They opined that trade liberalization leads to economic growth, improved living standards and in turn reduces poverty. According to [Dollar and Kraay \(2001\)](#), countries which engaged in large-scale post-1980 “globalizing” or trade liberalizing had considerably expanded trade, larger tariff reductions, lower inflation, rates of growth, and significantly reduced levels of poverty, while those nations which continued isolationist policies and did not engage in any concerted liberalization efforts suffered and were largely stagnated.

Early studies ([Dollar, 1992](#); [Sachs & Warner, 1995](#)) had related trade policy variables to growth rates, and found that trade openness is associated with more rapid growth. Since 2000, studies have shown that enhanced growth through trade has also led to poverty reduction ([Bhagwati, 2004](#)), while [Topalova \(2006\)](#) see trade as boosting average incomes, which leads to growth in incomes of the poor and, thus, a reduction in the poverty rate. According to [Cali et al. \(2015\)](#), the effects of trade on poverty manifest themselves in a variety of ways, including through the labour market (wages and employment), production and consumption. The importance of “appropriate” policies according to [Bhagwati \(2004\)](#) which includes, diversifying away from products whose world prices might fall steeply, promoting financial development and developing vital infrastructure, will make trade reforms to yield the greatest benefits. In support of this, [Mitra \(2016\)](#) asserted that trade may lessen poverty provided it is supported by suitable institutions and policies that support labour mobility, proper financial development, and high-quality public infrastructure.

The importance of trade liberalization cannot be over emphasised. Trade liberalization opens up a country’s economy by improving social and economic infrastructure, leading to an increase in output, employment and reduction in poverty rate. It is on this note that the African leaders agreed to establish the African Continental Free Trade Agreement (AfCFTA) in order to expand intra-African trade through better harmonization and coordination of trade liberalization across Africa ([Hartzenberg, 2019](#)). However, the start off date for the Agreement which was due to commence on July 1, 2020, had been postponed due to the COVID-19 pandemic. Hence, the threat to global economic activities is conspicuously evident in international trade and capital flows across the globe. As a result of the COVID-19 pandemic, major supply and demand chains were broken all over the globe having a dire consequence on all the sectors of the economy.

The outright closure of factories, due to lockdowns, border closures and low domestic and global demand consequently led to massive global job losses push-

ing up the poverty group in the society. The backward integration by domestic firms, whereby the source their inputs locally, should be encouraged as this will ensure continuous supply of inputs, especially in times of supply shocks as seen in this COVID-19 crisis. In Nigeria, like other nations, the impact of the crisis has been felt in every sector of the economy. The heightened uncertainty concerning COVID-19 pandemic had seen investors leaving the stock market, subsequently putting pressure in the foreign exchange market. The fear of the unknown, as well as the temporary closure of forex sales to the BDC in March 27<sup>th</sup> 2020 further led to speculative activities in the foreign exchange market, which caused a spike in the BDC rate to N409/US\$1 at end March 2020 from N359/US\$1 at end January 2020. Consequently, the external reserves continue to deplete as the Central Bank of Nigeria (CBN) intervenes to stabilize the market.

Over the years, Nigeria external reserves position has been building up which boosts the investors' confidence in investing in the country (CBN, 2020). For instance, the reserve was at US\$32.34 billion in 2010 rose to US\$34.24 billion in 2014. This showed an increase in reserve of 5.9 percent from 2010 to 2014. This, however, fell by 17.4 percent which was to US\$28.3 billion in 2015 due to oil price shock, which is a major source of reserve, but latter rose by 39.1 percent to US\$39.35 billion in 2017 and also increased by 8.2 percent to US\$42.59 billion in 2018 by the end-December. Consequently, the Foreign Portfolio Investment (FPI) which was US\$1.38 billion in 2010Q4 fell to US\$0.27 billion in 2015Q1. The FPI drastically fell by 80.4 percent due to the uncertainties surrounding the general election of 2015. This further plunged by 14.8 percent to US\$0.23 billion at the onset of recession period in 2016Q1 in Nigeria, but latter rose in 2017Q4 to US\$3.79 billion which was huge increase of 1547.8 percent. This could be attributed to the establishment of the investors and exporters (I&E) window in the forex market, which boosted investors' confidence in the domestic financial market. This however, fell to US\$1.38 billion in 2018Q1 but latter rose to US\$1.88 billion in 2019Q4 reflecting the strong macroeconomic fundamentals which boosted investors' confidence (CBN, 2020).

However, the negative impact of the recent COVID-19 crisis on global capital inflows has seen the reserves depleting faster than expected. The external reserve which stood at US\$38.09 billion in December 2019, fell to US\$36.73 billion which was 6.2 percent decrease and a farther decrease of 8.3 percent to US\$33.69 billion from January and March 2020, respectively (CBN, 2020). This further holds significant implication for the sustainability of the Central Bank's interventions in the foreign exchange market, a factor responsible for the relative stability of the Naira in recent times. Consequently, capital flows, particular portfolio investment have also reduced in recent times, with more threats of a capital reversal from existing capital on maturity of the investments as the pandemic continues. However, volatility of capital inflows, apart from destabilising government finances also breed macroeconomic instability.

Trade openness in Nigeria has ranged from 0.2 to 0.5 percent between 2000 and 2019. This could be interpreted as the trade liberalization policies of Nigeria being more of inward oriented and encouraging import substitution policies. Exports of Nigeria fell from 49.0 percent of their gross domestic product (GDP) in first quarter 2000 to 30.0 and 23.0 percent at the same quarter in 2005 and 2010, respectively. However, imports as a percent of their GDP at 7.4 percent in first quarter of 2000 rose to 17.4 per cent in the same quarter of 2005, but slightly fell by 0.3 percentage points to 17.1 percent in 2010Q1 (CBN, 2020). Available data showed that exports and imports at 10.4 and 14.2 per cent of their GDP in 2015Q1 fell to 6.7 and 8.2 per cent in 2016Q1, respectively, during the recession era. However, the policy measures initiatives and programs put in place to boost trade led to an increase of 15.5 per cent and 11.7 per cent of their GDP, respectively in 2018 (CBN, 2020).

Despite these, poverty rate in the Nigeria has been rising. The importance of poverty reduction all over the globe cannot be overemphasized. To this affect the United Nations in its aim to ensure social protection for the poor and vulnerable has the Sustainable Development Goal number 1 (SDG 1) as a global call to end poverty in all its forms and dimensions by 2030. According to UNDP, about 736 million people in 2015, lived on less than US\$1.90 a day; lacking food, clean drinking water and sanitation, even though the number of people living in extreme poverty fell by more than half between 1990 and 2015 (UNDP, 2020). The report further noted that 80 percent of those living in extreme poverty on less than US\$1.90 a day are in south Asia and Sub-Saharan Africa. According to the Human Development Report (2019), 51.4 percent of the population are multi-dimensionally poor while an additional 16.8 percent are classified as vulnerable to multidimensional poverty.

Many international organisations have consistently ranked Nigeria as the country that best exemplifies global poverty. In a study on poverty and inequality that was published in 2020 by the National Bureau of Statistics, it was reported that 40.1% of the entire population was considered to be poor. This serves as confirmation of the previous statement. To put it another way, the real per capita expenditures of four out of ten people in Nigeria are less than N137,430.00 (US\$381.75) per year, which is equivalent to \$1.05 USD per day. This means that out of a population of over 200 million people in Nigeria, there are more than 82.9 million people who, according to the country's criteria, are classified as living in abject poverty (National Bureau of Statistics (NBS), 2020).

In spite of increase and growth in trade liberalization between Nigeria and rest of the world which should have benefited Nigerian economy and reduce poverty level, Nigerian poverty level is increasing. Hence, the broad objective of the study is to empirically investigate the impact of trade liberalization on poverty reduction in Nigeria, while the specific objectives include; to investigate the impact of trade liberalization on poverty reduction in Nigeria; to investigate the impact of trade liberalization on poverty reduction in Nigeria; to ascertain the impact of

trade openness on poverty reduction in Nigeria; to determine the impact of foreign portfolio investment on poverty reduction in Nigeria; to investigate the impact of foreign direct investment on poverty reduction in Nigeria, and to examine the impact of capital importation on poverty reduction in Nigeria.

It is therefore, important to study the relationship between trade liberalization and poverty reduction as this will aid the policy makers in concentrating, among others, on improving the major factors that will attract and sustain trade that will benefit not only the economy but the citizens as well. This paper also aims to aid decision makers in putting up measures to attract and enhance the inflow of the more stable and long-term foreign direct investment (FDI) as this will impact positively on the employment of the citizens, thus, reducing poverty level.

To this end, the paper is structured into five sections. Following the introduction, section two provides the literature review which theoretical reviews while section three is the data and methodology. Section four and five are for the results and discussion, conclusion and policy recommendations respectively.

## 2. Literature Review

### 2.1. Theoretical Literature

Trade theory predicts that in the absence of artificial restrictions, nations will export goods for which they have a comparative advantage and will import goods for which they have a comparative disadvantage. Over the years, the theoretical links between trade liberalization and economic growth have been discussed.

Adam Smith in an inquiry into the nature and causes of the wealth of nations in 1776, presented the gains from international trade as being depended on the decisions of countries to produce and export only commodities that they possess absolute advantage over other trading partners. Thus, each nation would gain by specializing in the production of the good that it produces at a lower cost than the other nation, while importing the good that it produces at a higher cost. Some of the assumptions of the theory are: lack of mobility for factors of production; no barriers to trade for the exchange goods; no trade imbalances or trade deficits, or surpluses and no economies of scale (constant returns to scale). This theory is seen as a positive-sum game, by Afaha and Aiyelabola (2012), as both countries involve will gain from the trade. However, challenges arise from some countries that have absolute advantages in almost all commodities it requires over a trading partner. This led to the breakdown of the theory of absolute advantage which brought about the theory of comparative advantage.

In 1887, David Ricardo presented the theory of comparative advantage which is an improvement on Adam Smith's theory of Absolute Advantage. The theory states that countries should specialise in the production and export of goods, according to the relative opportunity costs of production in each country, measured by the alternative production given up to produce that tradable good. Consequently, through specialisation and trade, there is mutual benefit for countries

when they export goods for which they have a comparative advantage, and import the goods that they cannot produce at a lower opportunity cost relative to other countries. Suranovic (2010), regarded Ricardo's theory as one of the most powerful, yet counter-intuitive insights in economics, which implied that comparative advantage rather than absolute advantage is responsible for much of international trade.

According to Adenugba and Sotubo (2013), the less efficient nation should specialize in the production and exportation of the good in which it is relatively less inefficient, while the more efficient nation should specialise in the production and exportation of the good in which it is relatively more efficient, that is where the country's absolute advantage is greatest. Some assumptions of the Comparative Advantage theory are: there are only two countries that produce the same two commodities; tastes are similar in both countries and prices of the two commodities are determined by labour cost. Labour is the only factor of production and all labour units are homogeneous; the supply of labour and technological knowledge is unchanged; there is free trade, no transport costs and no trade barriers or restrictions in the movement of commodities.

In the early 1900s, Heckscher and Ohlin built upon the Ricardian theory in developing the Heckscher-Ohlin (HO) theory. This theory holds that a country will export the commodities that require relatively intensive use of those factors of production that are locally abundant (Leamer, 1995). Hence, a labour-abundant country will produce and export labour-intensive goods, while a capital-abundant country will produce and export capital-intensive goods. Some assumptions of the HO theory are: there are only two countries, two goods and two factors of production; Good X is labour intensive, while good Y is capital intensive; both countries use the same technology and production functions are homogeneous with constant returns to scale; consumer preferences are identical in both countries; goods and factor markets in both nations are perfectly competitive and there are no transportation costs, tariffs or other trade barriers. This theory was, however, criticized by the Leontief paradox which found that the US exported labour-intensive commodities and imported capital-intensive commodities, even though it is the most capital-abundant country in the world.

The export-led growth propounded by Neoclassical economists in the 1970s, rendered it a more rational and efficient alternative to other strategies of economic growth and development. The export-led growth hypothesis (ELGH) postulates that export expansion is a major determinant of growth. Thus, Export-led growth is a policy strategy, aimed at increasing a nation's rate of economic growth by relying upon an expansion of its exports as well as increasing the amounts of labour and capital within the economy.

Theories have shown that international trade leads to welfare gains through specialization in production and exchange of goods and services and through the availability of a larger variety of final and intermediate goods. Thus, trade liberalization in developing countries is expected to benefit unskilled labour, which is

the most abundant factor of production, leading to poverty reduction, most especially, when labour move across sectors.

## 2.2. Empirical Literature

Several studies have directly examined the effect of trade liberalization on poverty. Nevertheless, whether trade liberalization influences poverty or not is still inconclusive in the literature. [Dollar and Kraay \(2002\)](#) study titled the growth is good for the poor. The study used 92 countries for over forty (40) years. The ordinary least square and 2-stage least square were used as techniques of estimation. From the results, it was found out that increase in growth rates that accompanies expanded trade on average translate into proportionate increases in incomes of the poor, leading to poverty reduction. The paper concluded that on average, greater globalization, those relating to trade volumes, is a force for poverty reduction as there is no significant correlation between changes in inequality and changes in trade volumes.

[Goldberg and Pavcnik \(2004\)](#) empirical examined the relationship between trade liberalization, inequality, and poverty using micro data from several developing countries that underwent significant trade reforms in recent years. The countries include; Indonesia, Colombia, Brazil, Morocco, Peru and El Salvador among others. The study showed that trade-related mechanisms affects poverty through earnings of less-educated workers, industry wage premiums, occupational wage premiums as well as effects on worker employment and/or unemployment. The study concluded that the effects of international trade on poverty are country-specific and it depends on the exposure of the poor to international trade through employment opportunities and the above-mentioned sources of income, the impact of trade on these sources of income and the nature of the trade policy change in the country in question. In the same vein, [Goh and Javorcik \(2006\)](#) investigated the impact of trade liberalization on the industry wage structure in Poland between in 1994-2001. The study interviewed different household and questionnaire based on the data collected through the Polish Labor Force Survey (LFS). The results showed that trade liberalization in Poland during the 1990s, led to higher wages in all industries, after controlling for individual worker characteristics, geographic variables, and industry and time effects.

In a study by [Sakr \(2012\)](#) which examined the relationship between trade liberalization and poverty reduction in China and India and [Kis-Katos and Sparrow \(2015\)](#) on poverty, labour markets and trade liberalization in Indonesia. These studies provided evidence in support of a strong presumption that trade liberalization alleviate poverty in the long-run. In the same vein, the study on the relationship between trade liberalization and poverty reduction developing countries by [Mitra \(2016\)](#) used general equilibrium welfare analysis to investigate, at each possible level of income, the impact on real income arising from trade agreements in Latin America. The paper found significant welfare gains for the poor and a reduction in poverty, both of which were attributable to increased

trade.

Using the cointegration and error correction methodologies, [Modeste \(2019\)](#) asserted the impact of trade liberalization on export supply and poverty in Guyana. Evidence from the study revealed that trade liberalization in Guyana resulted in the expansion of the country's supply of exports and the reduction in its poverty rate. The study also showed that the real effective exchange rate and the growth of both the economy and the agricultural sector were important factors for expanding the country's supply of exports and reducing its poverty rate. However, [Goldberg and Pavcnik \(2007\)](#) found no relationship between international trade and poverty in urban Colombia as there was no evidence that declines in import tariffs were associated with increased unemployment. In support of this, [Topalova \(2010\)](#) found that poverty declined less in Indian districts that were more exposed to import tariff declines.

In his study, trade liberalization and poverty reduction complimentary or contradictory aims. [Mercurio \(2013\)](#) used 2-stage least square methodology. He found that trade liberalization leads to economic growth, which in turn brings about poverty reduction. The study concluded that trade liberalization is a necessary but not sufficient step towards poverty reduction. He opined that trade liberalization must be complemented with other policy choices as well as sufficient institutional and governance related support.

In Nigeria, [Nwafor et al. \(2005\)](#) using a Dynamic Computable General Equilibrium Model found that with trade liberalization, capital income improves over time, and decreases poverty level of the urban households, while land and labour income reduce but increases rural households poverty in both the short- and long-run. The study also found that agricultural sector policies implemented along with trade liberalization will have a pro poor effect as it will benefit the rural areas. However, [Yusuf et al. \(2013\)](#) using the ARDL approach on time series data from 1980-2011. They investigated the relationship between trade liberalization, economic growth and poverty reduction in Nigeria. The study found that trade liberalization in Nigeria does not show significant improvement on the welfare of Nigerian and does not empower the common man out of poverty. Also, trade liberalization does not cause poverty reduction. In other words countries with a high propensity to import and poor commodity rises do not need to follow the one-size-fits-all trade liberalization policies but should focus on the policies peculiar to its environment.

[Ojeyinka and Adegboye \(2017\)](#) examined the impact of trade liberalization on performance in the Nigerian economy, with special reference to agricultural and manufacturing sectors. The Generalized Method of Moment technique (GMM) was used for the analysis. Findings from the study showed that there is significant positive impact of trade liberalization on the output of agricultural sector while a negative but significant relationship exists between measures of trade liberalization and manufacturing output in Nigeria. The study also reveals that exchange rate exerts a positive but insignificant impact on agricultural output



while the effect of inflation on agricultural output is positive and significant within the study period. Unlike the agricultural output, both exchange rate and inflation have negative impact on manufacturing sector's output. The study concludes that government should embark on programmes that promote local production to fully harness the opportunity presents by trade liberalization.

Onakoya et al. (2019) investigated nexus between trade liberalization and poverty in 21 African countries covering the period 2005-2014. The methodology used in the study is the pooled OLS technique. The findings reveal that foreign direct investment and inflation rate had a positive relationship with the human development index while exchange rates and trade openness were negatively related to poverty level at the 5 percent level. The study recommended urgent policy measures aimed at revamping the poverty alleviation programmes. The study recommended that in a bid to diversify export market, developing countries should target other developing countries in the spirit of South-South cooperation. Such countries should also consider the joining or strengthening of regional economic integration. Incentives for production and human capacity building in the export-oriented sector should be emplaced. Social and economic policies are required to protect any country against the adverse effects of lowered trade barriers.

Given different findings and opinions, this paper aims to contribute using high frequency data, to the argument on the role of trade liberalization in fostering economic development and the reduction of poverty in Nigeria. The paper also seeks to determine the possibility of a long-run relationship among the variables of interest, which include poverty index, capital importation, trade openness, foreign portfolio investment and foreign direct investment.

### **3. Data and Methodology**

#### **3.1. Sources of Data**

This study was conducted using quarterly data from 2000Q1 to 2022Q4. The scope of the data was shown to capture the various Nigerian government trade policies doing the fourth republic in the new democratic dispensation. The data for the variables which include poverty index, capital importation, trade openness, foreign portfolio investment, foreign direct investment and exchange rate were sourced from World Development Index (WDI), Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS).

#### **3.2. Description of Variables**

Poverty index captures the percentage of households in a country deprived along three dimensions of well-being—monetary poverty, education, and basic infrastructure services. Poverty index is measured in percentage.

Capital importation is the banking transactions, gathered through Electronic Financial Analysis and Surveillance System (e-FASS) software, which enables the automatic reporting of all banking transactions to CBN. It is measured in Billion.

Trade openness is one measure of the extent to which a country is engaged in

the global trading system. Trade openness is usually measured by the ratio between the sum of exports and imports and gross domestic product (GDP).

Foreign portfolio investment refers to investing in the financial assets of a foreign country, such as stocks or bonds available on an exchange. It is measured in Billion.

Foreign direct investment involves establishing a direct business interest in a foreign country, such as buying or establishing a manufacturing business, building warehouses, or buying buildings. It is measured in Billion.

Exchange rate is a rate at which one currency will be exchanged for another currency.

### 3.3. Theoretical Framework

The theoretical framework for this study is based on the Heckscher-Ohlin theory of trade. This theory holds that a country will export the commodities that require relatively intensive use of those factors of production that are locally abundant. The overall trade agreement between nations with goods and factor markets are perfectly competitive and there are no transportation costs, tariffs or other trade barriers. This theory therefore is relevant to this study because trade liberalization opens up a country's economy and allows importation of goods that the country is not well-endowed with and exportation of goods that the country is well-endowed with.

### 3.4. Model Specification

This study used model that permits the simulation and influence of macroeconomic variables on the Nigerian economy. The model consists of two behavioural equations and four explanatory variables. This study adapted the model of [Sachs and Warner \(1995\)](#), with the functional relationship specified as follows:

$$POV = f(TDO, CPI, EXR) \quad (1)$$

$$POV = f(TDO, FPI, CPI, EXR) \quad (2)$$

In order to capture the responsiveness of the dependent variables (POV) to the explanatory variables (TDO, CPI, FPI, FDI, EXR), we take the log of equations (1) and (2) which can be expressed for the estimation of the parameters as follows:

$$\begin{aligned} \Delta \ln POV_t = & \alpha_1 + \sum_{i=1}^k \beta_{1i} \Delta \ln TDO_{t-1} + \sum_{i=1}^k \delta_{1i} \Delta \ln CPI_{t-1} \\ & + \sum_{i=1}^k \varnothing_{1i} \Delta \ln EXR_{t-1} + \lambda_1 ECM_{t-1} + \varepsilon_{1t} \end{aligned} \quad (3)$$

$$\begin{aligned} \Delta \ln POV_t = & \alpha_1 + \sum_{i=1}^k \beta_{1i} \Delta \ln TDO_{t-1} + \sum_{i=1}^k \pi_{1i} \Delta \ln FPI_{t-1} + \sum_{i=1}^k \Omega_{1i} \Delta \ln FDI_{t-1} \\ & + \sum_{i=1}^k \varnothing_{1i} \Delta \ln EXR_{t-1} + \lambda_1 ECM_{t-1} + \varepsilon_{1t} \end{aligned} \quad (4)$$

POV is poverty index; CPI stands for capital importation; TDO is trade openness FPI denotes foreign portfolio investment; FDI represents foreign direct investment while EXR is the exchange rate. The parameter estimates for the models are  $\beta$ ,  $\delta$ ,  $\emptyset$ ,  $\pi$  and  $\Omega$  while  $\varepsilon$  is the error term.

The *a priori* expectations are determined by the principles of economic theory guiding the economic relationship among the study variables. It is expected that  $\beta$ ,  $\delta$ ,  $\pi$ ,  $\Omega < 0$  while  $\emptyset > 0$ . It is the expectation of this paper that with the drive to improve the ease of doing business and attracting foreign investment in Nigeria through provisions of infrastructure and reduction of institutional rigidities or bureaucracies that trade liberalization would lead to poverty reduction in Nigeria.

### 3.5. Estimation Procedure

This study employed econometrics methodology in examining the relationship between trade liberalization and poverty reduction in Nigeria. The stationary status of the variables was used to conduct using Augmented Dickey Fuller (ADF) while Johansen co-integration test was used to check the long-run relationship of the variables (Dickey & Fuller, 1979; Johansen & Juselius, 1990). The Error Correction Mechanism (ECM) model was used to estimate the models of trade liberalization and poverty reduction because the variables fulfil the consideration for the use of the method to analysis the models.

#### 3.5.1. Stationarity Test

Stationarity is defined as a quality of a process in which the statistical parameters (mean and standard deviation) of the process do not change with time (Challis & Kitney, 1991). The assumption of the classical regression model necessitates that both the dependent and independent variables be stationary and the errors have a zero mean and finite variance. According to Granger and Newbold (1974), the effects of non-stationarity include spurious regression, high  $R^2$  and low Durbin-Watson (DW) statistic. Below are basic reasons why data must be tested for non-stationarity.

First, the stationarity or otherwise of a series can strongly influence its behaviour and properties, for instance, persistence of shocks will be infinite for non-stationary series. Secondly, if two variables are trending over time, a regression of one, on the other hand, could have a high  $R^2$  even if the two are totally unrelated and this is known as spurious regressions. Thirdly, if the variables in the regression model are not stationary, then it can be proved that the standard assumptions for asymptotic analysis will be invalid. In other words, the usual “t-ratios” will not follow a t-distribution, so it is impossible to validly undertake hypothesis tests about the regression parameters (Bowerman & O’connell, 1979).

The Augmented Dickey Fuller test modifies the work done by (Dickey & Fuller, 1979). The aim of the Dickey Fuller theory was to test the hypothesis that  $\delta = 1$  in:

$$Y_t = \delta Y_{t-1} + \mu_t \quad (5)$$

Thus, the hypotheses are formulated:

$H_0$ : Series contains a unit root;

$H_1$ : Series is stationary.

The rejection of the null hypothesis under these tests means that the series do not have a unit root problem. The standard Dickey Fuller test estimates following equation:

$$\Delta Y_t = \beta_1 + \beta_2 \delta Y_{t-1} + \mu_t \quad (6)$$

where  $Y_t$  is the relevant time series,  $\Delta$  is a first difference operator,  $t$  is a linear trend and  $\mu_t$  is the error term. The error term should satisfy the assumptions of normality, constant error variance and independent error terms. According to Gujarati (2004) if the error terms are not independent in Equation (3.8), results based on the Dickey-Fuller tests will be biased.

### 3.5.2. Co-integration Test

Johansen and Juselius (1990) is employed to determine the number of co-integrating vectors using the methodology with two different test statistics namely the trace test statistic and the maximum Eigen-value test statistic. The trace statistic tests the null hypothesis that the number of divergent co-integrating relationships is less than or equal to “ $r$ ” against the alternative hypothesis of more than “ $r$ ” co-integrating relationships, and is defined as:

$$\theta_{\text{trace}}(r) = -T \sum_{j=r+1}^p \ln(1 - \hat{\theta}_j) \quad (7)$$

The maximum likelihood ratio or the maximum Eigen-value statistic, for testing the null hypothesis of at most “ $r$ ” co-integrating vectors against the alternative hypothesis of “ $r + 1$ ” co-integrating vectors, is given by:

$$\begin{aligned} \theta_{\text{max}}(r, r+1) &= -T \ln(1 - \hat{\theta}_{r+1}) \\ \theta_{\text{trace}}(r) &= -T \sum_{j=r+1}^p \ln(1 - \hat{\theta}_j) \end{aligned} \quad (8)$$

where  $\hat{\theta}_j$  = the Eigen values,  $T$  = total number of observations. Johansen argues that, trace and statistics have nonstandard distributions under the null hypothesis, and provides approximate critical values for the statistic, generated by Monte Carlo methods (Haug, 1996). In a situation where Trace and Maximum Eigen-value statistics yield different results, the results of trace test should be preferred.

### 3.5.3. Error Correction Mechanism

The Error Correction Mechanism (ECM) will be used to determine the short-run relationship among the variable. The ECM indicates the speed of adjustment from the short-run equilibrium to be long-run equilibrium state. The greater co-efficient of the parameter shows a higher speed of adjustment of the model from the short-run to the long-run equilibrium.

The ECM ( $p$ ) form is written as:

$$\Delta y_t = \delta + p y_{t-1} + c \Delta y_{t-1} + \varepsilon_t \quad (9)$$

where  $\Delta$  is the differencing operator, such that  $\Delta y_{t-1} = y_t - y_{t-1}$ .

The parameter  $p$  shows the ECM, it is expected to be negative and significant so as to show the speed of adjustment.

## 4. Results and Discussion

### 4.1. Descriptive Statistics

The descriptive analysis is presented in **Table 1** which contains the statistical properties of POV, EXR, TDO, CPI, FPI and FDI.

**Table 1** shows the behaviour of the variables during the review period. The table contains details for the mean, maximum values, minimum values, range, standard deviation, skewness, kurtosis and Jarque-Bera for 92 observations. POV represents the poverty index which is the dependent variable. EXR, TDO and CPI represent the exchange rate, trade openness and capital importation respectively. FPI is the foreign portfolio investment while FDI is the foreign direct investment.

It was observed from the summary statistics with reference to the Jarque Bera estimates and probability values for EXR, TDO, CPI and FPI were normally distributed due to their high probability value of 0.827953, 0.058060, 0.052097 and 0.749571 which are higher than the probability of 0.05. This means that the results will not be biased. On the other hand, the probability values of POV and FDI were not normally distributed due to their low probability values of 0.000004, 0.000000 and 0.000000 respectively which are lower than the probability value of 0.05. From the Central Limit Theorem (CLT), non-normality does not affect mean values since Least Squares parameters are mean values, the non-normality of the variables does not affect the parameters in the model to be estimated.

**Table 1.** Descriptive statistics.

	POV	EXR	TDO	CPI	FPI	FDI
Mean	17455.96	86.20235	4828620.	679551.0	16.78805	14.60604
Median	1510.940	86.41500	4175994.	312000.0	16.89029	9.625000
Maximum	96985.02	90.43000	15000000	2375000.	29.80000	76.80000
Minimum	123.9500	80.32000	1788.170	2129.000	6.490000	0.200000
Std. Dev.	28830.41	2.158746	3739672.	695826.1	4.909665	18.04734
Skewness	1.661614	-0.220728	0.861224	0.795062	0.011387	2.028840
Kurtosis	4.411686	2.953910	2.943392	2.255272	3.547968	6.183879
Jarque-Bera	24.98701	0.377599	5.692557	5.909306	0.576509	50.98688
Probability	0.000004	0.827953	0.058060	0.052097	0.749571	0.000000
Sum	802974.0	3965.308	2.22E+08	31259345	772.2505	671.8780
Sum Sq. Dev.	3.74E+10	209.7082	6.29E+14	2.18E+13	1084.716	14656.79
Observations	92	92	92	92	92	92

Source: Author's Computation.

## 4.2. Unit Root Test

The data analysis begins with unit root test on each of the variables to determine the stationary property of the time series variables. The Augmented Dickey-Fuller test was used to test for unit root. All the variables were regressed on trend and intercept to determine if they have trend, it was discovered that all the variables (six) have trend and intercept, hence the unit root test involve trend and intercept. The result is presented in **Table 2**.

The Six variables (POV, EXR, TDO, CPI, FPI and FDI) underwent unit root test using the Augmented Dickey-Fuller (ADF) test. The result showed that all variables were non-stationary at levels  $I(0)$  but all the variable were stationary at first difference  $I(1)$ .

## 4.3. Johansen Co-Integration

The study proceeds with Johansen co-integration test having established that all series are not stationary at level but were stationary at first difference. The co-integration test allows for the testing of the long-run equilibrium relationships among the series. The result obtained from **Johansen and Juselius (1990)** is presented in **Table 3** and **Table 4**. The result is based on eigenvalue test and trace test to determine the number of co-integration vectors.

**Table 2.** Unit root test for stationarity result.

Variable	At Level $I(0)$		Stationarity Status	Ist Difference $I(1)$		Stationary Status
	ADF Statistics	Critical Value		ADF Statistics	Critical Value	
POV	-3.156842	-4.323979 (1%)	NS	-4.46701	4.090602 (1%)	S
		-3.580623 (5%)			-3.473447 (5%)	
		-3.225334 (10%)			-3.163967 (10%)	
EXR	-1.344554	-3.699871 (1%)	NS	-5.40757	-4.090602 (1%)	S
		-2.976263 (5%)			-3.473447 (5%)	
		-2.627420 (10%)			-3.163967 (10%)	
TDO	-7.811533	-4.088713 (1%)	NS	-7.811533	-4.088713 (1%)	S
		-3.472558 (5%)			-3.472558 (5%)	
		-2.627420 (10%)			-3.163450 (10%)	
CPI	-2.232413	-4.339330 (1%)	NS	-4.628465	-4.262735 (1%)	S
		-3.587527 (5%)			-3.552973 (5%)	
		-3.229230 (10%)			-3.209642 (10%)	
FPI	-1.957161	-4.309824 (1%)	NS	-5.834706	-4.252879 (1%)	S
		-3.574244 (5%)			-3.548490 (5%)	
		-3.221728 (10%)			-3.207094 (10%)	
FDI	-2.177122	-4.356068 (1%)	NS	-6.844252	-4.262735 (1%)	S
		-3.595026 (5%)			-3.552973 (5%)	
		-3.233456 (10%)			-3.209642 (10%)	

Note: NS = Not Stationary. S = Stationary. Source: Author's Computation.

**Table 3.** Johansen co-integration test. Series: POV EXR CPI TDO.

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.977601	186.0584	55.24578	0.0000
At most 1*	0.854706	72.09690	35.01090	0.0000
At most 2	0.334412	14.22708	18.39771	0.1740
At most 3	0.064946	2.014533	3.841466	0.1558

\*Denotes rejection of the hypothesis at 0.05. Source: Author's Computation.

**Table 4.** Johansen co-integration test. Series: POV FDI FPI EXR TDO.

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.939025	175.0298	69.81889	0.0000
At most 1*	0.730056	85.51672	47.85613	0.0000
At most 2*	0.545953	43.61140	29.79707	0.0007
At most 3*	0.337562	18.34565	15.49471	0.0181
At most 4*	0.149111	5.167145	3.841466	0.0230

\*Denotes rejection of the hypothesis at 0.05. Source: Author's Computation, 2020.

**Table 3** shows co-integration result among four of the variables which are POV, EXR, CPI and TDO. The result showed that two of the variables (POV and EXR) converge in the long run thereby depicting the existence of long run relationship among them. Also from **Table 4**, five variables were tested for co-integration, POV, FDI, FPI, EXR and TDO. The result showed that there are five co-integrated variables, which means that the variables converge in the long-run and there is long-run relationship among the variables. The long-run relationship exists at 5% level of significance according to the trace test statistics which indicates that we reject the null hypothesis if the probability values of the respective variable are less than 0.05. However, CPI and TDO were not co-integrated with the other variables in **Table 1** because we accept the null hypothesis if the probability values of the variables are greater than 0.05.

#### 4.4. Error Correction Mechanism

The Error Correction Mechanism model (ECM) is estimated based on the stationarity property of the variables. The ECM result is shown in **Table 5**.

The error correction mechanism results for Equation (3) and (4) have the correct sign which is negative (-) which showed that the models correct short-run disequilibrium in the previous period to equilibrium in the current period. The estimated speed of adjustment is negative and statistically significant with values

**Table 5.** Error correction mechanism result.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPI)	0.000000	0.000000	0.163992	0.8725
D(EXR)	0.073663	0.031183	2.362266	0.0359*
D(TDO)	-3.843191	5.674507	-0.677273	0.5111
CointEq(-1)	-0.056515	0.01699	3.326379	0.0061
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI)	-0.000000	0.000000	-1.189476	0.2593
D(FPI)	0.000000	0.000000	1.518573	0.1571
D(EXR)	0.061221	0.028384	2.156863	0.0541
D(TDO)	0.804929	5.462867	0.147345	0.8855
CointEq(-1)	-0.063007	0.013166	4.785728	0.0006

Source: Author's Computation.

of  $-0.056515$  and  $-0.063007$  respectively, for the two models. This mean that 5.7 percent of any movement into disequilibrium are being corrected to restore equilibrium within a quarter in Equation (3) model, while 6.3 percent of any movement into disequilibrium are corrected to restore equilibrium within a quarter in Equation (4) model.

#### 4.5. Least Square Regression Results

The result of the least square estimate for Equation (3) is shown in **Table 6**. The result shows that trade openness has positive but insignificant impact on poverty rate. Capital importation has positive and significant impact on poverty rate while exchange rate has positive and significant impact on poverty rate. The result fulfils a priori expectations of this paper.

For robustness check, the capital importation components, foreign portfolio and foreign direct investment were used for the analysis, which was specified in Equation (4). The result of the least square estimate showed that trade openness has positive but insignificant impact on poverty level; foreign portfolio investment has positive and significant impact on poverty level. Foreign direct investment has negative and insignificant impact on poverty level while exchange rate has positive and significant impact on poverty level. The result fulfils a priori expectations of this paper (**Table 7**).

#### 4.6. Post Estimation ECM Test

It is a necessity to test the ECM model for stability to validate the results. This can be done using the AR Root method. The conditions to declare a model stable using AR roots are: all roots must lie within the polynomial bound and the roots must be less than one. Below is the tabular and graphical representation of the AR Roots test.



**Table 6.** Least square regression result. Dependent Variable: POV.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TDO	168.7127	89.37676	1.887657	0.0672
CPI	1.524358	4.073479	3.743294	0.0006*
EXR	1.430802	0.250131	5.720203	0.0453*
C	-143.4184	54.42732	-2.635044	0.0123
R-squared	0.541808	Mean dependent var		184.8783
Adjusted R-squared	0.503626	S.D. dependent var		60.34825
S.E. of regression	42.51766	Akaike info criterion		10.43236
Sum squared resid	65079.05	Schwarz criterion		10.60124
Log likelihood	-204.6471	Hannan-Quinn criter.		10.49342
F-statistic	14.18991	Durbin-Watson stat		1.570412
Prob(F-statistic)	0.000003			

Source: Author's Computation.

**Table 7.** Least square regression result. Dependent Variable: POV.

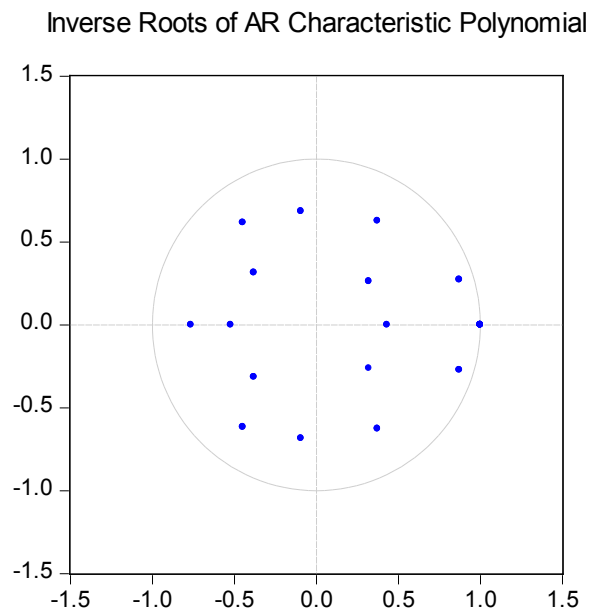
Variable	Coefficient	Std. Error	t-Statistic	Prob.
TDO	198.7038	100.1285	1.984487	0.0551
FPI	1.304508	5.334509	2.403762	0.0217*
FDI	-2.986708	4.153808	-0.677872	0.5023
EXR	1.291995	0.2927	4.414061	0.0001*
C	-102.2446	68.03024	-1.502928	0.1418
R-squared	0.455026	Mean dependent var		184.8783
Adjusted R-squared	0.392743	S.D. dependent var		60.34825
S.E. of regression	47.02739	Akaike info criterion		10.65581
Sum squared resid	77405.15	Schwarz criterion		10.86692
Log likelihood	-208.1161	Hannan-Quinn criter.		10.73214
F-statistic	7.305808	Durbin-Watson stat		1.459145
Prob(F-statistic)	0.000218			

Source: Author's Computation.

**Table 8.** Roots of characteristic polynomial. Variables: POV EXR TDO CPI FPI FDI.

Root	Modulus
0.996938	0.996938
0.702172	0.702172
0.673998 - 0.137061i	0.687793
0.673998 + 0.137061i	0.687793
-0.521727	0.521727

No root lies outside the unit circle. ECM satisfies the stability condition. Source: Author's Computation.



**Figure 1.** AR stability test. Source: Author's Computation.

This shows that values of the roots are less than unity. Also, the modulus values are also less than unity and the inverse roots of the AR characteristic polynomials lie within the unit circle. This is as shown in **Table 8**. Based on these observations, we conclude that the estimated ECM model is stable (**Figure 1**).

The laying of all the roots within the polynomial is an indication that the model is good and stable, and can be used for forecasting and policy decision.

## 5. Conclusion and Recommendations

The broad objective of this study is to examine the impact of trade liberalization on poverty reduction in Nigeria. Many emerging economies and proponents of trade liberalization have utilized a variety of trade policy instruments, including subsidies and protectionism, to reduce poverty and accelerate growth and become major export-oriented economies. It was discovered that trade liberalization has the capacity to become the oil for poverty reduction in Nigeria because of her abundant resources that can be found all over the country. However, focusing on production and export of non-oil sub-sectors of the economy, would not only generate foreign earnings but also create job, which will reduce poverty in the country.

From the results, this paper has showed that short-run disequilibrium in the previous period will be restored back to equilibrium in the current period. Trade openness has positive but insignificant impact on poverty level, while capital importation has positive and significant impact on poverty level in Nigeria. The study of **Mercurio (2013)** is in line with this finding. Foreign portfolio investment has positive and significant impact on poverty rate. This finding aligned with the study of **Topalova (2010)**; **Mitra (2016)**. The Foreign direct investment has negative and insignificant impact on poverty level while exchange rate has

positive and significant impact on poverty level. The studies of Yusuf et al. (2013); Ojeyinka and Adegboye (2017), and Modeste (2019) support this findings but the study of Onakoya et al. (2019) did not aligned with this findings.

It is therefore recommended that government should enact trade policies that will make international trade favourable to Nigeria and beneficial to the citizenry. The Government should ensure that values are added to primary products that are being exported in order to gain more from trade liberalization. The Government should improve on the ease of doing business in Nigeria which will attract and sustain more foreign investors in critical sectors of the economy that have capacity to increase output, income and reduce poverty. The Central Bank of Nigeria should also continue with the interventions and measures from the supply side in at stabilizing the foreign exchange rate which will encourage and boost the confidence levels of both local and foreign investors to increase investment in Nigeria. Increased investment will lead to increase in output, employment, income, and consequently, reduce poverty level in Nigeria. The study suggests that further study should look at trade liberalization and employment generation in Nigeria.

### Conflicts of Interest

\*The authors declare no conflicts of interest regarding the publication of this paper.

\*The views expressed in this paper are those of the authors and do not necessarily represent the positions of the affiliated institutions of the authors. All errors remain entirely that of the authors.

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