EXPLORING THE INTERACTION OF TRADE OPENNESS, INCOME INEQUALITY, AND POVERTY IN NIGERIA

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ABSTRACT

The literature on the nexus between trade openness, income inequality and poverty appear conspicuously and of diverse outcomes. Perhaps, the mixed findings may be attributed to methodology and economic structure of the country in view. The current study examines the trade openness on income inequality and poverty in Nigeria between 1981 and 2019 using Autoregressive Distributed Lags (ARDL) methodology. Our findings show that trade openness had different effects on inequality and poverty in Nigeria in the short and long run. While its relationship with inequality is a short-run phenomenon, it had a long-run relationship with poverty. Overall, trade openness had a declining effect on inequality and poverty. In the former, its impact was not statistically significant. However, the gains of trade openness on inequality and poverty were reversed when inequality influenced trade openness. In essence, with the influence of inequality, trade openness had an increasing effect on poverty. As a result, this study makes several recommendations to policymakers. To begin, a policy framework must be established to ensure that Nigerian trade is integrated with the rest of the world. Evidence from this study has suggested that policies such as restricting trade through border closures must not feature as a policy option as long as one of the goals of the economy is poverty reduction and reduction in inequality.

Keywords: trade openness, income inequality, poverty ARDL methodology

INTRODUCTION

Over the years, trade has acted as an agent of distributional changes in local economies (Goldberg & Pavnick, 2007; Santos-Paulino, 2012). It is a pivotal tool for sustaining output growth in both developed and developing countries.

Nevertheless, the potential role of global movement of resources across the borders in accelerating output growth through greater integration into the world economy, the literature on the nexus between trade openness, inequality and poverty have been controversial and mixed. Several empirical pieces of literature have argued that trade openness aided investment, industrial development, and income growth in developing countries. These studies outlined different channels through which this impact is transmitted (see Bukhari & Munir, 2016; Neutel & Heshmati, 2006; Hameed & Nazir, 2009; Hammoris & Kai, 2009; Okungbowa & Eburajolo, 2014; Nwosa, 2020, amongst others). Another line of studies argues that trade openness does not necessarily lead to equality of income and poverty reduction but poses a threat to less developing countries (LDCs) output growth and macroeconomic factors stabilization. They argue that trade openness exacerbates environmental problems (Bergh & Nilsson, 2011; Santos-Paulino, 2012; Rahim, Abidin, Ping, Alias & et al., 2014). While there is a significant empirical investigation regarding trade openness and inequality, measurement of poverty and income distribution, focus on Asia and Latin American countries, there is a sparse debate regarding the impact of different economic policies on poverty outcomes in Africa, particularly Nigeria. Moreover, a persistent concern is the impact of trade openness, primarily the flows of trade and capital, on poverty and inequality (Harrison & McMillan, 2006; Goldberg and Pavnick, 2007; Santos-Paulino, 2012). Hence, the study examines the relationship between global interconnections, income inequality, and poverty in Nigeria.

For developing countries like Nigeria, the impact of trade openness on poverty reduction has been uneven due to the government's failure to undertake structural revolution towards enhancing local industries and export drive. For instance, complete exposure to trade for agricultural output could expand the country's reliance on food imports and rising poverty. Trade openness may also worsen income distribution by embracing skill-biased technical change in response to increased foreign competition or the increased globalization of production (Feenstra, 2008). At the same time, the insufficient development of exports and trade capacity reflects the fact that poor households in Nigeria may only receive a small portion of global trade revenues. The situation has compelled the weakening of domestic growth and persistent poverty. The current study argues that if more trade openness stimulates growth, as pro-globalization advocates claim, such integration should have led to more remarkable sustained growth in Nigeria like other countries in Latin America and Asia. Furthermore, the sparse studies dedicated to Nigeria are widely attributed to the inconsistent and inaccurate long-term data series on income structure, poverty, and trade openness measurement indicators.

Our findings reveal that trade openness had different effects on inequality and poverty in Nigeria in the short and long run. While its relationship with inequality is a short-run phenomenon, it had a long-run relationship with poverty. Overall, trade openness had a declining effect on inequality and poverty. In the

former, its impact was not statistically significant. However, the gains of trade openness on inequality and poverty were reversed when inequality influenced trade globalization. In essence, with the influence of inequality, trade globalization had an increasing effect on poverty. The current study into this research framework and attempts to investigate the relationship between trade, inequality, and poverty in Nigeria over the period 1981-2019. Section 2 discusses related literature on the subject. Section 3 provides sources of data and methodology. Section 4 focuses on the results and discussion. Section 5 concludes the study.

LITERATURE REVIEW

The debate on the empirical literature on the relationship between trade openness, income inequality, and poverty have remained inconclusive owing to the mixed outcomes (Dollar & Kraay, 2001; Santarelli & Figini, 2002; Heshmati, 2005; Neutel & Heshmati, 2006; Hameed & Nazir, 2009; Basu, 2006; Ogunyomi, Daisi & Oluwashikemi, 2013; Dorn, Fuest & Potrafke, 2018; Ogwumike, Maku & Alimi, 2018; Nwosa, 2020; and host others). A substantial number of the studies contended that trade openness promoted investment, industrial development, employment, and income growth in developing countries. Bukhari and Munir (2016), for example, studied the relationship between globalization and income inequality in a number of Asian economies from 1980 to 2014. They employed a combination of pooled OLS and instrumental variable least squares. The findings imply that trade and technological globalization reduce income disparities in the Asian economies investigated, whereas financial globalization raises income inequality. While education has an inverse association with wealth disparity, foreign direct investment has a positive relationship with it.

Likewise, Hameed and Nazir (2009) found that globalization reduces income inequality and poverty in Pakistan by focusing on the trade liberalization aspect of globalization in Pakistan from 1970-2004. They employed the Toda and Yamamoto (1995) and Dolado and Lutkepohl (1996) of Granger causality to examine the causal relationship between the variables. Findings revealed that trade liberalization played a positive role in employment generation but negatively influenced per capita GDP. On the whole, their results seem to suggest that globalization, while leading to a reduction in poverty, has at the same time exacerbated income inequality. Neutel and Heshmati (2006) conducted a cross-country study in 2001 to investigate the relationship between globalization, inequality, and poverty in 65 developing nations. Cross-sectional regression analysis yielded empirical evidence of a substantial interaction between globalization and poverty and income disparity. Globalization alleviates poverty and minimizes economic disparity. When regional variability is taken into account, the relationship between globalization and poverty remains significant. According to a non-linear study, the benefits of globalization have diminishing returns on poverty.

Besides, Akinbobola and Isike (2009) empirically investigated the relationship between the inflow of capital, degree of openness, poverty, and economic growth in South Africa between 1980-2005. Using the Vector autoregressive technique, the study discovered that in the short run, variation in economic development in South Africa is explained by factors other than foreign capital inflows and economic openness. However, in the long run, this is irrelevant. Furthermore, capital inflow explains a considerable improvement in the human development index, since capital inflow and economic openness both favourably affected poverty reduction. In essence, trade liberalization has had little impact on the South African economy's growth rate. Goff and Singh (2014) explored the equivocal impacts of trade openness on poverty reduction in 30 chosen African nations from 1981 to 2010 using the panel System Generalized Method of Moment (GMM) estimator. The study's findings show that trade openness reduces poverty in nations with strong financial sectors, high education levels, and strong institutions.

Dorn, Fuest, and Potrafke (2018) recently re-examined the link between globalization and income inequality for 140 countries from 1970 through 2014. Using an instrumental variable approach, they find that the link between globalization and income inequality differs across different countries. There is a robust positive relationship between globalization and inequality in transition countries, including China and most Middle and Eastern European countries. The study found that neither OLS nor 2SLS results show any significant positive relationship between globalization and inequality in the sample of the most advanced economies. Nwosa (2020) investigates the relationship between globalization, economic growth, and income inequality in Nigeria utilizing yearly secondary data from 1981 to 2018, employing both vector error correction modelling (VECM) and auto-regressive distributed lag (ARDL) methodologies. In the long run, the VECM results reveal a unidirectional causality from inequality and globalization to economic progress. In comparison, in the short run, unidirectional causality from inequality to economic development. According to the ARDL assessment, globalization and economic growth are significant considerations of inequality in Nigeria.

In contrary to studies that reported trade openness tends to reduce poverty and income inequality, other lengthy studies argue that trade openness does not necessarily lead to equality of income in the presence of trade distortion (Edwards, 1997; MacDonald & Majeed, 2012; Ogunyomi, Daisi & Oluwashikemi, 2013). For example, MacDonald and Majeed (2012) examined the impact of globalization on cross-country inequality and poverty using a panel data set for 65 developing counties from 1970 through 2008. They employed a two-stage least square and GMM. Globalization has a detrimental and statistically significant impact on poverty in nations with relatively developed financial markets, according to the study. However, globalization's ability to reduce inequality in these economies is

limited. The study also discovered a non-monotonic linkage between income distribution and economic growth of economy, and the government emerges as a prominent role in lowering inequality in developing nations. Ogunyomi, Daisi, and Oluwashikemi (2013) investigated the impact of globalization on income inequality and economic growth in Nigeria for a specified period 1986-2010. Using the ordinary least squares (OLS) method, the findings demonstrate that economic globalization has resulted in increasing income disparity and lower Nigeria's economic growth due to a focus on financial globalization and other macroeconomic imbalances rather than trade globalization.

Literature also provides that the conflicting outcomes are linked to modeling choices and level of openness as well as sources of poverty (see Santos-Paulino, 2012; Adigbokhan, 2008; Nwokoye *et al.,* 2019). Santos-Paulino (2012), for example, suggested via a meta-analysis that the influence of globalization on poverty reduction has been unequal. The findings in the literature, however, are susceptible to modelling choices. Trade openness raises overall welfare, but the advantages are insignificant and unequally distributed. The welfare effects are mostly measured through price changes, with a special emphasis on the influence on the relative demand for domestic factors of production and, in particular, the demand for skilled versus unskilled labour. According to the research, poverty restrictions stem from a variety of sources, including infrastructure, skills, insufficient markets, and policy. While Nwokoye *et al.* (2019) examined the income inequality effects of globalization in Nigeria using quarterly data from 1985 to 2015 in a Stolper-Samuelson framework. Using Johansen's cointegration and error correction model, the study found that globalization, technology, and foreign direct investment significantly increased income inequality. At the same time, productivity reduced income inequality in Nigeria in the long run. Literature also provides information on the empirical investigations on the effects of globalization on poverty (see Ogunyomi et al., 2013; Okungbowa and Eburajolo, 2014; Adebisi and Muyiwa, 2015), as well as the relationship between income inequality and poverty in Nigeria (Ogbeide and Agu, 2015; Adigbokhan, 2008). However, studies have not shown if trade openness can moderate the adverse effects of income inequality on poverty in developing countries like Nigeria. Hence, the study investigates the relationship between trade, inequality, and poverty in Nigeria over the period 1981-2019.

RESEARCH METHOD
Model specification and estimation strategy
This study adopts and transforms the model of Aisien (2007) and Waamene (2010) to examine the relationship between trade openness, income inequality, and poverty in Nigeria. The model specifies the poverty rate as a function of a vector of trade openness and income inequality. Thus, the equation is stated functionally as:

$$POV = f(GLOB, GINI) \qquad\qquad (1)$$

Where: *POV* is poverty rate; *GLOB* is a vector of globalization, i.e., trade openness measured by trade as a ratio of GDP, and financial openness measured by foreign direct investment to GDP; *GINI* is Gini coefficient as a measure of inequality. In mathematical form, it becomes:

$$POV_t = \alpha_0 + \text{B}'GLOB_t + \beta_1 GINI_t + \mu_t \tag{2}$$

The variables remain as defined; B' is a vector of the parameters of trade openness; α_0, β_1 are parameters; t is time; μ is an error term. The empirical model for poverty uses the absolute poverty indicator and trade openness variables. Poverty is the dependent variable, and it is intricately linked to income disparity. Furthermore, poverty may have an impact on the economy due to the likelihood of falling into a poverty trap. The study considers another essential variable, government spending and financial credit to the private sector to GDP, which are essential factors that affect the poverty rate. Introducing the variable into equation (1), it becomes:

$$POV_t = \alpha_o + \text{B}'GLOB_t + \beta_1 GINI_t + \beta_2 GEXP_t + \beta_3 FCPS_t + \beta_4 FININT_t + \mu_t \tag{3}$$

Where *GEXP* is government expenditure to GDP; FCPS is financial credit to the private sector to GDP; B' is a vector of the parameters of globalization; FININT is the financial integration; α_0, β_{1-3} are parameters; t is time; μ is the error term. The model equation (3) was to re-specify to gauge the interactive effect of trade openness and inequality on poverty rate as below:

$$POV_t = \alpha_0 + \text{B}'GLOB_t + \beta_1 GINI + \Pi'GLOB_t \times GINI + \beta_2 GEXP_t + \beta_3 FCPS_t + \mu_t \tag{4}$$

Where *GLOB×GINI* is an interactive term of trade openness and inequality; β' and $\prod'$ are vectors of trade openness and its interactive terms respectively; a_0, β_1 to β_3 are parameters; t is time; μ is error term. The study employed the autoregressive distributed lag (ARDL) estimation technique to examine the impact of trade openness on the poverty rate. Also, it is used to investigate the impact of the interaction impact of trade openness and inequality on the poverty rate in Nigeria. The ARDL methodology is preferred because it computed both the short and long-run estimates of the model. This methodology was developed by Pesaran and Shin (1999) and Pesaran *et al.* (2001). The study structure the ARDL model as:

$$\Delta POV_t = \alpha_0 + \sum_{i=1}^{p} \beta_i POV_{t-i} + \sum_{j=0}^{q} \beta_{0i}\Delta GLOB_{t-j} + \sum_{j=0}^{q} \beta_{1i}\Delta RGDP_{t-j} +$$
$$\sum_{j=0}^{q} \beta_{2i}\Delta GEXP_{t-j} + \sum_{j=0}^{q} \beta_{3i}\Delta FCPS_{t-j} + \sum_{j=0}^{q} \beta_{4i}\Delta EDU_{t-j} + \sum_{j=0}^{q} \beta_{5i} FININT_{t-j} +$$

$$\delta_1 POV_{t-1} + \delta_2 GLOB_{t-1} + \delta_3 RGDP_{t-1} + \delta_4 GEXP_{t-1} + \delta_5 FCPS_{t-1} + \delta_6 EDU_{t-1} + \delta_7 FININT_{t-1} + \mu_t \tag{5}$$

All variables remain as earlier described in the study. $\delta_1 - \delta_7$ are parameters for the long-run relationship between POV and the explanatory variables while $\beta_{0i} - \beta_{5i}$ are parameters for the short-run relationship between POV and the explanatory variables. The moderating impact of trade openness and inequality on poverty rate was captured in equation (6) below as:

$$\Delta POV_t = \alpha_0 + \sum_{i=1}^{p} \beta_i POV_{t-i} + \sum_{j=0}^{q} \beta_{0i} \Delta GLOB * GINI_{t-j} + \sum_{j=0}^{q} \beta_{1i} \Delta RGDP_{t-j} + \sum_{j=0}^{q} \beta_{2i} \Delta GEXP_{t-j} + \sum_{j=0}^{q} \beta_{3i} \Delta FCPS_{t-j} + \sum_{j=0}^{q} \beta_{4i} \Delta EDU_{t-j} + \sum_{j=0}^{q} \beta_{5i} FININT_{t-j} + \delta_1 POV_{t-1} + \delta_2 GLOB * GINI_{t-1} + \delta_3 RGDP_{t-1} + \delta_4 GEXP_{t-1} + \delta_5 FCPS_{t-1} + \delta_6 EDU_{t-1} + \delta_7 FININT_{t-1} + \mu_t \tag{6}$$

However, the relationship between trade openness and inequality and between trade openness and the poverty rate is expected to be negative. Suppose there is an inflow of trade and foreign direct investment into an economy. It is expected to improve economic activities as there is a high tendency of more income inflow, thereby reducing inequality and poverty level. Similarly, high financial credit to the private sector is also expected to link inequality and poverty negatively. Similarly, government expenditure is also expected to reduce inequality and the poverty rate. Also, income growth is expected to have a negative relationship with inequality. As income increases, there are chances of reduction in information asymmetry, leading to a fall in income inequality and poverty.

Data Sources and Measurement
The study used yearly data for a period of 39 years from 1981 to 2019. The key variables of interest in this paper are income inequality, poverty rate, and trade openness. Income inequality is gauged by the Gini coefficient index, which is a scale from 0 to 100. Data on the Gini coefficient index were sourced from the Standardized world inequality database. However, the definitions and methodologies for estimating the Gini index are similar among these studies (Lecuna, 2019; Mocan, 1999; Ogede, 2020). In general, approaches to estimating trade openness differ greatly across studies. However, this study defines it as a trade balance expressed as a percentage of the GDP (GLOB) following the work of Ogede (2004), Ogwumike et al. (2018), and Maku, Adesoye, Babasanya & Adelowokan (2018). Poverty rate (POV) is also explored and defined as the bottom 50% share of pre-tax national income. The literature on the determining factor of income inequality, poverty and trade openness is massive, and therefore the inclusion of control variables should not be overstated. The study uses government expenditure (GEXP) as a percentage of government expenditure to GDP. Financial capital to the private sector (FCPS) is sourced from the world development

indicator, and it is used to gauge the impact of financial development. It is explored as a percentage of financial capital to the private sector to GDP.

The study uses secondary school enrolment to gauge the institutional effect of good education on inequality. Conflicting outcomes on the effect of education on inequality have been found in empirical literature (see Acemoglu, 2002; Lemieux, 2006; among others). The study also explores foreign direct investment to gauge the impact of financial integration. The foreign direct investment variable is sourced from World Development Indicator (WDI). The Real Gross Domestic Product (RGDP) employed was sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin. However, the variables used, including their measurement and the source, are presented in Table 1.

Table 1. Variable measurement, definition, and sources

Variable (s)	Measurement	Source
Income Inequality (GINI)	Index	Standardized world inequality database
Trade Globalisation (GLOB)	(Import + Export)/RGDP	CBN Statistical Bulletin
Government Expenditure (GEXP)	% GDP	CBN Statistical Bulletin
Financial capital to the private sector (FCPS)	% of GDP	World Development Indicator(WDI)
Poverty rate (POV)	Rate	World Inequality Database
Foreign Direct Investment FINITE)	% of GDP	World Development Indicator (WDI)
Real Gross Domestic Product (RGDP)	Constant 2010 prices in Billions of Naira	CBN Statistical Bulletin
Education (EDU)	% of gross enrolment	World Development Indicator (WDI)

RESULT AND DISCUSSION

This section discusses the empirical findings on income inequality, poverty, and trade openness nexus. Table 2 presents the descriptive statistics and statistical features of the series under consideration. The Table shows that the mean for GINI is not too far apart from its maximum and minimum values. This shows that the series has likely not suffered in terms of the variability within the period under review. The series is not normally distributed, given that the probability of its Jarque-Bera (J-B) test is less than 0.05. The series is negatively skewed while having a leptokurtic kurtosis, given that it is greater than 3.

Table 2. Descriptive Statistics

	GII	POV	FDI	FCPS	GLOB	EDU	GEXP	RGDP
Mean	37.903	0.140	1.553	9.210	16.951	22.261	3.726	34690.67
Median	43.500	0.139	1.159	8.169	11.247	25.178	2.091	23688.28
Maximum	44.000	0.167	5.791	19.626	56.534	56.205	9.448	71387.83
Minimum	0.000	0.120	0.257	4.958	0.098	0.000	0.911	13779.26
Std. Dev.	14.728	0.012	1.234	3.556	16.678	17.826	2.838	20237.78

Skewness	-2.223	0.584	1.738	1.195	0.609	-0.071	0.795	0.674
Kurtosis	5.942	2.937	6.070	3.999	2.115	1.725	2.166	1.882
Jarque-Bera	46.169	2. 580	34.9578	10.902	3.679	2.674	5.241	4.986
Probability	0.000	0.328	0.000	0.004	0.158	0.263	0.073	0.083

Interestingly, the result for POV also shows that the mean, maximum and minimum values are close. The series is positively skewed and platykurtic. Its J-B statistic shows that the model is normally distributed. On FDI, results show that the maximum value is larger than the mean value, pointing to possible fluctuations in the series. The series is positively skewed and is leptokurtic. The Jarque-Bera test indicates that the series is not normally distributed. FCPS is shown to have a maximum of about 20% of GDP while its mean value is shown as 9.2%. The series is positively skewed with a leptokurtic kurtosis while not normally distributed. The GLOB series is shown to have a maximum value quite more than the minimum value. The series has a platykurtic kurtosis, which is positively skewed and normally distributed. EDU is seen to have a mean more than twice lower than its maximum value suggesting that secondary enrolment in Nigeria has suffered several episodes of fluctuations. The series is negatively skewed with a platykurtic kurtosis and is normally distributed. GEXP and RGDP both have maximum values that are larger than the mean values. These series are positively skewed, normally distributed, and possess platykurtic kurtosis. The correlation matrix is reported in table 3. It provides the level and extent of the direction of the relationship among the variables.

Table 3. Correlation Matrix

	POV	GINI	EDU	FCPS	FDI	GEXP	GLOB	LRGDP
POV	1	-0.399	0.198	0.246	-0.521	0.258	0.501	0.477
GINI		1	0.076	0.215	0.370	0.121	0.119	0.257
EDU			1	0.459	-0.042	0.619	0.374	0.405
FCPS				1	0.114	0.839	0.726	0.783
FDI					1	0.084	-0.039	0.012
GEXP						1	0.835	0.807
GLOB							1	0.952
LRGDP								1

Stationarity and cointegration test results

Table 4 shows the results of the stationary test utilizing the augmented Dickey-Fuller (ADF) tests. The results of the variables' stationarity tests are presented at both levels and first difference. After establishing the stationarity level of our variables, we use the ARDL bound test to determine whether there is a long-run relation between the variables and estimate both the short-run and long-run estimates of our parameters.

Table 4. Augmented Dickey-Fuller (ADF) unit root test

Variable(s)	Level			First Difference			Stationary Status
	None	Constant	Constant and trend	None	Constant	Constant and trend	
POV	0.187	-2.274	-2.717	-2.151**	-3.956**	-5.311***	I(1)
GINI	-0.733	-2.380	-1.379	-4.243***	-4.127***	-4.867***	I(1)
EDU	-1.511	-2.265	-2.169	-7.628***	-7.538***	-7.506***	I(1)
FCPS	0.471	-2.255	-4.097**	-5.691***	-5.732***	-5.638***	I(1)
FDI	- 2.130**	-3.933***	-3.851***	-8.133***	-8.019***	-7.973***	I(0)
GEXP	-0.176	-1.113	-2.855	-5.728***	-5.697***	-5.617***	I(1)
GLOB	2.050	0.764	-2.541	-3.952***	-4.355**	-4.549**	I(1)
LRGDP	2.526	-0.097	-2.403	-2.158**	-3.434**	-3.352*	I(1)

Note: "***", "**" and "*" indicate significance at 1%, 5% and 10% respectively

Empirical Results

Table 5 shows the results of the ARDL bound tests for establishing the long-run relationship among the variables using the Akaike Information Criterion (AIC) to automatically determine the lag time. The crucial bounds were selected using the values suggested by Pesaran et al. (2001) for the restricted intercept and no trend. The hypothesis was evaluated using F-statistics at k = 5 against the critical bound values at various significance levels. Table 5 displays the results of the ARDL bound test, which show that the F-statistic values are greater than the critical values at the upper bound levels. Consequently, we reject the null hypothesis of no cointegration for the four models at the 1%, 5%, and 10% levels. As a result, it confirms an established and one-of-a-kind long-term relationship between 1981 and 2019. We calculated both the short-run and long-run parameters, which are shown in Table 6, based on the confirmation of a stable long-run relationship among the estimated variables.

Table 5. ARDL bounds test result for Cointegration

Dependent variable		Functions			*F*-statistics	
Poverty					3.968685	
	10%		**5%**		**1%**	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Critical bound values	2.26	3.35	2.62	3.79	3.41	4.68

A quick review of the empirical results on the effect of trade globalization on poverty in Nigeria presented in Table 6 reveals that, in the short run, trade openness exerts a positive effect on poverty. That is, the more the trade openness in Nigeria, the higher the rate of poverty. More precisely, poverty rises by about 0.00069 percent, following a rise in openness by about 1 percent. This relationship is not statistically significant given that the t-statistics of the coefficient of credit to the private sector is greater than the 0.05 threshold for this study. However, the lagged

effect (by one year) of trade openness on poverty is negative. That is, for every 1 percent rise in trade openness in the previous year, the current poverty rate will decline by 0.0002. This relationship is statistically significant at the 0.05 level of significance. The long-run effect of trade openness on poverty in Nigeria remained positive and statistically not significant. The control variables have different short-run and long-run. In the short run, inequality exerted a positive effect on poverty, such that the higher the inequality, the more the rate of poverty. All things being held constant, a rise in inequality by 1 percent will induce about 0.00002 falls in the poverty rate. This effect is not statistically significant given that the t-statistics of the coefficient of inequality is greater than the 0.05 threshold for this study. In the long run, however, poverty falls with rising inequality. That is, *ceteris paribus*, a rise in inequality by 1, in the long run, will lead to about a 0.005 percent fall in the poverty rate.

Additionally, a rise in government expenditure by 1 percent induces about a 0.0003 percent fall in the poverty rate in the short run. This relationship is not statistically significant at the 0.05 level of significance. The long-run effect of government expenditure on the poverty rate is similar to the short-run effect. From the results, credit to the private sector is negatively related to poverty in the short run. *Ceteris Paribus,* a rise in credit to the private sector by 1 percent in the short-run will lead to about 0.0004 percent decline in the poverty rate. This short-run relationship is statistically significant given that the t-statistics of the coefficient of credit to the private sector is less than the 0.05 threshold for this study. The effect, in the long run, becomes positive and statistically not significant. Finally, financial integration was found to exert a positive effect on poverty in the short run. From the results, a 1 percent rise in financial integration will induce about 0.0003 percent decline in the poverty rate. However, this effect is not statistically significant given that the t-stat of the coefficient of financial integration is greater than the 0.05 level allowable for this study. The long-run effect of financial integration is similar to the short-run effect. The results show that about 14 percent of the previous equilibrium level will be recovered, given a shock to the system.

Furthermore, the adjusted R^2 of the model shows that the model has a good fit given that the independent variables explain about 99 percent of variations in inequality. Furthermore, the probability value of F-statistics for joint significance of the independent variables' effect on inequality shows that their effects are jointly significant given that the probability value of the F-statistics is less than the 0.05 threshold for this study. The Breusch-Pagan-Godfrey Heteroskedasticity Test shows that the F-statistics is greater than the 0.05 allowed for this study. We then conclude that the residual term of the model does not suffer from heteroscedasticity, and the result also affirms using the normality and Breusch-Godfrey Serial Correlation LM Tests.

Table 6. ARDL Short and long-run estimates

Ordinary Model Estimate			Interactive model Estimate		
Variable	Coefficient	Std. Error	Variable	Coefficient	Std. Error
Short-Run Estimates					
D(POV(-1))	0.63166***	0.1177	D(POV(-1))	0.64823***	0.1134
D(GLOB)	0.00006	0.0001	D(GLOB)	0.00004	0.0000
D(GLOB(-1))	-0.00017***	0.0001	D(GINI)	-0.000002	0.0000
D(GINI)	0.00001	0.0000	D(GLOB)*(GINI)	0.000001**	0.0000
D(GEXP)	-0.00028	0.0003	D(GEXP)	-0.00032	0.0004
D(FCPS)	-0.00035**	0.0002	D(FCPS)	-0.000208	0.0002
D(FDI)	0.00027	0.0002	Break$_{2007}$	-0.001205	0.0016
Break$_{1986}$	-0.00036	0.0015	Break$_{2012}$	0.00313**	0.0013
Break$_{1995}$	0.00093	0.0008			
Break$_{2013}$	0.00209*	0.0011			
ECT(-1)	-0.15051***	0.0382	ECT(-1)	-0.1621***	0.0305
Long-Run Estimates					
GLOB	0.00069*	0.0004	GLOB	0.000236	0.0002
GINI	-0.00046*	0.0002	GINI	-0.0005***	0.0001
GEXP	-0.00187	0.0018	(GLOB)*(GINI)	0.00001**	0.0000
FCPS	0.00017	0.0009	GEXP	-0.00199	0.0023
FDI	0.00182	0.0015	FCPS	0.00172*	0.0010
break$_{1986}$	-0.00239	0.0098	Break$_{2007}$	-0.00743	0.0099
Break$_{1995}$	0.00620	0.0055	Break$_{2012}$	0.01929***	0.0066
Break$_{2013}$	0.01389**	0.0059			
Constant	0.14729***	0.0064	C	0.14075***	0.0062
Adj. R^2	0.99		Adj. R^2	0.99	
F-stat	283.181***		F-stat	308.37***	
Models' diagnostic and stability test					
Normality test	2.8101	{0.2453}	Normality test	1.3872	{0.4997}
Serial correlation	2.30087	{0.0866}	Serial correlation	1.19734	{0.3201}
Heteroskedasticity test	0.72046	{0.7334}	Heteroskedasticity test	0.127803	{0.7229}
ECT(-1)	-0.15051***	0.038172	ECT(-1)	-0.1621***	0.030501

*** ,** and * represent statistical significance level at 1%, 5% and 10%, respectively.

The values in parenthesis "{ }" reveal the non-acceptance of the null hypothesis at a 5% level.

The empirical results of the interactive effect of trade openness and inequality on poverty in Nigeria are also reported in Table 6. The findings show that, in short, the interaction of trade openness and inequality is positive. In this

model, the short-run effect of trade openness alone is positive; that is, the more Nigeria opens its border for trade, the more the poverty rate. All things being equal, a rise in trade openness by 1 percent will cause an increase in poverty by 0.0004 percent. However, this relationship is not statistically significant, given that the coefficient of the t-statistics of the variable is more significant than the 0.05 level allowable for this study.

On the other hand, inequality has a negative relationship with poverty. That is, the higher the inequality, the lower the poverty rate. All else equal, a rise in inequality by 1 leads to a fall in the poverty rate by 0.000002 percent. This effect is not statistically significant at the 0.05 level. However, the effect of openness on poverty is positive when it has interacted with inequality. That is, trade openness that is complemented by inequality increases poverty. All else equal, an increase in trade openness by 1 percent leads to a rise in poverty by 0.000007 percent. This relationship is statistically significant given that the t-statistics of the coefficient is less than the 0.05 threshold set for this study. The effects of government expenditure and credit to the private are adverse. By implication, it is rising government expenditure and credit to the private sector to reduce the poverty rate. However, this relationship is found not to be statistically significant at the 0.05 level, given that the t-statistics of their coefficients are greater than the 0.05 level set for this study.

Besides, in the long run, trade openness and inequality on their own follow the effect found in the short run, except that on its own in the long run, the negative effect of inequality is statistically significant. The effect of trade openness on the poverty rate in Nigeria, when complemented with inequality, remains positive and statistically significant in the long run. Finally, in the long run, the effect of government expenditure on the poverty rate remains negative and statistically not significant. On the contrary, in the long run, financial credit to the private sector turns positive but still statistically insignificant. In the long run, more credit to the private sector increases the poverty rate in Nigeria. The error correction term indicates that only about 16 percent of disequilibrium in the series will be recovered in a year, given a shock to the system, showing that the speed of adjustment is slow. At the same time, the adjusted R^2 of the model shows that the model has a good fit. The independent variables explain about 99 percent of variations in the poverty rate.

Furthermore, the probability value of F-statistics for joint significance of the independent variables' effect on inequality shows that their effects are jointly significant given that the probability value of the F-statistics is less than the 0.05 threshold for this study. The post-estimation findings also suggest that the residual term of the model does not suffer from heteroscedasticity. At the same time, the normality and Breusch-Godfrey Serial Correlation LM Tests confirm normality and non-existence of serial correlation, respectively.

Discussion of Findings

The relationship among these variables is a short-run phenomenon. There is no long-run association between them, suggesting that trade openness cannot be relied upon to drive down inequality in the long term. Its short-run effect is also insignificant. As seen in the model, the relationship between trade openness and inequality may not be cointegrated in the long run because it should be in an interactive relationship with trade openness.

Nevertheless, the findings here are consistent with that of Bukhari and Munir (2016), who found that trade openness reduced poverty in selected Asian countries. It is interesting that while trade openness does not have a long-run relationship with inequality, it does with poverty. However, while the contemporaneous short-run effect of trade openness drives up poverty, its lag drives it down significantly. The result indicates that the poverty reduction in the present period is affected more by trade openness in the previous period. This is an important observation as it points to the lack of protection from the adverse effects that the poor face when the economy's trade is exposed to the rest of the world turns positive with time. Opponents of trade openness, unlike the findings in this study, often cite its poverty increasing tendency, especially if the trading sector is capital intensive, which leaves lots of labour unemployed and poor, for example (Rahim *et al.,* 2014), even if others benefit significantly in an economy like Nigeria. The findings here about the short-run poverty reduction effect of trade openness agree with the findings by Maku, Adesoye, Baabsanya, and Adelowokan (2018). Perhaps the poverty-reducing capacity of trade openness in Nigeria may come from its developing financial institutions, which Goff and Singh (2014) posited as a crucial determinant of the poverty-reducing capacity of trade openness.

Trade openness has a short-run increasing effect on poverty when it interacts with inequality. It had earlier been found that trade openness reduced poverty. However, in the presence of inequality, that effectively breaks down in the short run. The findings are be expected given that inequality is not a state of affairs that reduces poverty; hence, the interaction of inequality and trade openness dampens the effect of trade openness on poverty. This effect is robust for the long run, where the interaction effect of inequality and trade openness reverses the earlier poverty reduction effect of trade openness. The results further demonstrate that if poverty in Nigeria will be reduced by trade openness, it has to be accompanied by attempts to reduce inequality. Findings in this study are close to that of MacDonald and Majeed (2012), who found a negative effect of globalization on poverty in 65 developing countries. It has been established that this negative effect may result from the presence of inequality interacting with trade openness.

CONCLUSION

The current study examines the trade openness on income inequality and poverty in Nigeria between 1981 and 2019 using ARDL methodology. Our findings

show that trade openness had different effects on inequality and poverty in Nigeria in the short and long run. While its relationship with inequality is a short-run phenomenon, it had a long-run relationship with poverty. Overall, trade openness had a declining effect on inequality and poverty. In the former, its effect was not statistically significant. However, the gains of trade openness on inequality and poverty were reversed when inequality influenced trade openness. In essence, with the influence of inequality, trade openness had an increasing effect on poverty.

This study, therefore, offers some recommendations that will help policymakers. First, provide a policy framework that ensures Nigerian trade interacts with the rest of the world. Evidence from this study has suggested that policies such as restricting trade through border closures must not feature as a policy option as long as one of the goals of the economy is poverty reduction and reduction in inequality. Generally, results on the effects of trade openness on poverty and inequality show that trade openness reduces both inequality and poverty. Given the findings that trade openness does not have an immediate effect on poverty reduction, as reported in the short run, the need to push back on more restrictive trade policies in Nigeria should be taken seriously, given that its effects take time to materialize. The government must ensure that the tradeable sectors are expanded to ensure that industries with more labour-intensive input are supported. Income inequality is made more pronounced when the tradeable sectors are mostly capital intensive, as seen in the impact of trade openness on income inequality. Lastly, policymakers strive to expand the tradeable sectors to allow for more globally integrated trade. Findings from this study have shown that that should be pursued to reduce inequality since inequality drags down the declining poverty effect of trade openness as seen in the interaction effect of trade openness and inequality on poverty.

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