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Poverty Reduction and Economic Development in Nigeria

Kolapo, Funso. T. (Ph.D)
Ekiti State University
Department of Finance and Department of Business Administration

Adeleke, Kareem. O (Ph.D)
Federal Polytechnic, Ado-Ekiti

Edewusi, Damilola G. (Ph.D)
Ekiti State University
Department of Finance and Department of Business Administration

ABSTRACT

Extant literature shows that the incidence of poverty is one of the biggest threats to human development, however, not many studies have acknowledged the important role of financial development and access to internet services in reducing the incidence of poverty to enhance economic development. Therefore, this study examined the relationship between poverty reduction and economic development in Nigeria using data for the period of 2003Q1 to 2019Q4. The data for this study is collected from the United Nations Human Development Reports and the World Bank's World Development Indicators Database. Using the Autoregressive Distributed Lag Model-Error Correction Modelling (ARDL-ECM) estimator, the results of the ARDL long-run estimates showed that poverty reduction, financial development, economic growth, trade openness, and the internet had positive and significant effects on human development. Furthermore, urbanisation had a negative but non-significant effect on human development, indicating a negative coefficient and exact p-value of 0.064735 and 0.8221. Meanwhile, the results of the ARDL short-run estimates except for urbanisation are consistent with the long-run results. Besides, the Error Correction Model (ECM), which indicates the speed of adjustment back to long-run equilibrium level after a short-run disturbance, showed a coefficient which is negative (-0.145327) and significant at 1% level of significance, implying that about 15% of any disequilibrium in the short-run is adjusted back to the long-run equilibrium in each quarter. Based on the long-run estimates, the study concludes that poverty reduction is important for economic development in Nigeria. It is, therefore, recommended that the poverty reduction strategies of the Nigerian government should not be pursued in isolation but rather in connection with access to financial and internet services, among other things.

INTRODUCTION

Poverty is a global issue, and no country in the world is free from it. However, the level and severity of poverty vary across the world. Moreso, many countries, particularly the developing nations, are caught up in the web of abject poverty, such that countries of the United Nations seek to tackle poverty. However, remarkable success has been recorded; none of these countries have eradicated poverty.

The incidence of poverty is prominent in most African countries. For instance, poverty in Nigeria affects about 67% of the population who have no sufficient means of supporting their families (World Bank, 2018a). Poverty exists when the people of a particular society could not achieve a specified welfare level accepted as a minimum standard of that society (Ravallion, 2017). Poverty is a threat to the big and central goal of economic development for any economy. To break out of poverty, there is the need to improve the standard of living, and this can be achieved through investments in human capital, improved health care facilities, and better education, all of which are important to enhance economic development (Ijaz, 2018).

Economic development in Nigeria, particularly in the area of human development, has not been encouraging because Nigeria has recorded a low human development index (HDI) over the years and figures which are comparably low to the high HDI for other African countries such as Libya, Mauritius, Algeria, and Tunisia. For instance, from 2009 to 2010, Nigeria's HDI dropped from 0.490 to 0.484; it increases to 0.512 in 2012 and has managed to increase to 0.532 in 2017. However, despite the low increase, human development in Nigeria compared to its African neighbour and other emerging economies is disappointing because the country is placed at 157th among 189 countries in the world (Human Development Report, 2018). The low HDI in Nigeria can be attributed to the low quality of human life, high deprivation, and poverty among rural and urban households. Moreso, poverty has become severe in Nigeria due to higher costs of living, greater vulnerability to changes in income, and exposure to environmental hazards.

Literature shows that financial development will potentially play a crucial role in enabling the poor and vulnerable to access financial services such as credit and insurance risk services or even broaden their access to such services because it will strengthen the productive assets of the poor, boost their productivity and increase their chances of achieving a sustainable livelihood (for instance, Jalilian & Kirkpatrick, 2002; Kirkpatrick & Green, 2002). Moreso, the local financial sector's development can contribute directly to poverty reduction by improving the deposits and credit facilities available for the poor and ensuring optimal allocation of resources among them. However, the poor and vulnerable's ability to effectively utilise such domestic resources are crucial for enhancing economic growth and reducing poverty (Bayar, 2017; Boukhatem, 2016). The indicators of financial development in Nigeria have recorded significant growth in the last few decades. For instance, private credit to GDP has grown from 5.9% in 1981 to 20.8% in 2016 (CBN, 2017), whereas the poverty level has not recorded significant improvement. According to the World Bank (2018) Report, the number of people living in poverty has risen to 86.3 million, and this is about 50% of the Nigerian populace. The high cost of accessing loans from banks is responsible for unfelt impact of financial development on the poverty level (Olohunlana & Dauda, 2019).

On the empirical front, most studies on the relationship between financial development, poverty reduction, and economic development have been based on cross-sectional evidence, whereas only a few studies have applied time-series data and techniques in investigating the relative strengths of the financial sector towards poverty reduction and the extent to which this promotes economic development. At the same time, such a relationship is mainly underexplored in Nigeria. Most studies in Nigeria either concentrated on how financial development and economic growth affect poverty reduction (for instance, Aye, 2013; Dandume, 2014; Oloyede, 2014). These studies have ignored important factors such as access to financial and internet services, which can reduce poverty level and, improve economic development.

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Using time-series data from 2003 to 2019, this study focused on the relationship between economic development and poverty reduction in Nigeria while integrating the role of financial development in such a relationship. Moreso, in the modern globalised world, the importance of information and communication technology (ICT) captured using the internet cannot be ignored for sustainable human development (Khan *et al.*, 2019). Therefore, this study contributes to the existing body of knowledge by filling the identified gaps.

This study's broad objective is to examine the relationship between poverty reduction and economic development in Nigeria over the period 2003Q1 to 2019Q4.

LITERATURE REVIEW

Conceptual Discussion

Poverty itself is defined as a situation where income is not sufficient to meet a minimum standard of living. However, extreme poverty is defined as living with per capita household consumption below 1.90 international dollars per day (2011, PPP prices). Poverty is defined as the incapacity to afford a basic minimum satisfactory consumer utility level (Janjua & Kemal, 2011). The World Bank describes poverty as "the inability to attain a minimal standard of living" gauged relative to their basic consumption needs (World Bank, 1990). Poverty can be classified as primary or secondary: Primary poverty is defined as the difficulty or impossibility of meeting one's basic needs such as nutrition and housing by way of income, while secondary poverty is defined as when, even if their earnings are sufficient to meet their basic needs, the poor and vulnerable cannot do so for reasons other than those linked to income (Pinzani & Rego, 2019). Consistent with the definition of poverty by the World Bank (1990), this study used households and non-profit institutions serving households (NPISHs) final consumption expenditure per capita growth to measure poverty reduction (Uddin *et al.,* 2014).

On the other hand, financial development is a multi-faceted concept capturing various aspects of the financial sector, including its depth, access, efficiency, and stability (World Bank, 2014). However, this study refers to financial development as the ability to improve the opportunities for the poor and low-level income groups to access formal finance by reducing the cost associated with lending to small borrowers; this can also reduce poverty. A well-functioning financial system can enable the poor to access financial services; hence the poor can achieve a sustainable livelihood by investing the financial resources productively. Thus, this hstudy adopts domestic credit to the private sector (percent of GDP) as the proxy for financial development, as Beck, Demirgüç-Kunt, and Levine (2004) frequently used. Economic development is a multivariate concept; hence there is no single satisfactory explanation for it. Economic development is a process where low-income national economies are transformed into modern industrial economies. Long-term and high rates of economic growth is an essential condition for achieving economic development. According to Lopez and Servén (2009), economic development cannot be achieved without addressing the constraints affecting the people living in extreme poverty. It involves qualitative and quantitative improvements in a country's economy. Political and social transformations are also included in the concept of economic development in addition to economic changes.

THEORETICAL REVIEW

This study hinges the relationship between poverty reduction and economic development on the trickle-up theory of economic development, explaining the channels through which poverty

reduction can affect economic development. The theory developed by Todaro (1997) expresses that poverty is reinforcing and self-sustaining in nature, thus obstructing poor people from contributing to economic development (Ijaz, 2018). Furthermore, a country will be able to harvest economic development only by setting the goal of reducing poverty because of its resultant effect for increased economic growth, which would trickle-up to the middle-class and affluent class (Nindi & Odhiambo, 2015). The trickle-up theory asserts that there are reinforcing factors such as limited access to financial and internet services that maintain poverty amongst the poor population and impede them from contributing to economic development. These aforestated factors put the poor in the vicious cycle of poverty, and if the masses are poor, the country will experience slowed economic growth (Nindi & Odhiambo, 2015). The theory suggests that poor countries can enhance economic development by formulating economic policies that target and alleviate poverty, mainly by boosting the living standards of disadvantaged people who are an important contributor to economic development.

EMPIRICAL REVIEW

Dreze and Sen (2002) examined the effect of a steady reduction of poverty on India's economic development. The study found that poverty reduction is followed by a better standard of living and economic growth, thus giving rise to economic development. Lopez and Servén (2009) studied the relationship between poverty and economic growth in 85 countries using data from 1960 to 2000. The results of the dynamic generalised method of moments (GMM) estimator revealed that poverty had a significant and negative effect on economic growth, which is an important factor behind economic development. Bello *et al.* (2009) investigated government programmes towards poverty alleviation on economic development in Nigeria. Using qualitative and quantitative methods, the study showed that government poverty reduction programmes positively impact economic development.

Seetanah *et al.* (2009) studied the role of infrastructure in alleviating poverty in 20 developing countries from 1980 to 2005. Applying the GMM estimator, the results showed that infrastructure crucial in curbing poverty since it provides easy access to resources and services, thus promoting economic development. Ijaiya, Ijaiya, Bello, and Ajayi (2011) examined the impact of Nigeria's economic growth on poverty reduction over the period 1980 to 2008. Using multiple regression analysis, the results revealed that the initial economic growth level does not lead to poverty reduction, but an increase in economic growth leads to poverty reduction. Omoniyi (2013) investigated the importance of education in alleviating poverty and thus economic development. The results showed that education matters for building human capital, which plays a crucial role in curbing poverty, thus directly improving the quality of life and economic development.

Oloyede (2014) examined the effect of poverty reduction programmes on economic development in Nigeria over the period 1980 to 2010. Applying the ordinary least square estimator, the results showed that poverty reduction significantly affects economic development in Nigeria. Uddin *et al.* (2014) studied the relationship between financial development, economic growth, and poverty reduction in Bangladesh from 1975 to 2011. Using the ARDL cointegration with structural breaks, the results showed a long-run relationship between financial development, economic growth, and poverty reduction. Furthermore, financial development and poverty reduction accelerate economic growth, but the impact is

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weak. Baghebo and Emmanuel (2015) investigated the impact of poverty alleviation on Nigeria's economic growth over the period 1981 to 2013. Employing the ARDL bounds testing approach to cointegration, the results showed that an increase in government expenditure leads to poverty alleviation, increasing the level of gross domestic product that measures economic growth.

Using the autoregressive distributed lag (ARDL) bounds testing approach to cointegration, Nindi and Odhiambo (2015) examined the causal relationship between poverty reduction and Swaziland's economic growth over the period 1980 to 2011. The results showed that economic growth does not Granger cause poverty reduction in the short- and long-run. However, poverty reduction Granger causes economic growth. Gangas (2017) investigated the relationship between economic growth and poverty reduction in Nigeria from 1980 to 2013. Using the ordinary least square (OLS) estimator, the results showed that poverty reduction harms economic growth. Nakabashi (2018) studied the effects of poverty on economic development across 26 Brazilian States over the period 1980 to 2015. Using the ordinary least square (OLS) estimator with robust standard errors, the results indicated that poverty reduction is crucial in improving economic development. Dewi *et al.* (2018) studied the inter-linkages between financial sector development, economic growth, and poverty reduction in Indonesia from 1980 to 2015. Adopting the ARDL cointegration framework, a long-run relationship exists between the variables. It also showed that unidirectional causality runs from the financial sector to poverty reduction and a bi-directional causality between economic growth and poverty reduction.

Acharyaa and Sadath (2019) examined the how energy poverty can influence economic development in India. Estimating a Multidimensional Energy Poverty Index (MEPI), the results showed that energy poverty is quite extensive in India with substantial variations across the states and districts. Furthermore, the study records a negative relationship between economic development and energy poverty.

Research Gap

The relationship between poverty alleviation and economic development is unclear as most studies are related to economic growth and not economic development. A large strand of studies assessed the effects of economic growth or economic development on poverty reduction (Dewi *et al*., 2018; Uddin *et al.,* 2014). Furthermore, most of the empirical studies in Nigeria have focused on the effect of poverty reduction on economic growth. In contrast, its effect on economic development has not received so much attention. Furthermore, most previous studies that have attempted to examine such relationships have concentrated mainly on Latin American and Asian countries, while African countries received little attention (for instance, Dreze & Sen, 2002; Ijaz, 2018; Nakabashi, 2018). Besides, the few studies that examined the effect of poverty reduction on economic growth or development in Nigeria have ignored the active role of financial development or access to internet services for poverty reduction as it may affect economic development (for instance, Baghebo & Emmanuel, 2015; Bello *et al.,* 2009; Gangas, 2017; Oloyede, 2014).

METHODOLOGY

This study adopts the *ex-post facto* research design to examine the relationship between poverty reduction and Nigeria's economic development. This research design allows data

collection procedures from secondary sources. The data used for this study are sourced from the Human Development Report and the World Bank's Database. This study collects annual data on the human development index, households and non-profit institutions serving households (NPISHs), final consumption expenditure per capita growth, domestic credit to the private sector by banks, real GDP per capita growth rate, urban population growth, the sum of export plus imports expressed as a percentage of GDP, and internet usage over the period 2003 to 2019. This study's period is determined based on data availability, particularly for the human development index, which is only available from 2003. However, this study utilised the simple linear interpolation approach to convert the annual data into quarterly frequency for the period 2003Q1 to 2019Q4. It is necessary to increase the number of periods required for long-run estimations.

Model Specification

This study adopts the model specified in the study of Khan, Ju, and Hassan (2019). The modification to the model was based on the inclusion of poverty reduction and financial sector development measures, which are the main variables in this study.

The model for this study is specified as:

$$HDI = f(POVR, DCPS, GDPG, URB, OPEN, INTERNET) \quad (1)$$

Eq. (1) can be restated in econometric form as:

$$\ln HDI_t = B_0 + \beta_1 POVR_t + \beta_2 \ln DCPS_t + \beta_3 GDPG_t + \beta_4 \ln URB_t + \beta_5 \ln OPEN_t + \beta_6 \ln INTERNET_t + \mu_t \quad (2)$$

where; where HDI is the human development index, POVR is poverty reduction, DCPS is domestic credit to the private sector by banks, GDPG is the economic growth, URB is urbanisation, OPEN is the trade openness, and INTERNET is internet usage. While β_0 is the intercept of the model; β_1- β_6 is the regression coefficients to be estimated; t represents a time dimension, and μ is the stochastic error term. From equation two (2), all of the other variables except HDI and GDPG are estimated in natural logarithmic form because both variables contain negative observations. This study controlled other determinants of the human development index such as economic growth, urbanisation, trade openness, and internet usage as suggested by extant literature.

Estimation Techniques

This study adopts the Autoregressive Distributed Lag Model-Error Correction Modelling (ARDL-ECM) approach over the ordinary least squares (OLS) estimates because OLS produces results which are short-run oriented and may be biased. The ARDL-ECM examines the long-run relationship between the variables and ates both the short-run and long-run effeceffects The ARDL bounds testing approach to cointegration is reliable regardless of whether the series are integrated purely in order of I(0), purely I(1), or where the series are integrated of both order zero I(0) and one I(1). The approach avoids the pre-testing problem associated with integrating variables that standard cointegration techniques encounter (Pesaran, Shin, & Smith, 2001).

Data Sources and Measurements

The period 2003Q1 to 2019Q4 was determined based on data availability on the human development index (HDI). This study adopts households and non-profit institutions serving

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households (NPISHs) final consumption expenditure per capita growth as poverty reduction because there was insufficient data on the poverty headcount ratio at national poverty lines in Nigeria. Moreso, there is a reliable and stable record for poor people's consumption expenditure compared with their income. The study takes a cue from the previous studies of Dhrifi (2015), Odhiambo (2009), Shahbaz and Rehman (2013). The definition and measurements of the variables for this study are as shown in Table 1.

Table 1: Definition of Variables and their Measurements

Variable	Variable Code	Definitions of Variables and their Measurements	Source	Expected Sign	Supporting Studies
Human Development Index	HDI	A composite index comprises three basic human development dimensions, including long and healthy life, knowledge, and a decent standard of living.	Human Development Reports	NA	Ijaz (2018); Khan *et al.* (2019).
Poverty Reduction	POVR	POVR is measured as households and non-profit institutions serving households (NPISHs) final consumption expenditure per capita growth. It is expressed as an annual %.	World Development Indicator Database	$\beta_1 > 0$	Dewi *et al.* (2018); Ho and Iyke (2017); Kheir (2018); Uddin *et al*. (2014).
Financial Sector Development	DCPS	Domestic credit to the private sector (DCPS) refers to financial resources provided to the private sector by deposit-taking institutions. It is a quantity-based measure of financial sector development, which indicates the depth of the financial sector. It is measured as a percentage of GDP.	World Development Indicator Database	$\beta_2 > 0$	Chinweze (2017); Ho and Iyke (2017).
Economic Growth	GDPG	It shows the degree of economic productivity of a country. It is measured as the rate of growth of real GDP per capita.	World Development Indicator Database	$\beta_3 > 0$	Dewi *et al.* (2018); Khan *et al.* (2019); Sehrawat and Giri (2017).
Urbanisation	URB	It represents the living standard of the urban population. It is measured as urban population growth (annual %).	World Development Indicator Database	$\beta_4 > 0$	Khan *et al.* (2019); Khan, Ju, and Hassan (2018).

Trade Openness	OPEN	It refers to the openness of a country to trade with other countries of the world. It is measured as the sum of export plus imports expressed as a percentage of GDP.	World Development Indicator Database	$\beta_5 > 0$	Khan *et al.* (2019); Sehrawat and Giri (2017).
Internet Usage	INTERNET	It refers to the individuals who have used the internet (from any location) in the last three months. It is measured as a percentage of the population.	World Development Indicator Database	$\beta_6 > 0$	Khan *et al.* (2019).

Source: **Adapted from the literature review in section 2.** ***Notes:*** **where $\beta > 0$, it implies that the variable exhibit a positive relationship with the measure of economic development, whereas $\beta < 0$ implies that the variable exhibit a negative relationship with the measure of economic development. NA implies not available**

DATA ESTIMATION AND RESULTS

Summary Statistics

Table 1 shows the summary statistics of the variables in the model specified for this study. Thus, the mean, minimum value, maximum value, and standard deviation of all the underlying variables are shown in the results.

Table 1. Summary Statistics

Statistics	HDI	POVR	DCPS	GDPG	URB	OPEN	INTERNET
Mean	0.495	1.685	13.526	2.782	4.665	36.309	12.957
Maximum	0.533	34.236	22.978	6.692	4.836	59.944	28.619
Minimum	0.432	-21.63	7.128	-4.482	4.286	19.814	0.506
Std. Dev.	0.027	13.244	4.177	2.844	0.171	9.704	8.796
Observations	60	60	60	60	60	60	60

Source: **Author's Computation, (2021).** ***Note:*** **HDI = Human development index, POVR = Poverty reduction, DCPS = Domestic credit to the private sector, GDPG = Gross domestic product per capita growth rate, URB = Urbanisation, OPEN = Trade openness, INTERNET = Internet**

Table 1 reports that HDI has the lowest mean value of 0.495, implying that the human development index is low in Nigeria, therefore corroborating the prevailing incidence of poverty in the country. In contrast, OPEN has the highest mean value of 36.309, and this suggests that Nigeria has continued to further open to trade with the rest of the world because of its perceived development potentials. Furthermore, the HDI has the lowest value of standard deviation (0.027), implying that there are no significant changes in the Variable over the period investigated. Hence, Nigeria ranks low in HDI persistently and the index for Nigeria does not seem to show any fluctuations. POVR has the highest standard deviation value (13.244), suggesting that the poverty reduction strategies of the Nigerian government appear to be effective because the increasing ability of households and other non-profit institutions to increase their consumption expenditure. GDPG deviates rapidly from the mean value of 2.782,

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this implies that output productivity could have fluctuated due to changes in other policy variables such as inflation and exchange rates.

Stationarity Test

The stationarity of variables as well as their order of integration -*I*(d) is determined by performing the augmented Dickey-Fuller (ADF) Unit Root Test developed by Dickey and Fuller (1981). It is important to determine the stationarity of each Variable when dealing with time-series analysis because such variables could be stationary. Thus, the study test the null hypothesis that the variables examined have a unit root.

Table 2. Results of the augmented Dickey-Fuller (ADF) unit root test

Variable	Unit root at level		Unit root at first difference		I(*d*)
	***t* statistic**	***p*-value**	***t* statistic**	***p*-value**	
LnHDI	-2.012396[a]	0.1832	-3.306467[b]	0.0000***	I(1)
POVR	-2.451465[a]	0.0152**	-	-	I(0)
LnDCPS	-2.303414[b]	0.1744	-3.057820[a]	0.0028***	I(1)
GDPG	-4.175443[c]	0.0088***	-	-	I(0)
LnURB	-1.997735[a]	0.0489**	-	-	I(0)
LnOPEN	-2.332717[b]	0.1655	-3.402306[a]	0.0010***	I(1)
LnINTERNET	-7.920252[b]	0.0000***	-	-	I(0)

Source: **Authors' Computation, (2021).** ***Notes:*** **[a], [b] and [c] indicates test equation has no intercept and trend, intercept only, and intercept and trend, respectively, while *** and ** denote the rejection of null hypothesis at *p*<0.01 and *p*< 0.05 significance level, respectively**

Table 2 shows the results of the ADF unit root test conducted to determine the stationarity of the seven variables from the empirical model, such as human development index (HDI), poverty reduction (POVR), domestic credit to the private sector (DCPS), gross domestic product per capita growth rate (GDPG), urbanisation (URB), trade openness (OPEN), internet (INTERNET). From the results, lnHDI, lnDCPS, and lnOPEN are first-difference stationary series which follows the *I*(1) processes at 1% level of significance, POVR and lnURB are level stationary series which follows the *I*(0) processes at 5% significance level whereas GDPG and lnINTERNET are level stationary series which follows *I*(0) processes at 1% level of significance. Meanwhile, the result of the ADF unit root test indicates that the order of integration of the variables is a mixture of *I*(0) and *I*(1) series and there are no I(2) series. Therefore, the Autoregressive Distributed-Lag (ARDL) model is an appropriate technique for determining the likelihood of a long-run relationship between mutually integrated variables. Consequently, the study proceeds to test for the presence of long-run cointegrating relationship among the underlying variables using the Autoregressive Distributed Lag Bounds cointegration approach.

ARDL Bound Testing Approach to Co-integration

The ARDL bounds testing procedure was developed by Pesaran and Shin (1999) and supported by Pesaran *et al.* (2001). It helps to determine the long-run co-integrating relationship among the variables of this study. The optimal lag order of 10 is automatically selected for the ARDL specification based on the Schwarz information criterion (SIC). The null hypothesis of no long-term relationship can be rejected/accepted by comparing upper bound critical values from the ARDL bounds test with the computed *F*-statistics value from the test. Thus, the null hypothesis

will be rejected when the calculated *F*-statistic exceeds the upper bound critical values and accepted if otherwise. However, if the value of the *F*-statistics falls within the critical value band, then the test is inconclusive. The results of the bounds test are reported in Table 3.

Table 3. Results of the ARDL Bounds Test of Cointegration

***F*. stat**	**Asymptotic critical values**	**Lower (I0) bounds**	**Upper (I1) bounds**	**Decision**
23.73277*** (k = 6)	10%	2.12	3.23	Rejection of the null hypothesis of no cointegration
	5%	2.45	3.61	
	1%	3.15	4.43	

Source: Authors' Computation, (2021). Note: * denotes the rejection of null hypothesis at p<0.01 significance level**

The results of the ARDL bounds test in Table 3 indicate that the calculated *F*-statistics value is 23.73277, a figure which is largely higher than the upper critical value of 4.43 and significant at 1% level of significance. Accordingly, the null hypothesis of no long-run cointegrating relationship is hereby rejected, hence the variables exhibit long-run co-movement. By establishing that the variables are co-integrated for the long-run relation, this study presents the long-run and short-run dynamic estimates from the ARDL cointegration technique which is based on Schwarz Information Criteria (SIC) and the optimal lags structure for the underlying ARDL model that minimises the SIC is specified as ARDL (1, 4, 4, 1, 1, 1, 1). This emphasises on the process by which the regressors enter the model.

ARDL Regression Estimates

The variables exhibit a long-run cointegration relationship, hence the model was estimated using the following ARDL specification (1, 4, 4, 1, 1, 1, 1). The results of the ARDL long-run regression estimates are reported in Table 4 as follows:

Table 4. Results of the ARDL Long-run Estimates

Dependent Variable: lnHDI

Variable	**Coefficient**	**Standard error**	***t* statistic**	***p*-value**
POVR	0.002867	0.000959	2.990914	0.0050***
LnDCPS	0.031495	0.015285	2.060550	0.0466**
GDPG	0.032834	0.001823	1.554679	0.0128**
LnURB	-0.064735	0.285873	-0.226447	0.8221
LnOPEN	0.024598	0.002172	1.132061	0.0265**
LnINTERNET	0.056577	0.021473	0.771983	0.0452**
Constant	-0.614285	0.417905	-1.469916	0.1503

***Source:* Authors' Computation, (2021). *Notes*: *** and ** denote the significance of the variables at *p*<0.01 and *p*<0.05 significance levels, respectively. POVR = Poverty reduction, LnDCPS = logged value of domestic credit to the private sector, GDPG = Gross domestic product per capita growth rate, LnURB = logged value of urbanisation, OPEN = logged value of trade openness, INTERNET = logged value of internet**

Table 4 reports the results of the estimated ARDL long-run relationship between the dependent Variable and independent variables. Based on the signs of the variables, the results show that most of the explanatory variables, including poverty reduction (POVR), logged value of domestic credit to the private sector (lnDCPS), gross domestic product per capita growth rate

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(GDPG), logged value of trade openness (lnOPEN), logged value of internet (lnINTERNET) are positively related to the logged value of human development index (lnHDI) as shown by the positively signed coefficient values for each of the variables. Meanwhile, lnURB has a negatively signed coefficient value, implying that a negative relationship exists between lnURB and lnHDI. The independent variables, except lnURB exhibit an expected behaviour with the dependent Variable and in terms of the significance of the variables, all but lnURB are significant in explaining human capital development index as shown by their respective *p*-values.

In terms of the coefficient's magnitude, the long-run estimation shows that a 1 unit increase in POVR will increase lnHDI by 0.2867%, whereas a 1% increase in lnDCPS will cause lnHDI to increase by 0.0315%. Meanwhile, a 1 unit increase in GDPG will spur lnHDI by 3.2834%. A 1% increase in lnURB leads to 0.0647% decrease in lnHDI. Similarly, a 1% increase in lnOPEN leads to 0.0246% increase in lnHDI, whereas a 1% increase in lnINTERNET leads to 0.0566% increase in lnHDI.

A battery of model diagnostics and stability tests were conducted to determine the adequacy of the model specified for this study and, hence, validate the results from the estimations. These model diagnostics and stability tests can suggest whether the short-run and long-run estimates from this study are free from non-normality of the error term, serial correlation, mis-specification of the model, heteroscedasticity, and model instability.

Table 5. Results of the Model Diagnostics and Stability Tests

Test	Instrument	Statistics	Decision
Normality	NA	Jarque Bera (3.45267) *p*-value (0.35930)**	Residuals are normally distributed
Heteroscedasticity	Breusch-Pagan-Godfrey ARCH test	*F*-statistic (0.660117) *p*-value (0.8315)**	No heteroscedasticity
LM Serial correlation	Breusch-Godfrey LM test	*F*-statistic (0.859534) *p*-value (0.4324)**	No serial correlation
Model Specification Error	Ramsey test	*F*-statistic (0.073035) *p*-value (0.7886)**	No specification error
Stability	CUSUM and CUSUM Squared tests	Lies within between critical boundaries at a 5 percent level of significance	No structural change

Source: **Authors' Computation, (2021).** ***Notes:*** **** denotes the non-rejection of the null hypothesis. Also, NA implies not available**

Table 5 shows that there is the absence of higher-order autocorrelation in the model. The Breusch-Pagan-Godfrey test showed that the errors are independent of the independent variables and they are homoskedastic. The model is correctly specified as revealed by the RESET test which shows a non-significant *p*-value. These diagnostic tests are performed to determine the rejection of the null hypothesis by examining the test statistic value of each test and the *p*-value at a 5% level of significance. The cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) tests suggested by Brown, Durbin, and Evans (1975) are used to determine the structural stability of the long-run coefficients. The results showed that the ARDL error correction model is stable since neither the plots of CUSUM nor CUSUMSQ statistics

exceeds the critical bounds of 5% significance level. Thus, the stability tests show that there is no problem of structural change in the model since the plots of the test lie within critical boundaries at the 5 percent level of significance. However, the results of the error correction model (ECM) which allows a variable to be dynamic in the short-run while remaining at equilibrium, in the long-run, are displayed in Table 6.

Table 6. Results of the ARDL Short-run Regression Estimates

Dependent Variable: lnHDI

Variable	Coefficient	Std. error	*t* statistic	*p*-value
Δ(POVR)	0.000366	0.000065	5.586637	0.0000***
Δ(POVR(-1))	0.000002	0.000048	0.033459	0.9735
Δ(POVR(-2))	0.000003	0.000048	0.065518	0.9481
Δ(POVR(-3))	0.000189	0.000053	3.537006	0.0011***
Δ(LOGDCPS)	0.006278	0.007574	0.828934	0.4126
Δ(LOGDCPS(-1))	0.001872	0.011089	0.168796	0.8669
Δ(LOGDCPS(-2))	0.002705	0.011011	0.245654	0.8073
Δ(LOGDCPS(-3))	0.012726	0.006515	1.953200	0.0586*
Δ(GDPG)	0.001618	0.000676	2.394662	0.0220**
Δ(LOGURB)	-5.270561	0.701110	-7.517456	0.0000***
Δ(LOGOPEN)	0.014801	0.006326	2.339832	0.0250**
Δ(LOGINTERNET)	0.033574	0.012571	2.670633	0.0113**
ECM($_{t-1}$)	-0.145327	0.050027	-2.904954	0.0062***
Model Results				
R-squared	0.857			
Adjusted R-squared	0.782			
F-statistics	21.173			
p-value (*F* statistic)	0.000***			
Durbin Watson Stat.	1.946			

Source: **Authors' Computation, (2021).** ***Note:*** *****, **, and * denote the significance of the variables at**
***p*<0.01, *p*<0.05, and *p*<0.1 significance levels, respectively.**
Cointeq = lnHDI - (-0.0029*POVR - 0.0315*lnDCPS + 0.0028*GDPG -0.0647*lnURB + 0.0246*lnOPEN -0.0166*lnINTERNET - 0.6143

Table 6 reveals the results of the ARDL short-run model, it shows that the explanatory variables and their initial values, including [Δ(POVR), Δ(POVR(-1)), Δ(POVR(-2)), Δ(POVR(-3)), Δ(lnDCPS), Δ(lnDCPS(-1)), Δ(lnDCPS(-2)), Δ(lnDCPS(-3)), Δ(GDPG), Δ(lnURB), Δ(lnOPEN), Δ(lnINTERNET)] have positive coefficient values, hence the exhibit positive relationship with logged value of human development index (lnHDI). Meanwhile, Δ(lnURB) has a negatively signed coefficient value, implying a negative relationship between Δ(lnURB) and lnHDI. It is inferred that an increase in any of the independent variables and their lags from the ARDL short-run model will lead to a positive change in lnHDI up to the value of each variable's coefficients whereas only Δ(lnURB) has a negative and significant coefficient value. Furthermore, the results showed that the variables in the short-run estimates except [Δ(POVR(-1)), Δ(POVR(-2)), Δ(lnDCPS), Δ(lnDCPS(-1)), and Δ(lnDCPS(-2))] are significant because their

coefficients are lower than the conventional levels of significance. The value of R-squared and adjusted R-squared were estimated to be 0.857 and 0.782, which implies the model of this study is strongly well-fitted; hence the explanatory power of the independent variables regarding the behaviour of lnHDI is satisfactory. The F-statistics's coefficient value (21.173) has an exact *p*-value of 0.000 implies that the overall significance of the short-run ARDL model. Based on the rule of thumb, the Durbin Watson statistics, which is close to 2, falls within the acceptable limit with a value of 1.95, hence there is no presence of first-order serial correlation in the model.

The error correction term's lagged value (ECM_{t-1}) has a coefficient value of -0.145, which is negative and significant at a 1% level of significance. The *p*-value of the ECM term is reported as 0.0062. Thus, it indicates the speed of adjustment from the short-run toward long-run equilibrium, implying that any deviations in the short-run toward the long run are corrected by 15 percent in each quarter.

DISCUSSION OF FINDINGS

The estimated results established the presence of a long-run equilibrium relationship; therefore the discussion of findings are based on the ARDL long-run estimates, which are provided as follows:

Poverty reduction showed a positive and significant effect on the measure of economic development (human development index). This result supports the assumptions of the Trickle-up theory of economic development, which suggest that economic policies and factors such as access to financial and internet services are important to pursue the goal of poverty reduction because they help to sustain long-term economic growth, which would trickle-up to the middle-class and affluent class, thus improving the living conditions of poor and vulnerable in the society.

The positively signed and significant relationship between domestic credit to the private sector and human development index suggests that the development of the depth of the financial sector seemed to hold the promise of enhancing economic development by supplying access to capital to financially restricted economic entities, hence, financial deepening can help the poor and lessen income inequality. This finding led credence to the Trickle-up hypothesis and corroborates the positive findings of Jalilian and Kirkpatrick (2002) and Uddin *et al.* (2014).

Growth of real GDP per capita had a positive and significant effect on human development index. This result suggests that economic growth is a channel through which poverty reduction affects human development, such that the welfare, health status and level of education of the poor tend to increase following an increase in per capita income. This finding is in line with the evidence provided by Ijaiya *et al.* (2011).

Urbanisation showed a negative but non-significant effect on human development index. This suggests that urbanisation discourages human development index in Nigeria, implying that the urban populace does not make productive use of increased access to financial and internet services. It conforms to the positive evidence provided in the studies of Khan *et al.* (2019) and Khan *et al.* (2018) whose studies argued that positive effect of urbanisation is a result of urban population's being more open to advanced technologies, thus using them to facilitate their standard of living.

Trade openness revealed a positive and significant effect on human development index. It tends to encourage import and export businesses, implying that market competencies which emerge through trade openness make it easy to access branded and durable goods at a low price so that it continuously improve human life. This finding deviates from the negative evidence from the studies of Khan *et al.* (2019) who argued that trade openness transmits the problems of one country to another, thereby affecting the economy and human development process of the trading partners negatively.

Internet exhibited a positive and significant relationship with human development index as expected. This result agrees with the underlying assumptions of the Trickle-up hypothesis and the findings of Khan *et al.* (2019) that the presence of internet services in the urban and rural areas tend to promote human development index. Therefore, the importance of internet cannot be ignored for the economic development process because it provides a smooth platform through which the banking sector and stock market may enhance the well-being of the people.

CONCLUSION AND RECOMMENDATIONS

This study investigated the relationship between poverty reduction and economic development in Nigeria from the period 2003Q3 to 2019Q4. Based on the results from the ARDL bounds test cointegration approach, the study showed that a long-run equilibrium relationship exists between the variables specified in the model. The study concludes that poverty reduction is important for economic development in Nigeria. Based on the findings of this study, the following policy recommendation can be put forward- First, the positive effect of domestic credit to the private sector on human development index suggests that the government and financial sector regulators should embark on policies such as the incidence of low financial transaction costs which can further deepen the financial sector by increasing financial accessibility to the poor and strengthening banks credit allocation towards them. Second, the positive effect of internet on human development index indicates that the poverty reduction strategies of the Nigerian government should not be pursued in isolation but rather in connection with access to financial and internet services. Third, policymakers in the Nigerian economy should formulate relevant policies such as those that can encourage trade openness, curb internet-related vices in the urban centres to promote human development.

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