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Journal of Sustainable Development in Africa (Volume 20, No.2, 2018)
ISSN: 1520-5509
Clarion University of Pennsylvania, Clarion, Pennsylvania

WHAT ARE THE DRIVERS OF HUMAN DEVELOPMENT IN NIGERIA?

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ABSTRACT

Human development is worrisomely weak in Nigeria despite several efforts by the government to improve it. Specifically, about half of the citizens still live under $1.9 a day. Consequently, the World Bank ranked Nigeria low among human development countries in 2016. This study employs Sen's capability approach to investigate the drivers of human development. To gain a deeper understanding of how human development is influenced by its drivers, the components of human development—education, health and income indexes—are modelled and estimated using data covering 1990 to 2016. Results from the autoregressive distributed lag (ARDL) method show that human development is affected, albeit differently, by these drivers both in the short run and in the long run. Specifically, funds from international donors and remittances show evidence of "fungibility" while control of corruption is good for human welfare. Immunization against measles raises health status but much still need to be done in this area. Carbon emission is detrimental to human development and so, it is recommended that this should be addressed with effective rules of law.

Keywords: Human Development, Education Index, Health Index, Income Index, Autoregressive Distributed Lag

INTRODUCTION

The Nigeria economic growth showed remarkable improvement in a couple of decades but such improvement appeared not to be commensurate with the expected level of development. Measured in 2011 PPP term, available evidence reveals that GDP rose from $289 billion in 1990 to $576.5 billion in 2005 and then rose dramatically to $1,027.4 billion in ten years later. In fact, the Human Development Report released by the UNDP (2016) revealed that human development index (HDI) for Nigeria has improved over years. The HDI rose from 0.45 in 2003 to 0.5 in 2010 and then rose to 0.53 in 2015. Given the good news about the GDP performance and the improvement in the indicator of development, it is expected that poverty and inequality would have reduced considerably. But the country has been identified as one of the most impoverished countries in the world, as it ranked 25th among the poorest in the world. To be specific, statistics indicates that about 70 percent of Nigerians live below the poverty line of $1.25 per day in 2015 while about half of the citizens live under $2 a day (World Bank, 2016). The data also show that those in the core poverty bracket in urban and rural areas had risen from 25.2 percent, 316 percent to 43 percent and 50 percent respectively. Further, the multidimensional poverty index fell from 0.29 in 2008 to 0.24 in 2011 and later rose to 0.28 in 2015 (UNDP, 2016). What this implies is that Nigerians are more impoverished even as the GDP increases.

In the light of the government's concern for poverty alleviation, numerous policies and programmes have been designed at one time or another to meet the special needs of the poor. In particular, several poverty alleviation programmes came on board in 1980s. These include: Directorate of Food, Roads and Rural Infrastructure (DFRRI) in 1986, Family Support Programme and the Family Economic Advancement Programme in 1993, Poverty alleviation Programme (PAP) in 2000, National Poverty Eradication Programme (NPEP) in 2001, National Economic Empowerment and Development Strategy (NEEDS) in 2004, Seven Point Agenda in 2007, Agricultural Transformation Agenda (ATA) in 2012 and recently, the Economic Growth Recovery Plan (EGRP).

Beyond the domestic poverty reduction programmes, there are various interventions by the international development agencies. At the forefront of the international dimension are the activities of the World Bank, United Nations Children Education Fund (UNICEF), United Nations Development Programme (UNDP), United States Agency for International Development (USAID), World Health Organization (WHO) etc. The World Bank has been supporting poverty alleviation in Nigeria through such strategies as promoting broad-based economic growth that could generate income-earning opportunities for the poor. It has also supported the strategy of improving access to basic social services, so that the poor can take advantage of these opportunities (Oyeranti & Olayiwola 2005). These various strategies were reflected in the education and health indexes of the country. For instance the education index rose from 0.45 in 1990 to 0.47 in 2000 and then to 0.48 in 2015. Life expectancy index, a proxy for health status, also rose from 0.4 in 1990 to 0.41 in 2010 and then to 0.51 in 2015. Despite this improvement, it is still not clear why poverty is on the high side and inequality is not improving.

The Millenium Development Goal (2015) reports that the level of impoverish is not reducing perhaps because the poverty alleviation programmes in the country were weak in alleviating extreme poverty and hunger even though there is evidence of

improvement in health and education. Another good reason is that some of the poverty alleviation programmes are fraught with weak governance institution, in this case, corruption, policies inconsistency, weak monitoring and assessment plans.

This issue has aroused the interest of many researchers to investigate poverty, inequality and economic growth in Nigeria. Unfortunately, dearth of data on poverty and inequality could not allow them to do good justice to the issue. Even barring data scarcity, researchers do not unanimously agree on the impact of economic growth on development, using poverty and inequality as proxy. At one end, results from the panel data estimates suggests that economic growth which is supposed to be a stimulus to poverty reduction has contributed to the deteriorating condition of the poor and make people more vulnerable. At the other end, the output growth is indeed key to promoting living standard. Other researchers maintained that economic growth has not been directly contributing to the promotion of well-being in developing countries (Sahn and Younger 20014; Aigbokhan 2000). Noting that results from panel estimation cannot be applied on the country basis, it is important to investigate the drivers of wellbeing at the country level.

This paper seeks to investigate why well-being is low in Nigeria by utilizing the newly developed human development index published by the United Nations Development Programme (UNDP). Meanwhile, data on for the new HDI (NHDI) are available from 1990 to 2015 for most countries, while they are only available for Nigeria between 2000 and 2015. But using the formula used to compute the published components of NHDI, the first task was to construct the NHDI and its components for Nigeria from 1990 to 2016. These dataset are then subjected to econometric estimation in order to investigate the determinants of each of the NHDI components. It must be recalled that improvement in NHDI can be driven by one component. Thus, this study seeks to investigate factors driving health, education and per capita income indexes. By doing so, the researchers are convinced that deeper understanding of why the status of development is weak in Nigeria can be understood.

This study is the first to use this updated NHDI dataset for Nigeria. Another contribution to the existing knowledge is the choice of methodology. Many studies employed various methodologies and estimation techniques, but this study utilizes Autoregressive Distributed Lag (ARDL) model to obtain robust, stable and reliable results for economic policy recommendation. This method is better than the ones observed in recent development studies because ARDL provides a very valuable vehicle to estimate long-run and short-run dynamics even when the series are a combination of stationary and non-stationary time-series.

LITERATURE REVIEW

Issues of poverty, inequality and economic growth have received considerable attention in the literature. However, there is no unanimous agreement on the systematic connection among the three. Meanwhile some researchers claim that if the quality rather than quantity of economic growth increases, inequality will fall and poverty will fall because there is a strong connection between inequality and poverty (Mckay and Summer, 2008; Collier, 2007; Ogbeide and Agu, 2015). But some researchers opine that whether inequality will reduce poverty or not depends on the stage of economic growth. Specifically, for an economy that is at the developing stage, initial income may worsen inequality initially but eventually improve it. This line of taught is in agreement with the Kuznet invert U-shaped growth-inequality nexus. Another version of the literature argue that poverty is highly sensitive to economic growth, and so, there is a direct link between economic growth and poverty. Such link could be positive or negative depending on the quality of economic growth or the approach towards poverty alleviation (Kakwani and Pernia, 2000). Given the plethora of evidence on the growth-inequality-poverty link, only very recent studies that investigated the connection among the three are reviewed.

The study of Fosu (2010) assessed the extent to which inequality explains the impact of economic growth on poverty in SSA. He then compared this result with the case of non-SSA. He assembled an unbalanced panel data spanning 1977 to 2004 for SSA, comprising 24 countries and non-SSA comprising 61 countries, making a total of 85 countries. He considered the three measures of poverty, namely headcount, gap and squared gap. Employing the Sen's capability theory, he reported that income growth is a decreasing function of inequality. However, the magnitude of effect differs across region even though the direction of effect is similar. Specifically, the growth elasticity of poverty is low in SSA compared to non-SSA. This implies that poverty is less sensitive to increase in economic growth in SSA. He also discovered that while direction of effect is similar in all SSA countries, magnitude of effect differs, depending on the inequality attributes of the country. For instance, the poverty reduction arising from income growth in Ethiopia was more than double that in Namibia because of high inequality existing in the latter country. Also, in Ghana, the growth elasticity of poverty is twice that in Namibia but headcount poverty rate declines by 10 percent in a decade in spite of relatively modest growth.

When assessing the growth, inequality and poverty in developing countries, Fosu (2010) used poverty headcount, that is, percentage of population living below $1.25 and $2.5 daily as proxy for poverty. His interest was to examine the effect of economic growth on poverty reduction in developing countries since mid-1990s, with special attention on inequality. He report that the major driving force behind poverty is economic growth. Observing that average outcome may becloud country-specific reality, he estimated separate regression for each country in the sample. The result was diverse because for some country, economic growth plays a vital role in reducing poverty while reduction in inequality was important for poverty alleviation for others.

Janjua and Usman (2011) is one of the very few researchers that emphasize the influence of education in the poverty-inequality-growth link. According to the authors, the benefits of education vary from direct income effect to positive externalities, and by implication, reduce poverty. To empirically substantiate their points, they constructed a balanced panel

data of 40 developing countries between 1999 and 2007 and employ random effect generalized least square (RE-GLS). They found that the effect of income on poverty alleviation is moderate. However, there is no significant impact of inequality on poverty, but education improves poverty alleviation significantly.

That the result discovers the importance of education in poverty alleviation implies that one of the indicators of human development, that is education index, must be given important priority. This result is consistent with the spirits of Mckay and Sumner (2008) when they submit that growth by itself is not sufficient for poverty reduction and that for growth to reduce poverty, it must be tailored towards human development. Sen (1999) has earlier argued that income is just an instrumental freedom that is used to achieve other constitutive freedoms such as education, health or wellbeing. This then brought the idea of a measure of human development index (HDI) where some of its indicators such as health and education are positively related to growth. Hence, although income level is important for life expectancy (proxy for health status) other factors such as public health care system, nutrition and immunization program and maternal education level matter as well.

Cheema and Sial (2012) seek to ascertain the long run relationship among poverty inequality and growth in Pakistan using expenditure survey conducted in their country between 1992/1993 and 2007/2008 for eight (8) households. The result of the study suggests that the effect of growth on inequality was substantially larger than on poverty. They detected the influence of inequality in the growth-poverty nexus. According to the authors, the gross growth elasticity of poverty is larger than the net growth elasticity. They therefore suggest that part of growth on poverty reduction has been offset by inequality. When they decomposed the sample into rural and urban regions, they discover that growth and inequality reduce poverty in the rural region but only inequality matter for poverty reduction in the urban region. This suggests that there is a large inequality existing in the urban region compared to the rural region so that increase in income growth of the urban region will benefit the rich and worsen the deteriorating condition of the urban poor.

Agrawal (2008) assesses the relationship between economic growth and poverty alleviation in Kazakhstan using province level data. The paper found that provinces with higher growth rate experienced considerable decline in poverty. The channel through which growth reduces, according to the result, were decrease in unemployment and high level of real wages. Growth was achieved through productive use of oil revenue. Spending on social sectors such as education and health were not much even though the two variables showed negative effect of poverty.

In Nigeria, several researchers have assessed the issue of poverty, inequality and growth. Recent studies such as Aigbokhan (2000), Olaniyan and Awoyemi (2005), Adigun et al. (2011), Ijaiya, et al. (2011), Bakare and Ilemobayo (2013), Okoroafor et al (2013) and Kolawole et al. (2015) came out with diverse results. For instance, Aigbokhan (2000) analyzed poverty, inequality and growth over the period 1985-1996 and revealed that an increasing number of Nigerians were living in absolute poverty over the period under study. Poverty is higher in rural areas than in urban areas. Regionally, poverty was more pronounced in the southern zones than in the northern zones. Olaniyan and Awoyemi (2005) investigated a decomposition analysis of inequality in the distribution of household expenditure in rural Nigeria in 2005 and discovered that most of the inequality exists within group and not much of differences in groups explain appreciable levels of inequality, except for educational attainment of household head and the geopolitical zones that household belong to. Adigun et.al (2011) estimated

economic growth and inequality elasticities in rural Nigeria over the period 1996-2004 and discovered that the kind of poverty reduction taking place in Nigeria is not enough to reduce poverty and inequality significantly.

Ijaiya et al. (2011) analyzed economic growth and poverty reduction in Nigeria for the period 1980-2008. Employing what they called multiple regression and difference-in difference estimator that describes poverty reduction as a function of changes in economic (that is, they estimate a dynamic least square regression and included initial income in the model), they discovered that initial income level does not influence poverty in any form but continuous increase in economic growth leads to reduction in poverty. Bakare and Ilemobayo (2013) asked if economic growth influences reduction in poverty in Nigeria. To answer this question, they collected data on poverty and economic growth alongside other control variables such as unemployment and literacy rate. Their error correction (long-run equilibrium) results, from the data spanning 1981 to 2008, show that poverty was an increasing function of economic growth. In particular, a 1 percent increase in economic growth leads to 2 percent increase in poverty. However, the study of Okoroafor et al. (2013) indicated no significant relationship between poverty and economic growth using the data between 1990 and 2011.

Kolawole et al. (2015) examined poverty, inequality and growth in Nigeria over period 1980-2012 and found that GDP growth rate impacted positively on inequality but negatively on poverty headcount ratio. By implication, the result shows that as the economy grows, the gap between the rich and the poor widens even though there seems to be improvement in poverty. Ogbeide and Agu (2015) investigated possible causality among poverty, inequality, unemployment and life expectancy rate over the years 1980-2010 for Nigeria. Their results show a direct, albeit negative causality running from poverty to inequality while an indirect causality was observed through unemployment and low life expectancy.

Further evidence on poverty, inequality and growth in Nigeria include Ajakaiye et al. (2014) and Chukwu (2017). Paper by Ajakaiye et al (2014) appraises non-monetary multidimensional poverty in Nigeria using the novel first-order dominance approach. The dimensions are education, water, sanitations, shelter and energy use. They accessed the data from Nigeria Demographic and Health Survey (NDHS, of 1999, 2003, and 2008 for national, regional and zonal analysis), the Harmonized Nigeria Living Standard Survey HNLS (2008/09) and the Nigeria Living Standard Survey NLS of 2003/2004 for state analysis. They found that poverty have not kept pace with economic growth in Nigeria. A marginal 0.21 percent decline in population with acute deprivation was associated with 1 percent increase in growth. However, sanitation reported a considerably high percentage. The spatial first-order dominance comparisons show that regional inequality was notable with huge disparities in states.

Chukwu (2017) evaluated the effects of inequality on poverty in Nigeria using Araar's four competing approaches to semi-elasticity estimation. He finds that inequality semi elasticity estimates are sensitive to the chores of Foster-Greer-Thorbeck poverty measure. The rise in inequality continues at higher percentages say 5 to 10 percent. Furthermore, the effect of inequality on poverty was more pronounced in the urban areas than in the rural area and the squared poverty gap increased faster in the rural area than in the urban centers. The semi-elasticity estimation on poverty gap for both urban and rural produced higher expected poverty rates than other competing approaches.

The brief empirical review shows that different results were received by researchers across countries and regions based on the underlying methodology, nature of data and coverage. Perhaps one of the reasons why diverse results were obtained is due to measurement problem. Ajakaiye et al. (2014) decompose what could be viewed as components of poverty but the result can be interpreted as short run and so, it lacks long run predictability. Outcome of results coming from other authors suffer from fundamental econometric problems and this could mislead the policymakers. The present study seeks to use the components of human development index as proxy for welfare and investigate how each of these components is affected by their respective drivers. In the case of methodology, due to the nature of the data, the augmented distributed lag (ARDL), that has proofed more reliable in increasing the efficiency and consistency of both the short and the long run equilibrium of the models is employed.

METHODOLOGY AND DATA

This study modifies Okoroafor et al. (2013) model by measuring poverty using Human Development Index. But as pointed out earlier, poverty measure consists of HDI components, namely education index, health index and income index. Thus, to dig deeper into the way human welfare is affected, it is imperative to examine how each of the components is affected by economic growth and other control variables. The empirical review suggests that factors that can influence human development should also reduce poverty and inequality since most of the variables in the human development incorporate poverty and inequality. What remains is to identify the factors that drive each of these components.

For the education index, corruption index, exchange rate, public expenditure on education, and personal remittances were included. Also, educational related funds from international Donors such as the UNICEF, UNDP and ODA were included. The idea is that funds provided by these international agencies, if well-articulated, should improve education attainment. For health index, carbon-dioxide emission, immunization against measles, immunization against pertussis (whooping cough) ; diphtheria and tetanus, that is, DPT, funding from UNICEF, public health expenditure, personal remittances, funds from official development organization (ODA) and total population were considered. From all these variables, only caribon-dioxide emission is expected to have negative effect. In the case of population, the direction of effect is open. If it is positive, then it means the share of active working population is highly productive or the share is more than the dependency ratio. All other variables are expected to have positive effect on life expectancy.

For the income index, this study considers control of corruption, inflation, exchange rate, personal remittances and total population as main drivers. Increase in control of corruption is expected to raise income through investment confidence while increase in remittances should show a positive effect. The effect of other variables such as population, inflation and exchange rate is open. The economic specification for each component is provided in equations 1 to 3

$$EDUIN = F(CORR, EXCH, EDGOVT, REM, UNDP, ODA, UNICEF) \quad \text{.....1}$$

$$HEALIN = F(CO2, MISSLE, DPT, UNICET, HEALEXP, REM, ODA, , POP) \quad \text{.....2}$$

$$INCOME = F(CORR, CPI, EXCH, POP, REM) \quad \text{.....3}$$

Where EDUIN is educational index, HEALIN is health index and INCOME is income index. CORR, EXCH, EDGOVT, REM, UNDP, ODA and UNICEF represent control of corruption, exchange rate, public expenditure on education, personal remittances, donations by the United Nations Development Programme, Official Development Assistance and United Nations Children Education Fund respectively. CO2, MISSLE, DPT, HEALEXP, POP and CPI stand for carbon emission, immunization against measles & whooping cough, immunization against tetanus, public expenditure on health, and consumer price index respectively.

There are at least three major estimation issues that need to be addressed in equations 1 to 3. First, the existence of endogeneity among the regressors is not impossible. Also, there could be within and between effect of the regressors. Furthermore, some of the variables could be affected by time, that is, the behavior of the variable could be due to exponential trend. Generally, these series exhibit nonstationarity. There are several techniques for detecting and controlling nonstationarity. These include the Dickkey-Fuller (DF) and Augmented Dickky-Fuller (ADF) unit root test, the Phillip-Perron (PP), the Kwatsowski-Phillips-Schmidt-Shin (KPSS) stationarity test and the Elliot-Rotherberg-Stock (ERS) point optimal. The ERS optimal is useful for a sample of 50 and above and cannot be useful for this study. The null hypothesis in the DF, ADF and PP is that the series have no unit root, that is, the series is stationary at the level it is being tested. This null hypothesis in the KPSS is that the series is stationary. We employed the ADF unit root test for this study not only because its result is closely similar to the PP but also that it is commonly used in the literature.

Since the series exhibit different level of integration, as shown in the next section, an autoregressive distributed lag (ARDL) estimation technique proposed by Perasan et al. (2001) was employed. According to Greene (2005), ARDL are standard least squared regressions that incorporate lags of both the regressands and the regressors in a single model. Several advantages are associated with the use of ARDL. First, it has a built-in bound testing for investigating cointegrating relationship. Second, it is capable of dealing with endogeneity problems and has the ability to test the long run estimates which is not possible under alternative cointegrating techniques (Sezgin and Yildrim, 2002). Further, the small sample properties of the ARDL are by far superior to other forms of multivariate cointegration (Halicioglu, 2007). Finally, the method has gained popularity in recent years for examining and forecasting long run and cointegrating relationship among variables.

The basic ARDL model is specified in equation 4. As noted, some of the regressors, X_j may have no lagged terms, such that $q_j = 0$. Thus the term $\sum_{i=0}^{q_j} X_{jt-i}$ contains both static and dynamic series.

$$Y_t = \alpha + \sum_{i=1}^{\rho} \pi_i Y_{r-i} + \sum_{j=1}^{\kappa} \sum_{i=0}^{q_j} X_{jt-i}' \beta_{j,i} + \varepsilon_t \quad \text{..... 4}$$

In order to determine the appropriate lags for the dependent (Y) and independent (X) variables, Schwartz Information Criterion (SIC) was employed to automatically select the numbers of lag length that will enter the model. The SIC was chosen because it places high penalty on increasing the numbers of regressors. It follows that the ARDL does not require symmetry lag lengths, that is, each variable can have a different numbers of lags (Pearsan and Slim, 1999). Meanwhile, the long run transformation of the dynamic relationship can be done, given the estimated long run coefficient to be

$$\theta_j = \frac{\sum_{j=1}^{\kappa_j} \hat{\beta}_{j,i}}{1 - \sum_{i=1}^{\rho} \pi_i} \quad \text{……..……..5}$$

Hence the cointegrating regression form is obtained by transforming equation 4 into differences and substituting the long run form, that is, equation 5 to produce equation 6

$$\Delta Y_t = -\sum_{i=1}^{\rho-1} \pi_i^* \Delta Y_{t-1} + \sum_{j=1}^{\kappa} \sum_{i=0}^{q-1} \Delta X_{j,t-i}' \beta_{j,i}^* - \hat{\phi} con\,\text{int}\, eq_{t-1} + \varepsilon_t \quad \text{…….……..6}$$

Note that $con\,\text{int}\, eq_{t-1} = Y_t - \alpha - \sum_{j=1} X_{j,t}' \hat{\theta}_j$

And that $\hat{\theta} = 1 - \sum_{i=1}^{\kappa} \hat{\pi}_i$,

$$\pi_i^* = \sum_{m=i+1} \hat{\pi}_m ;$$

$$\beta_{j,i}^* = \sum \beta_{j,m}$$

The bound test procedure transforms equation 6 into

$$\Delta Y_t = -\sum_{i=1}^{\rho-1} \pi_i^* \Delta Y_{t-1} + \sum_{j=1}^{\kappa} \sum_{i=0}^{q_{j-1}} \Delta X_{j,t-i}' \beta_{j,i}^* - \rho Y_{t-1} - \alpha - \sum_{j=1}^{\kappa} X_{j,t-1}' \gamma_j + \varepsilon_t \quad \text{……..……..7}$$

In the event that there is level relationship, that is, ρ= 0, this implies that , suggesting that the model does not have long run relationship and so, the short run dynamics will be estimated. Using equations 4 and 6 or 7, the logarithmic transformation of the ARDL, cointegration and long run forms of equations 1to 3 are specified` in equations 7-15 for the three indicators.

Education index equation

The ARDL form

$$\ln EDUIN_t = \alpha_0 + \sum_{i=1}^{\rho} \pi_i \ln EDUIN_{t-i} + \sum_{i=0}^{q_1} \beta_i CORR_{t-i} + \sum_{i=0}^{q_2} \delta_i \ln EXCH_{t-i} + \sum_{i=0}^{q_3} \eta_i \ln EDGOVT_{t-i} + \sum_{i=0}^{q_4} \lambda_i \ln REM_{t-i} + \sum_{i=0}^{q_5} \vartheta_i \ln UNDP_{t-i} +$$

$$+ \sum_{i=0}^{q_6} \tau_i \ln ODA_{t-i} + \sum_{i=1}^{q_i} \varsigma_i \ln UNICEF_{t-i} + \varepsilon_t \quad \text{.....7}$$

The cointegration form

$$\Delta \ln EDUIN_t = \alpha_0 + \sum_{i=1}^{\rho} \pi_i \Delta \ln EDUIN_{t-i} + \sum_{i=0}^{q_1} \beta_i \Delta CORR_{t-i} + \sum_{i=0}^{q_2} \delta_i \Delta \ln EXCH_{t-i} + \sum_{i=0}^{q_3} \eta_i \Delta EDGOVT_{t-i} + \sum_{i=0}^{q_4} \lambda_i \Delta \ln REM_{t-i} + \sum_{i=0}^{q_5} \vartheta_i \Delta \ln UNDP_{t-i} +$$

$$+ \sum_{i=0}^{q_6} \tau_i \Delta \ln ODA_{t-i} + \sum_{i=1}^{q_i} \varsigma_I \ln \Delta UNICEF_{t-i} + \theta co\,\text{int}\, eg_{t-1} + \varepsilon_t \quad \text{.....8}$$

The long run form

$$\ln EDUIN_t = \xi_0 + \xi_1 CORR_t + \xi_2 \ln EXCH_t + \xi_3 EDGOVT_t + \xi_4 \ln REM_t + \xi_5 \ln UNDP_t + \xi_6 \ln ODA_t + \xi_7 \ln UNICEF + \varepsilon_t \quad \text{.....9}$$

Health Index equation

The ARDL form

$$\ln HEALIN_t = \alpha_0 + \sum_{i=1}^{\rho} \pi_i \ln HEALIN_{t-i} + \sum_{i=0}^{q_1} \beta_i \ln CO2_{t-i} + \sum_{i=0}^{q_2} \delta_i \ln MEASLE_{t-i} + \sum_{i=0}^{q_3} \eta_i \ln DPT_{t-i} + \sum_{i=0}^{q_4} \lambda_i \ln UNICEF_{t-i} + \sum_{i=0}^{q_5} \vartheta_i \ln HEALEXP_{t-i} +$$

$$+ \sum_{i=0}^{q_6} \tau_i \ln REM_{t-i} + \sum_{i=1}^{q_i} \varsigma_i \ln ODA_{t-i} + \sum_{i=1}^{q_i} \ln POP_{t-i} + \varepsilon_t \quad \text{.....10}$$

ARDL cointegration form

$$\Delta \ln HEALIN_t = \alpha_0 + \sum_{i=1}^{\rho} \pi_i \Delta \ln HEALIN_{t-i} + \sum_{i=0}^{q_1} \beta_i \Delta \ln CO2_{t-i} + \sum_{i=0}^{q_2} \delta_i \Delta \ln MEASLE_{t-i} + \sum_{i=0}^{q_3} \eta_i \Delta \ln DPT_{t-i} + \sum_{i=0}^{q_4} \lambda_i \Delta \ln UNICEF_{t-i} + \sum_{i=0}^{q_5} \vartheta_i \Delta \ln HEALEXP_{t-i} +$$

$$+ \sum_{i=0}^{q_6} \tau_i \Delta \ln REM_{t-i} + \sum_{i=1}^{q_i} \varsigma_i \Delta \ln ODA_{t-i} + \sum_{i=1}^{q_i} \psi \Delta \ln POP_{t-i} + \theta co\,\text{int}\, eg_{t-1} + \varepsilon_t \quad \text{.....11}$$

The long run form

$$\ln HEALIN_t = \xi_0 + \xi_1 \ln CO2_t + \xi_2 \ln MEASLE_t + \xi_3 \ln DPT_t + \xi_4 \ln UNICEF_t + \xi_5 \ln HEALEXP_t + \xi_6 \ln REM_t + \xi_7 \ln ODA_t + \zeta_8 \ln POP_t + \varepsilon_t \quad \text{.....12}$$

Income index Equation

The ARDL equation

$$\ln INCOME_t = \alpha_0 + \sum_{i=1}^{\rho} \pi_i \ln INCOME_{t-i} + \sum_{i=0}^{q_1} \beta_i CORR_{t-i} + \sum_{i=0}^{q_2} \delta_i \ln CPI_{t-i} + \sum_{i=0}^{q_3} \eta_i \ln EXCH_{t-i} + \sum_{i=0}^{q_4} \lambda_i \ln POP_{t-i} + \sum_{i=0}^{q_5} \vartheta_i \ln REM_{t-i} + \varepsilon_t \quad \text{.....13}$$

The ARDL cointegration form

$$\Delta \ln INCOME_t = \alpha_0 + \sum_{i=1}^{\rho} \pi_i \Delta \ln INCOME_{t-i} + \sum_{i=0}^{q_1} \beta_i \Delta CORR_{t-i} + \sum_{i=0}^{q_2} \delta_i \Delta \ln CPI_{t-i} + \sum_{i=0}^{q_3} \eta_i \Delta EXCH_{t-i} + \sum_{i=0}^{q_4} \lambda_i \Delta \ln POP_{t-i} + \sum_{i=0}^{q_5} \vartheta_i \Delta \ln REM_{t-i} + \theta co\,\text{int}\, eg_{t-1} + \varepsilon_t \quad \text{.....14}$$

The long run form

$$\ln INCOME_t = \lambda_0 + \lambda_1 CORR_t + \lambda \ \ln CPI_t + \lambda_3 \ln EXCH_t + \lambda_4 \ln POP_t + \lambda_5 \ln REM_t + \varepsilon_t \quad \text{.....15}$$

Data for all the variables except control of corruption were extracted from the World Development Indicators (2017) online version. In the case of corruption, data were obtained from the international country risk guide (ICRG) published by the political risk service (PRS). The coverage period was 1990 to 2016 based on availability of data.

RESULTS AND DISCUSSIONS

The descriptive statistics of the series is presented in Table 4.1 and all the variables are as defined earlier. The series are normally distributed based on the information provided by the Jacque-Bera probability values. The mean growth of carbon emission (LNCO2) was 11.16 and the minimum and maximum posted 0.89 and 4.14 respectively. Education index (EDUIN) recorded an average of 0.44 while health index (HEALIN) and income index (INCOME) had a mean of 0.44 and 0.33 respectively. The average growth of government spending on education (LNEDGOVT) was 22.8 but public spending on health was 21.8.

4.1 Descriptive statistics of the variables

Series	Mean	Maximum	Minimum	Std. Dev.	Jarque-Bera	Probability	Observations
CORR	0.252	0.333	0.167	0.062	1.617	0.446	27
LNCO2	11.163	11.559	10.412	0.401	3.879	0.144	27
LNCPI	3.603	5.214	0.890	1.237	2.961	0.228	27
LNDPT	3.648	4.143	3.045	0.292	1.233	0.540	27
LNEXCH	4.228	5.260	2.084	1.020	3.976	0.137	27
LNEDGOVT	22.731	24.347	20.756	1.190	2.195	0.334	27
LNHEALEXP	21.847	23.722	19.896	1.298	2.606	0.272	27
LNMEASLE	3.766	4.159	3.401	0.198	0.880	0.644	27
LNODA	20.335	23.160	18.839	1.297	2.351	0.309	27
LNREM	21.725	23.771	16.118	2.119	3.346	0.188	27
LNUNDP	16.168	17.266	15.068	0.495	0.864	0.649	27
LNUNICEF	17.081	17.855	16.279	0.553	2.615	0.270	27
LNPOP	18.705	19.021	18.376	0.202	1.720	0.423	27
EDUIN	0.450	0.477	0.411	0.020	2.016	0.365	27
HEALIN	0.441	0.509	0.402	0.040	3.094	0.213	27
INCOME	0.533	0.604	0.479	0.047	3.230	0.199	27

This implies that government spending on public education was more frequent than spending on public health. Out of the international funding organizations, official development assistance (LNODA) had the highest mean growth (20.39) followed by funding from the UNICEF (17.08) and then the UNDP (16.17).

Table 4.2: Result of the Augmented Dikkey-Fuller (ADF) unit root test

VARIABLES	Level			First Difference			I(d)
	None	**Constant**	**Constant & Trend**	**None**	**Constant**	**Constant & Trend**	
CORR	0.834	1.798	1.598	4.946***	4.883***	4.91***	I(1)
EDUIN	0.253	1.761	3.582**	2.799	2.764	2.775	I(0)
HEALIN	0.363	4.683***	2.973	-0.764	-0.979	1.181	I(0)
LNCO2	0.933	-1.569	-1.875	-4.43***	-4.482***	-4.438***	I(1)
INCOME	-3.864***	-4.283***	-2.375	-1.777	-1.822	-2.581	I(0)
LNDPT	-0.206	-1.965	-3.149	-6.464***	-6.340***	-6.365	I(1)
LNEXCH	-1.444	-2.127	-1.753	-4.246***	-4.705***	-5.000***	I(1)
LNEDGOVT	-1.723	-0.779	-3.624**	-5.341***	-6.824***	-6.693***	I(0)
LNHEALEXP	-2.485**	-0.072	-3.038	-3.825***	-3.826***	-4.591***	I(0)
LNMEASLES	-0.127	-1.162	-3.123	-4.116***	-4.117***	-4.374**	I(1)
LNODA	-0.825	-0.841	-3.012	-4.902***	-4.857***	-4.746***	I(1)
LNPOP	-0.495	-1.194	-3.151**	-1.665	-1.653	-1.859	I(0)
LNCPI	-2.247**	-2.247**	-2.66	-3.893***	-3.893***	-3.935***	I(0)
LNREM	-1.748	-3.125**	-2.214	-5.657***	-6.220***	-6.542***	I(0)
LNUNICEF	-0.633	-0.633	-3.850**	-6.850***	-7.243***	-6.995***	I(0)
LNUNIDP	-0.039	-4618***	-4.662***	-5.509***	-5.317***	-5.229***	I(0)

*Note: *,**,*** implies ADF statistics exceeds critical values at 10%, 5% and !% respectively based on MacKinnon (1996) one-sided p-values*

The maximum and minimum growth for each of these series followed the same behavior as in the average mean growth. The test for stationary indicates that the series exhibits different level of integration. For instance, education index, health index, income index, public spending on education, public spending on health, population (LNPOP) and consumer price index (LNCPI) are stationary at level. However, some of the series mentioned are stationary at levels when either constant and or trend are included. Other series failed to be stationary at level even when constant and trend were included. Since the series are stationary at different level with the highest level of integration is one (I(1)), the appropriate technique of estimation is the autoregressive distributed lag, just as suggested earlier.

The result of the ARDL is presented in the appendix. The implication of ARDL is that the coefficients will be interpreted as short run effect. In order to investigate the long run relationship of the series, a bounds test for cointegrating equations was performed and the result is presented in Table 4.3

Table 4.3*:* ARDL bounds cointegration test

Model	Test Statistic	Value	K	I(0)			I(1)		
				Critical Value			Critical Value		
				10%	5%	1%	10%	5%	1%
EDUIN	F-statistic	23.72***	7	2.03	2.32	2.96	3.13	3.5	4.25
HEALIN	F-statistic	323.8***	9	1.88	2.14	2.65	2.99	3.3	3.97
INCOME	F-statistic	13.32***	5	2.26	2.62	3.41	3.35	3.79	4.68

*Note: *** means the model cointegrates at 1%level of significance.*

Table 4.4: Cointegrating form/Parsimonious ECM of the determinants of welfare in Nigeria

VARIABLES	EDUCATION INDEX ARDL(1,2,1,2,2,2,2,2)	HEALTH INDEX ARDL(1,1,1,0,1,0,1,1,0,1)	INCOME INDEX ARDL(1,1,1,2,0,0)
D(CORRUPTION)	-0.456***		-0.008**
	(-5.148)		(-2.675)
D(CORRUPTION(-1))	0.099		
	(0.684)		
D(LNEXCH)	-0.035		-0.006
	(-1.557)		(-1.223)
D(LNEXCH(-1))			-0.012***
			(-6.919)
D(LNEDGOVT)	0.003		
	(0.326)		
D(LNEDGOVT(-1))	0.026**		
	(2.256)		
D(LNREM)	0.047***	-0.001	0.013***
	(5.254)	(-0.373)	(3.380)
D(LNREM(-1))	-0.009**		
	(-2.115)		
D(LNUNDP)	-0.015		
	(-1.689)		
D(LNUNDP(-1))	0.055***		
	(4.326)		
D(LNODA)	-0.322***	-0.001	
	(-4.320)	(--0.373)	
D(LNODA(-1))	0.006**		
	(2.095)		
D(LNUNICEF)	0.041**	0.002	
	(3.616	(1.465)	
D(LNUNICEF(-1))	-0.105***		
	(-6.365)		
D(LNCO2)		-0.001	
		(-0.691)	
D(LNMEASLE)		0.004	
		(1.319)	
D(LNDPT)		0.001	
		(0.767)	
D(LNHEALEXP)		0.005**	
		(2.725)	
D(LNPOP)		-0.136***	-0.013***
		(-5.616)	(-6.596)
D(LNCPI)			-0.017**
			(-2.674)
cointEq(-1)	-0.627**	-0.301***	-0.242***
	(-3.479)	(6.349)	(-7.310)
Included observation	25	25	25
Adjusted R-squared	0.801	0.869	0.893
Durbin Watson	2.06	2.37	1.9

*Note: numbers in parentheses are t-statistic. ***,** indicate significance at 1 percent and 5 percent respectively*

For each model, there exists a long run relationship among the variables since the F-statistics for each model is greater than the 1% critical level for both I(0) and I(1). Following this result, cointegrating form/parsimonious error correction model was estimated for each model. Table 4.4 shows the results and as can be read off, model for education index follows ARDL(1, 2, 1, 2, 2, 2, 2, 2), that is, the maximum lag was 2. Model for health index follows ARDL(1,1,1,0,1,0,1,1,0,1) while model for income index follows ARDL(1,1,1,2,0,0). It must be recalled that the number of lags are automatically selected using the Schwartz Information Criterion (SIC). Consequently, the maximum lag in the education index model is 2, while that of health index is 1 and income index exhibits maximum lag of 2.

Out of seven variables considered as determinants of education index, only exchange rate failed to significantly affect it in the short run while control of corruption had a positive effect. However, it is the contemporaneous value of control of corruption that matter for education index in the short run. Unlike control of corruption, lagged values of government spending on education exerted positive effect on education index. Specifically, education index will improve by 0.27 point this year for a 1 percentage increase in government education spending in the previous year. Put in other words, if government raises education spending by 1% this year, the result predicts a 0.2 points improvement in education index next year.

Although the response of education index to government spending on education is slow, the positive effect suggests that government spending on education, particularly on literacy and basic education is important for human development.

Education index is also influenced by lagged and contemporaneous values of personal remittances. As shown in the Table, if remittances increase by 1% this year, education index will fall by approximately 0.01 point next year. However, the same percentage increase in remittances will lead 0.05 point increase in the current year. This implies that current remittances are crucial to education improvement but it could be detrimental in the near future. Meanwhile, since the coefficient of the current remittances is larger than the coefficient of the lagged remittances, it can be said that remittances are important for education improvement.

Funds from all the international Donors (UNDP, ODA, and UNICEF) have diverse direction of effect on education index. Lagged values of UNDP and ODA had positive influence while current values of each of the variables had negative impact. However, the coefficient of UNDP was not significant. In the case of UNICEF, the current value was positive but the lagged value was negative. Further, while funds from international Donors are important for education improvement in Nigeria, some tend to be detrimental. Besides too much of the fund appeared to be fungible such that if becomes counterproductive, in the short run.

Turning to the second component of human development, that is, the health index, only two out of eight variables are significant in the short run. The result shows that government health expenditure and population had significant effect on health status in Nigeria. Increase in government health expenditure raises people's health standards while increase in population exposes people to low health condition. It may not be surprising that UNICEF funds are not significant in driving health status in Nigeria because UNICEF funds, by definition, are targeted towards educational development. Also,

immunization against measles and whooping cough could not influence health status in the short run, perhaps because such treatment is actually a preventive measure against health challenges in the long run.

Income index is significantly influenced by control of corruption, lagged value of exchange rate, personal remittances, population and price index. Out of these variables, only remittances indicated positive effect. This positive and significant effect is a confirmation of the received evidence that remittances raise people's wealth and so, increases people's purchasing power in the market. However, the negative effect of consumer price index, which indicates low purchasing power will reduce the power of remittances in improving people's market power. But it is also possible to conjecture that remittances could trigger price level particularly if the inflow increases demand pressure. A preliminary check to authenticate or rebuff this conjecture was carried out, using pairwise correlation analysis and Granger causality. The result indicates a weak correlation and insignificant causality. Therefore, remittances and price index are not strongly correlated neither do they cause each other. Therefore, putting the two variables together in the model cannot cast doubt on the prediction power of the coefficients. Owing to this finding, what can be said is that remittances tend to precipitate the negative influence of price index on people's market power. In other words, were there no remittances, income would have been grossly adversely affected by increase in price index.

In the like manner, a preliminary analysis similar to that of remittance-price index nexus was also carried out for remittances and exchange rate. The correlation coefficient also reported a weak but negative association while the Granger causality is not significant. Consequently, the exchange rate does not influence decision to remit or vice vasa. The same result was obtained in the case of exchange rate and price level.

The negative effect of exchange rate on income index indicates that depreciation is not good for income improvement. The reason for this is actually not clear but it suggests that people either revert to domestically produced goods to substitute for imported products or reduces importation (because imported products now appear to be relatively expensive) during depreciation period.

Control of corruption negatively influences income index. This result is not implausible because in the short run, control of corruption could have showed expected positive result, by making people to reduce act of corruption, and so, reduce spending of the corrupt/illicit money. The magnitude of effect of this variable indicates that a 1% increase in the control of corruption reduces income index by 0.01 point. This suggests that the effect is almost negligible. Increase in population rate reduces income index, due perhaps to dependency effect. However, just as in the case of control of corruption, the effect is somewhat negligible.

The speed of adjustment of the variables in each model in their respective long run equilibrium is such that following any shock in the education index, it takes around two years for adjustment to complete. Specifically, 60 percent of the shock is absorbed in the current year (when the shock occurs) and the rest 40 percent is taken care of next year. Therefore, the response of education index to a change in the variable that affects it will take approximately one and a half year for it to settle to another equilibrium. Unlike the education index, only 30 percent of such adjustment is absorbed in the current year when there is a shock from the factor that affects health index and 24 percent will be taken care of in the current year when

inc me index experiences any shock from its determinant. Hence, it is expected that any shock in the health index (if the shock influences health index) takes three years (including the current year) for the system to adjust fully to its long run equilibrium. But it will take income index four years (including the current year) for full adjustment to take place following any distortion in the variable that determines.

Table 4.5: The Long run determinants of human welfare in Nigeria

Variables	EDUCATION INDEX	HEALTH INDEX	INCOME INDEX
CORRUPTION	-1.287*** (-4.645)		1.574*** (3.562)
LNEXCH	-0.189*** (-5.256)		-0.161*** (-4.253)
LNEDGOVT	-0.027 (-1.259)		
LNREM	0.069*** (4.733)	0.001 (0.621)	-0.03*** (-3.489)
LNUNDP	-0.127*** (-10.229)		
LNODA	-0.049*** (-3.834)	-0.0004 (-0.368)	
LNUNICEF	0.235*** (4.102)	0.017*** (3.224)	
LNCO2		-0.013* (-1.807)	
LNMEASLE		0.024* (1.920)	
LNDPT		0.005 (0.711)	
LNHEALEXP		0.022*** (3.355)	
LNPOP		-0.072*** (-2.774)	-0.339*** (-3.453)
LNCPI			0.193*** (3.337)
constant	-0.238 (-0.569)	-1.703*** (-4.322)	-5.783 (-0.766)
Diagnostic Tests			
Breusch-Godfrey Serial Correlation LM Test	F-statistic	1.006	0.219	7.447
	Probability	0.576	0.917	0.119
Heteroskedasticity Test Breusch-Pagan-Gofrey	F-statistic	0.206	0.643	0.849
	Probability	0.989	0.789	0.594
Ramsey RESET Test	F-statistic	1.636	0.552	0.894
	Probability	0.2433	0.478	0.413
Normality Test	Jaque,Bera	0.508	0.685	2.781
	Probability	0.818	0.326	0.249

*Note: numbers in parentheses are t-statistic. ***,**,* indicate significance at 1 percent, 5 percent and 10 percent respectively.*

The long run model presented in Table 4.5 shows that all the drivers of education (except government spending on education) and income index are significant, while three variables (remittances, ODA and DPT) were not significant. Control of corruption is still negative in the long run. A 1 point increase in control of corruption reduces education index by 1.2 points. This outcome suggests that the education sector in Nigeria is corrupt-ridden in such a way that measures put in line to discourage corruption reduce educational status of people.

Depreciation is detrimental to education index in the long run. This can occur due to large dependence on importation of educational materials on one hand and increase in international school fees (in naira value) on the other hands. Either or both of these possibilities will reduce teaching-learning productivity and then reduces educational status. Remittances play important role in education status. Apart from being positive, the sensitivity of education to remittances is notable. A 1% increase in remittances will raise education status by 0.1 percentage point. Remittances are personal transfer to the recipients which are spent based on either the instruction of the sender or the discretion of the receiver. A major purpose for which remittances are meant is to offset school bills of the children of the family left behind or the children of the emigrants left behind. Hence, remittances are a means of encouraging school enrolment, discouraging drop-out and consequently raising educational status of a country.

Funds from the international Donors such as UNDP and ODA are counterproductive to education in Nigeria but funds from UNICEF were positive. This indicates that funds coming from UNICEF are effectively productive in raising educational status. The health status is positively affected by UNICEF, immunization against measles, and government health expenditure. Variables that affect health status negatively are carbon emission and population, while remittances, ODA funds and immunization against whooping cough (DPT) were insignificant in affecting health index in the long run. Increase in the rate of immunization against measles by 1% raises health status by 0.02 point. In the same vein, if UNICEF increases its funds by 1%, health status will improve by 0.02 point. Carbon emission reduces health status because a 1% increase in carbon emission dwarfs health status by 0.03 point. It must be noted that this variable did not influence health status in the short run. also the sensitivity of health index to this variable is relatively higher in the long run than short run (even though it is still negligible). It is therefore indicative that proliferation of carbon-dioxide has a long run implication for health status of Nigeria.

Another variable that positively influences income is the price index. As shown, a 1% increase in price index raises income index by 0.2 point. This suggests that increase in price index is important for income growth in the long run. This result is consistent with macroeconomic prediction that when the economy is approaching its long run, both price level and income will be rising all together and that in the long run, income will not respond to change in price level. Since income still respond to changes in price level but in a sluggish way, it means the economy is close to its long run. Exchange rate maintains its negative effect on income, suggesting that depreciation (increase in the quantity of naira per unit of dollar) reduces income. This could indicate large dependence on imports or low export response. Remittances were inimical to

income in the long run due to the large flair for imported products. Population also retained its negative effect but now having a larger magnitude of effect than the short run.

The post-estimation test for each of the model shows that there is no serial correlation or heteroskedsticity effect in any of the models. Also, there is no evidence of omitted variable as indicated by the RESET test. In the same vein, the series in each of the models are normally distributed. Following these outcome of diagnostic tests, results from the models and reliable because the coefficients are unbiased, efficient and consistent.

CONCLUSIONS

Nigeria is one of the richest mineral resource countries and has enjoyed large inflow of mineral revenue over the years. As a result, the country appears to be the richest economy in Sub-saharan Africa. Besides, it was identified as one of the fastest growing economies in the world. However, poverty, inequality and unemployment still persist. Despite several developmental policies implemented by the authorities, there is little improvement that was experienced. Knowing fully well that the components of human development are education, health and income, this study seeks to investigate the determinants of each of these components so as to gain deeper understanding on the determinants of human development.

The study employed Armatia Sen's capability approach as theoretical basis and the autoregressive distributed lag (ARDL) as econometric method to examine how education, health and income indexes respond to their respective determinants. Education index was significantly affected by control of corruption, public spending on education, personal remittances, and funds from international Donors. Current control of corruption, previous personal remittances, current funds from ODA and previous funds from the UNICEF had negative effect on education index. Previous public spending on education, current personal remittances, previous fund from ODA and current fund from UNICEF had positive effect on education index. This suggests that remittances and funds from ODA and UNICEF could be fungible. Health index were influenced positively by public spending on health and negatively by population growth. Income index was influenced positively by personal remittances, and negatively by control of corruption, exchange rate, population growth, and price index. The speed of convergence was fastest in the model of education index, followed by health index and then income index.

In the long run, control of corruption, personal remittances, and funds from UNICEF positively affect education index while exchange rate, funds from UNDP and ODA showed negative effect. Public spending on health, immunization against measles and funds from UNICEF were significant in positively driving health index, while carbon emission weakens health status of Nigeria. In the case of income index, control of corruption and price index had direct effect but the effect of exchange rate, remittances and population growth was negative.

Following these results, there is deeper understanding about the situation of human development in Nigeria. That is, it is clear that if any factor driving any of the components of human development is affected, then, the overall welfare will also be affected. The result shows that some factors such as public spending on education and health, remittances and funds from UNICEF and ODA should be encouraged. Since previous value of these variables impacted negatively on education, it means that they are still not effectively used. Hence, it is important to investigate why this is so. The fight against corruption

is good for both education and income indices and so, it is recommended that efforts to discourage corruption should continue. Continuous efforts to reduce corruption could also reduce the fungibility of remittances and ODA.

Proliferation of carbon emission is a threat to health status and must be discouraged. Therefore, a bill that will clamp down on individual or firms producing/generating carbon emission should be developed and passed to law. Positive population growth is not a sign of welfare improvement in the country. It has been established in the standard literature that population growth can reduce human development. Although the authorities are doing everything possible to put population growth under control, more efforts is still required. The sources of population should be explicitly identified and addressed appropriately.

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APPENDIX
THE ARDL RESULTS FOR EDUCATION INDEX

Included Observations 25 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags; automatic)

Fixed regressors: C
Number of models evalulated: 2187
Selected Model: ARDL(1, 2, 1, 2, 2, 2, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
EDUCINDEX(-1)	0.373265	0.180099	2.072550	0.1299
CORRUPTION	-0.456016	0.088567	-5.148803	0.0142
CORRUPTION(-1)	-0.251352	0.109595	-2.293457	0.1056
CORRUPTION(-2)	-0.099792	0.145761	-0.684629	0.5427
LNEXCH	-0.034849	0.022375	-1.557484	0.2172
LNEXCH(-1)	-0.083835	0.016211	-5.171581	0.0140
LNGOVRT	0.002774	0.008502	0.326309	0.7656
LNGOVRT(-1)	-0.046277	0.007814	-5.922066	0.0096
LNGOVRT(-2)	0.026379	0.011691	2.256400	0.1093
LNREM	0.046856	0.008918	5.254168	0.0134
LNREM(-1)	-0.011785	0.003149	-3.742532	0.0333
LNREM(-2)	0.008538	0.004037	2.115251	0.1247
LNUNIDP	-0.014849	0.008787	-1.689871	0.1896
LNUNIDP(-1)	-0.009918	0.003462	-2.864939	0.0643
LNUNIDP(-2)	-0.055356	0.012797	-4.325794	0.0228
LNODA	-0.032248	0.007465	-4.320080	0.0229
LNODA(-1)	0.007312	0.003175	2.303072	0.1047
LNODA(-2)	-0.006353	0.003032	-2.095431	0.1271
LNUNICEF	0.041377	0.011440	3.616774	0.0363
LNUNICEF(-1)	-0.000259	0.012512	-0.020732	0.9848
LNUNICEF(-2)	0.105939	0.016643	6.365370	0.0078
C	-0.149000	0.225905	-0.659570	0.5566

R-squared	0.997542	Mean dependent var	0.450446
Adjusted R-squared	0.980338	S.D. dependent var	0.020282
S.E. of regression	0.002844	Akaike info criterion	-9.247500
Sum squared resid	2.43E-05	Schwarz criterion	-8.174889
Log likelihood	137.5938	Hannan-Quinn criter.	-8.950003
F-statistic	57.98123	Durbin-Watson stat	2.961685
Prob(F-statistic)	0.003184		

*Note: p-values and any subsequent tests do not account for model selection.

THE ARDL RESULTS FOR INCOME INDEX
Included Observations 25 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags; automatic)
Fixed regressors: C
Number of models evalulated: 243
Selected Model: ARDL(1, 1, 1, 2, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INCOMEINDEX(-1)	1.042959	0.108555	9.607694	0.0000
CORRUPTION	-0.007938	0.017968	-0.441779	0.6654
CORRUPTION(-1)	-0.059695	0.038924	-1.533632	0.1474
LNCPI	-0.017271	0.007108	-2.429888	0.0291
LNCPI(-1)	0.008991	0.006740	1.334142	0.2035
LNEXCH	-0.005807	0.004749	-1.222878	0.2416
LNEXCH(-1)	0.000666	0.002231	0.298442	0.7697
LNEXCH(-2)	0.012039	0.001740	6.918582	0.0000
LNPOPTOT	-0.014579	0.042210	-0.345399	0.7349
LNREM	0.001298	0.000984	1.319690	0.2081
C	0.248456	0.736136	0.337514	0.7407

R-squared	0.998834	Mean dependent var	0.535699
Adjusted R-squared	0.998001	S.D. dependent var	0.048100
S.E. of regression	0.002151	Akaike info criterion	-9.145864
Sum squared resid	6.48E-05	Schwarz criterion	-8.609558
Log likelihood	125.3233	Hannan-Quinn criter.	-8.997115
F-statistic	1199.054	Durbin-Watson stat	1.939473
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

THE ARDL RESULTS FOR IHEALTH INDEX

Included Observations 25 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags; automatic)

Fixed regressors: C
Number of models evalulated: 512
Selected Model: ARDL(1, 1, 1, 0, 1, 0, 1, 1, 0, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LEI(-1)	0.691053	0.048658	14.20231	0.0000
LNCO2_KT_	0.001117	0.001616	0.690944	0.5070
LNCO2_KT_(-1)	0.003042	0.001366	2.226632	0.0530
LNIMUMISLE	0.003605	0.002733	1.319194	0.2197
LNIMUMISLE(-1)	0.003696	0.001881	1.964239	0.0811
LNDPT	-0.001405	0.001830	-0.767552	0.4624
LNUNICEF	0.002194	0.001497	1.465467	0.1768
LNUNICEF(-1)	0.003088	0.001046	2.950625	0.0162
LNPUBHEALTH	-0.003416	0.001715	-1.991667	0.0776
LNHEALTH	0.005158	0.001893	2.724523	0.0234
LNHEALTH(-1)	0.001928	0.001083	1.780353	0.1087
LNREM	-0.000420	0.000392	-1.072320	0.3115
LNREM(-1)	0.000675	0.000338	1.995973	0.0771
LNODA	-0.000135	0.000361	-0.373283	0.7176
LNPOPTOT	0.135319	0.024093	5.616464	0.0003
LNPOPTOT(-1)	-0.113042	0.022942	-4.927298	0.0008
C	-0.526247	0.151327	-3.477547	0.0070

R-squared	0.999923	Mean dependent var	0.442822
Adjusted R-squared	0.999787	S.D. dependent var	0.039826
S.E. of regression	0.000582	Akaike info criterion	-11.81444
Sum squared resid	3.05E-06	Schwarz criterion	-10.99183
Log likelihood	170.5877	Hannan-Quinn criter.	-11.57756
F-statistic	7323.827	Durbin-Watson stat	3.377468
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

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