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Determinants of Inclusive Growth in Nigeria: An ARDL Approach

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Abstract Nigeria is one of the fastest growing economies in the world, yet ranked 152nd out of 188 countries of the world [1]. As such, growth in one sector of the economy does not automatically translate into equal benefits for the populace. This paper therefore provides an empirical analysis of the relationship between inclusive growth and its determinants as studies in this area are limited. Against this backdrop, the study utilized annual data from 1981 till 2014, and employed both the autoregressive distributed lag model (ARDL) and the error correction method (ECM) to investigate the long-run and the short-run parameters among the variables. The findings suggest a negative relationship between government consumption, education expenditure and inclusive growth both in the short-run and the long-run. In contrast, inflation and population growth variable indicate a positive effect on inclusive growth in the short-run but turned out negative in the long-run. Finally, initial capital and FDI showed a negative relationship in the short run, but a significantly positive contribution to inclusive growth in the long-run. Based on these findings, the study recommends that policy makers should take appropriate steps to increase the inflow of foreign direct investment, reduce inflation, while they work at improving the quality of the population in order to achieve inclusive growth.

Keywords Inclusive growth, Auto-regressive distributed lag, Nigeria

1. Introduction

There is an increasing awareness of inclusive growth among policy makers in many countries, institutions, donors, and non-governmental organizations (NGO) aimed at addressing the deficiencies of prioritizing solely economic growth and ensuring that the benefit of growth is enjoyed by all. Organization for Economic Cooperation and Development [2] defines inclusive growth as a situation where the gap between the rich and the poor is less pronounced and the growth dividend is shared in a fairer way that results in improvements in living standards and outcomes that matter for people's quality of life (e.g. good health, jobs and skills, clean environment, community support). Several economic factors such as foreign investment, inflation, gross fixed capital formation, real exports, real imports, savings amongst others affect the inclusiveness of growth in a country. However, understanding the determining variables of inclusive growth in Nigeria is a prerequisite to identifying critical areas to direct available resources.

Nigeria operates an open economy in which international transactions constitutes an important portion of her aggregate economic activity, while the economic prospects and development rest critically on her international interdependence [3]. The economy's private sector has played a marginal role in the overall economic system while there exists an apparent domination of employment generation in the public sector. Also, the county's manufacturing sector has been further weakened by the absence of a broad-based growth in the economy since independence. In an attempt to address these challenges and promote inclusive growth, Nigeria embarked on several development programmes ranging from the International Monetary Fund (IMF), Structural Adjustment Programme (SAP), National Program for the Eradication of Poverty (NAPEP), National Economic Empowerment Development Strategy (NEEDS), the United Nations (UN)- sponsored National Millennium Goals for Nigeria (NMGN), Vision 20:20 among others, but with very minimal result.

In response to these policies, Nigeria's experienced a 7.5% GDP growth (see figure 1) over the last decade making her the 21st largest economy in the world based on the nominal GDP [4]. In the same vein, the depth of poverty and its incidence measured by the poverty gap at $1.25 a day increased from 21.9 percent in 1986 to 33.7 percent in 2010. Therefore, an expanding economy does not necessarily mean that everyone benefits equally from the increased prosperity [5]. As seen in the case of Nigeria, there still exists a high rate and duration of unemployment and underemployment, low human development index which pose a problem to

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macroeconomic policies, institutional lapses and bottlenecks, public sector in-efficiency, conflicts, structural impediments and economic instability. The juxtaposition of all these is reflected in the persistent low ranking of the country (152nd out of 188) in the world [1]. Recognizing the negative economic, social and political consequences of these trends, it is no longer sufficient to have economic growth year after year, but an inclusive growth which will cater for the vulnerable and reduce insecurity.

Considering the determinants of inclusive growth in emerging markets, [7] posited that macroeconomic stability, human capital and structural changes are the key variables while the role of technology is less discernible. In the same vein, [8] analyzed the determinants of inclusive growth in Africa, focusing on human capital development and population growth. However, studies such as [9-11] that have focused on the Nigerian situation have considered the benefits of inclusive growth in poverty alleviation, trade openness and capital investment as a means of achieving inclusive growth in Nigeria. Furthermore, [12] noted that when monetary policy is developed and conducted efficiently, it will influence the key drivers of inclusive growth in Nigeria. These therefore creates a gap for further studies on the determinants of inclusive growth in Nigeria.

The objective of this paper is to examine the various factors that influence inclusive growth, with special focus on the role of macroeconomic variables in Nigeria, both in the short-run and the long-run. To the best of our knowledge ours is the first attempt that undertakes a study estimating a linear dynamic model based on [13] multivariate autoregressive distributed lag (ARDL) approach, utilizing time series data covering the period from 1981-2014. Hence, a contribution to the existing pool of literature on the topic. The application of economic models in explaining the dynamics of inclusive growth will enable economic decision makers develop a more adequate understanding of macroeconomic time line and exercise their judgment in a much more structured and quantified manner.

The further contents of the paper can therefore be summarized as follows. Section 2 discusses the exposition on inclusive growth and a brief literature review, while section 3 presents the model and data. Section 4 discusses the empirical estimates of the determinants of inclusive growth in Nigeria and section 5 concludes the paper with policy implications.

2. Literature Review

2.1. Conceptual Issues on Inclusive Growth

The term ‘inclusive” growth can be traced to [14], and it is often used interchangeably with a suite of other terms, such as ‘broad-based growth’, ‘shared growth’, and ‘pro-poor growth’. In some cases, emphasis is laid on pro-poor growth, aimed at delivering higher income gains for low income groups than the rest of the population which will reduce inequalities in living standards. Another approach lays emphasis on productive employment, such that economic growth can generate jobs to absorb the growing population and ensure that workers reap the benefits of rising productivity. However, development economics is witnessing a paradigm shift from pro-poor growth to inclusive growth [15].

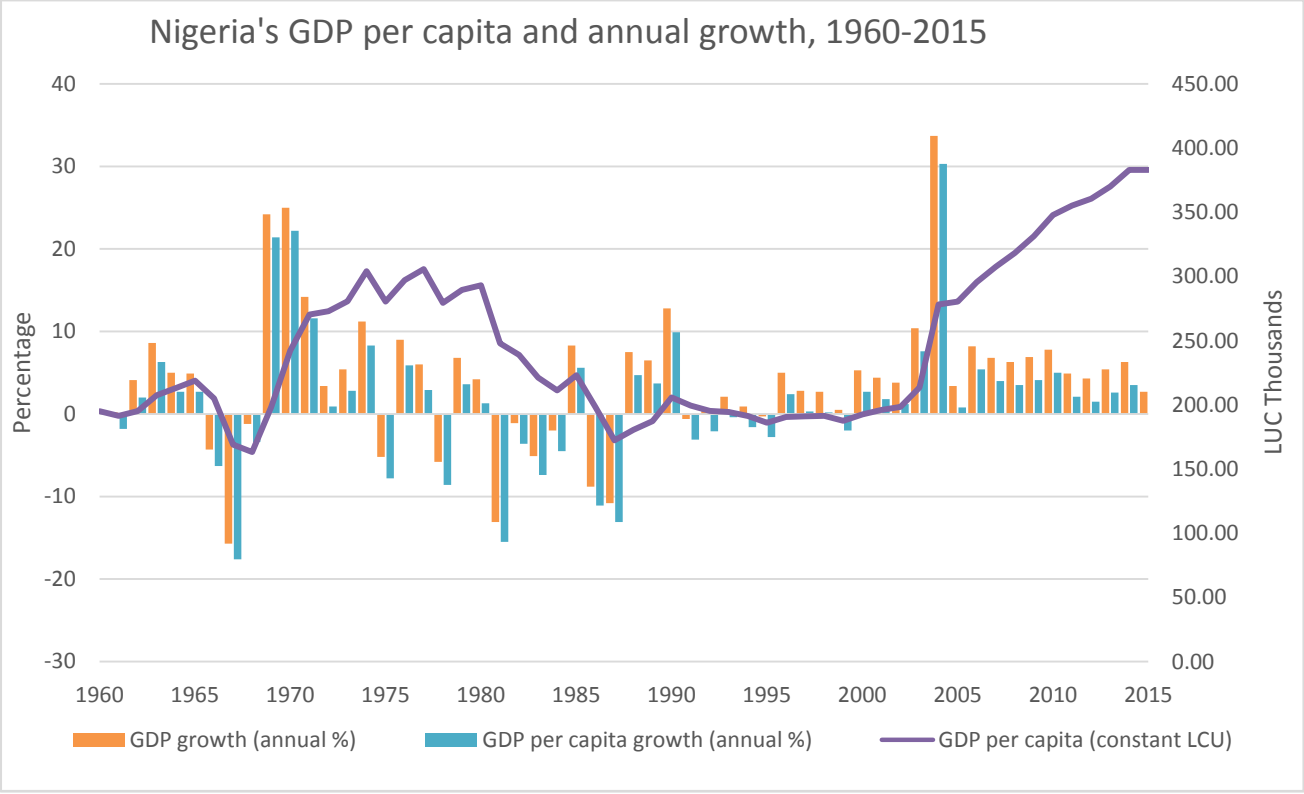
Inclusive growth is preferred because shared growth can be misunderstood as implying a focus on income distribution schemes, while broad-based and inclusive growth emphasize on policies that remove constraints to growth and create a level playing field for investment. Therefore, the main difference between inclusive growth and the pro-poor approach is that the pro-poor is mainly interested in the welfare of the poor while inclusive growth is concerned with opportunities for the majority of the labor force, poor and middle-class alike.

Several attempts have been made by scholars although it still remains rather ambiguous as a term because there is no universal definition to it [1]. The Asian Development Bank [16] defines inclusive growth beyond the broad-based growth. It is a type of growth that not only create new economic opportunities but also as one that ensures equal access to the opportunities created for all segments of the society, particularly for the poor. The World Bank [17] defines inclusive growth as the pace and pattern of economic growth which are interlinked and assessed together with the aim of reducing absolute poverty. This definition adopts a long-term perspective and it implies a direct link between macro and micro determinants of growth. Also, the International Policy Centre for Inclusive Growth [18] places its emphasis on participation so that in addition to sharing in the benefits of growth, people actively participate in the wealth process and have a say in the orientation of that process.

Inclusive growth is growth that not only creates new economic opportunities but also one that ensures equal access to the opportunities created for all segments of society including the disadvantaged and the marginalized [19]. Therefore, inclusive growth is about raising the pace of growth and enlarging the size of the economy, while leveling the playing field for investment and increasing productive employment opportunities [20]. Furthermore [21] illustrated inclusive growth as a situation where the wage rate is higher than per capita income (GDP per capita) and/or economic growth is accompanied by a fall in poverty rate, unemployment and inequality gap. In other words, inclusive economic growth is not only about expanding national economies but also about ensuring that the most vulnerable people of societies are reached.

[15] emphasized that faster and sustainable economic growth is a pre-requisite for inclusive growth, while they also identified the theoretical model that exhibits the eight key drivers of inclusive growth in a country. They then emphasized that key inclusive growth drivers such as economic growth should provide basic socio-economic amenities for all, while the government should promote administrative efficiency and ensure gender equality which

will enhance human capabilities. Also, productive employment can increase labour productivity which is capable of reducing poverty and substantially reduce income inequality.



Source: World Development Index [6]

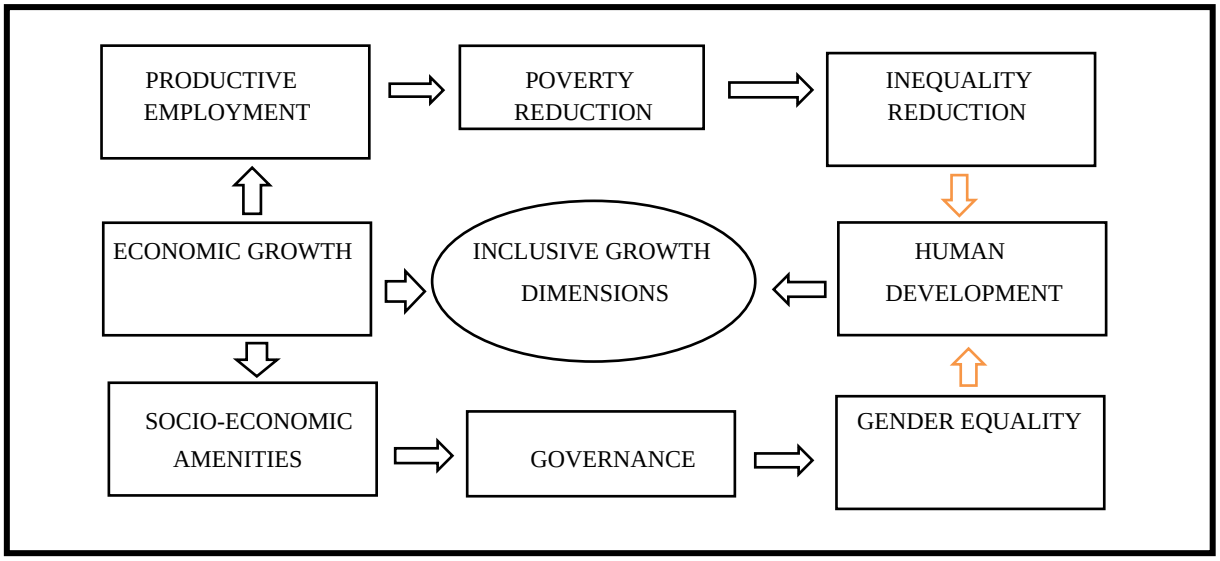


Figure 1. Theoretical model of inclusive growth by [22]

2.2. Three Challenges that Record Levels of Growth have Failed to Tackle

The Organization for Economic Cooperation and Development [2] highlighted the need to address the quality of growth and in particular, improve its inclusiveness. In addition, they identified three problems that the record levels of growth of the 1990s and 2000s failed to tackle, namely: unemployment, poverty and inequality.

The Nigerian Case

2.2.1. Poverty

Nigeria's poverty incidence, measured by the headcount ratio, worsened in all the geo-political zones and sectors (rural and urban) of the country in 2010 with about 112 million Nigerians living below the poverty line. Figure 2.1 reveals that more Nigerians were poor between 1980 and 2010 as 62.6% of Nigerians live in poverty as compared to 27.2 in 1980. Recently, United Nations (UN) report on Nigeria's Common Country Analysis (CCA) described the country as one of the poorest in the world, with over 80 million of her population living below poverty line. The contribution to poverty tends to be higher in the north than in the south; with northeastern, experiencing the highest poverty rate in the nation.

Furthermore, the National Human Development Report for Nigeria documented the following as the drivers of poverty: (a) low and declining real farm incomes; (b) higher prices of food and other essentials like transport, fuel (lower real incomes); (c) macroeconomic conditions– exchange rate, interest rate (access to credit), jobless and non-inclusive growth (gender issues in growth), inequality, unemployment and high dependence on oil; (d) socio-cultural conditions; (e) insecurity (conflict and displacement of populations); (f) stagnating rural economy (agriculture, infrastructure, insecurity, natural disasters); (g) gender imbalance (inequality of access to basic entitlements; education, health, sanitation, energy, housing; and (h) policy shocks.

2.2.2. Unemployment

The capacity of the Nigerian labour market to generate productive employment has not matched the growth rate of the labour force, hence the labour supply is in excess of its optimal level or it is greater than the demand. The trend of underemployment rate indicates that the Nigerian labour market has been generally dominated with under-employment situation much more than the outright unemployment phenomenon as the magnitudes of the underemployed outstripped the unemployed since 2010.

Largely, it shows a lack of economic activities as many people are engaged in jobs that are less than their educational attainments; while the situation has been aggravated by an increase in seasonal and temporary jobs that attract reduced income. [24] posited that low industrial base, infrastructural deficits, insecurity, poor governance and weak institutions are the causes of unemployment in Nigeria, despite recording a growth rate of over 5 per cent in the previous decade.

2.2.3. Inequality

Inequality in Nigeria is seen to have worsened due to a large income disparity as a result of a segmented labour market (formal and informal sector), unavailability of jobs and the inaccessibility of credit and financing. Several economic agencies such as the IMF, World Bank, UNDP have emphasized the detrimental effect of inequality on economic growth. Therefore, economic policies and reforms (exchange rate devaluation, trade and financial reforms, budgetary and monetary contraction) has been introduced by the Nigerian government in order to revitalize growth and also improve equity. The Gini Index (a measure of income inequality) in Nigeria was measured at 42.97 in 2009, as compared with 38.67 in 1985 (Figure 2.3) while the world bank 2011 reported that 80% of the world's wealth was in the hands of 20% of the richest population.

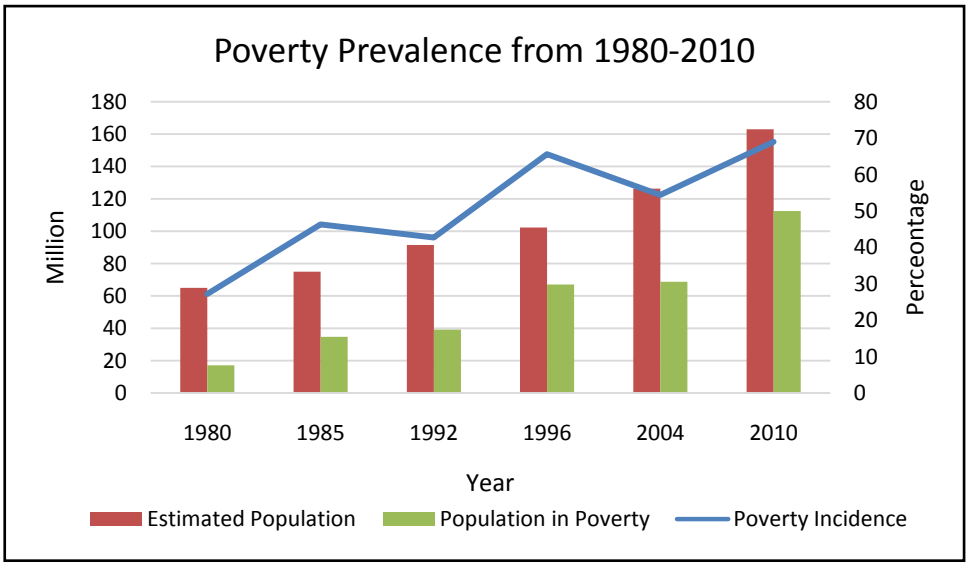


Figure 2.1. Nigeria's poverty prevalence. ***Source:*** *The 2010 Nigeria Poverty Profile Report by [22]*

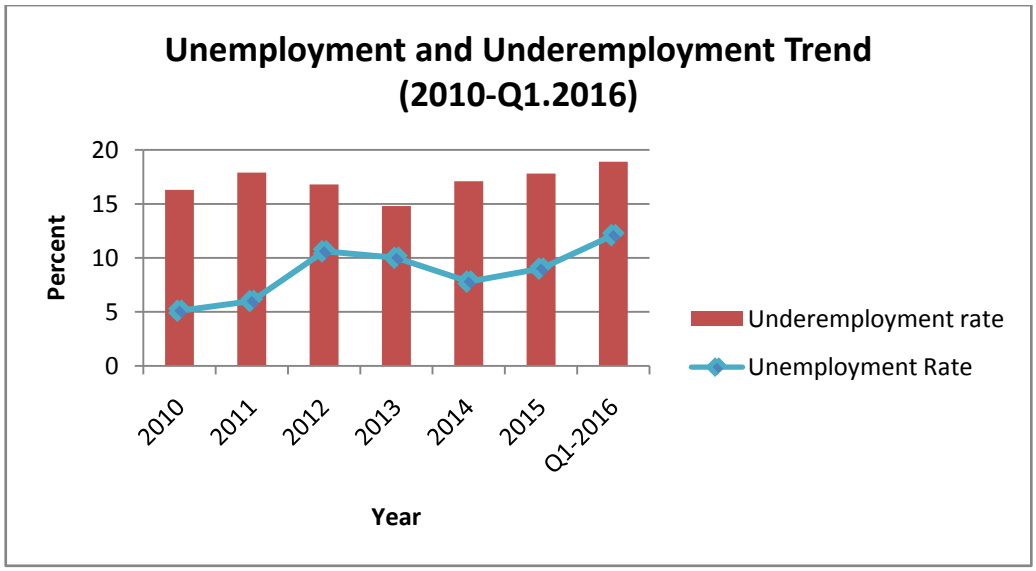


Figure 2.2. Nigeria's unemployment and underemployment trend. ***Source:*** *Authors' computations based on data from NBS [23]*

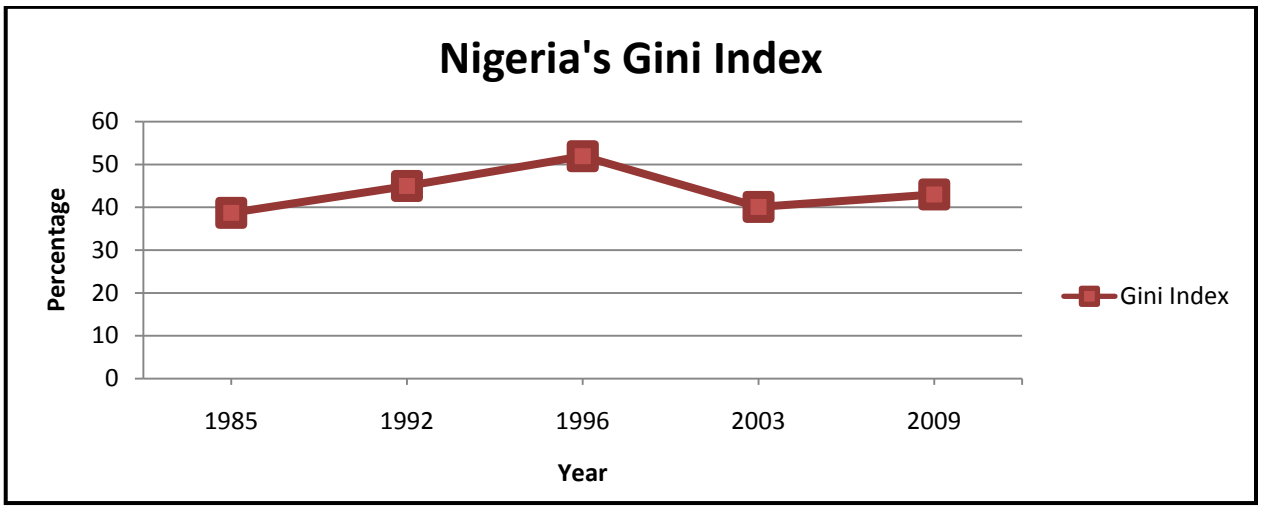


Figure 2.3. Nigeria's Gini Index. ***Source:*** *World Bank estimate [25]*

2.3. Review of Empirical Literature

Following the 2008 global economic meltdown, inclusive economic growth has become an issue that continues to be of substantial theoretical and empirical interest in both developed and developing countries. Various studies [26-28] have investigated the importance and benefits of inclusive growth beginning with [29], who pioneered the measurement of inclusive growth through the social opportunity function. Their findings revealed that growth is defined as inclusive if it increases the social opportunity function, which depends on two factors namely; average opportunities available to the population, and how opportunities are shared among the population. In addition to this [19] suggested that a development strategy with inclusive growth as the overarching goal should have two mutually reinforcing strategic anchors: first, high and sustainable growth to create productive and decent employment opportunities; and second, social inclusion to ensure equal access to opportunities.

Studies such as [20, 30] pointed out that the rapid pace of growth is unquestionably necessary for substantial poverty reduction but for growth to be sustainable in the long run, it should be broad based across the sectors and inclusive of the large part of the country's labor force. They also considered that inclusive growth exacerbates in opportunities like health, education, communication & transport, public services, nutrition and sanitation facilities for the destitute segment of the society. Furthermore, [31] reinstated that there is no universal definition of inclusive growth or inclusive development but inclusive growth is accompanied by lower income inequality so that the increment of income accrues disproportionately to those with lower incomes.

In 2013, [7] employed a five years' data set from 1979 to 2010 in analyzing the measurement and determinants of inclusive growth for both emerging markets and low income countries. Their findings revealed that macroeconomic stability, human capital, and structural changes are the foundation for achieving inclusive growth, while the role of technological change emphasized in the literature has a less

discernible impact. Adding to these factors, [27] discovered the importance of fiscal policies (increase spending on health, education, and social safety nets) in achieving inclusive growth. They also suggested a need for labor market reforms to boost the labor share of total income; and reforms to make financial systems more inclusive. Furthermore, the findings of [32] opined that social expenditures, spending on education, and educational attainment rates are important for fostering inclusive growth while macro-financial stability, with particular attention to inflation risks, is critical for promoting inclusive growth. [21] however suggested that augmenting health expenditure with natural resource appears to be more significant for making growth process inclusive. Therefore, inclusive growth requires, by definition, both economic growth and inclusion [26].

As far as inclusive growth in Nigeria is concerned, [28] utilized a growth diagnostic approach based on the Business Enabling Environment Approach (BEEA) and Employability Analysis Approach (EMPA) in examining the basic constraints to inclusive growth. Their findings identified two broad categories of constraints to inclusive growth in Nigeria, namely: constraints to business environment in Nigeria; and employability challenges of Nigerian graduates. They also discovered that these constraints are directly related to poor physical infrastructure, poor human capital formation, particularly, in the educational system and the inability to transform output growth to job creation. In the same vein, [33] asserted that it is absolutely imperative that government at all levels should promote a broad-based growth that generates productive employment, redistributes income, enhances equity and involves the active participation of the poor if the incidence of poverty is to be reduced in Nigeria. While most of these findings are based only on analysis of correlation coefficients among relevant variables it is widely documented that, despite the rise in economic growth, incomes of the majority of Nigerians have not risen.

More recently, [8] examined the role of health and population growth on inclusive growth in 14 African countries (including Nigeria) from 1995 to 2012 adapting the method of [7]. They discovered that population growth decreases the effect of inclusiveness while adequate financing of the health sector is fundamental to improve pro-poor growth in Africa. On the other hand, the study conducted by [11] found a one-way causality through inclusive growth to financial development through financial deepening measure. They also discovered that either a low level or high level of openness on trade and capital investment are desirable for inclusive growth in Nigeria.

The foregoing review of empirical studies indicated that recent studies have not provided adequate information in favor of the determinants of inclusive growth in Nigeria. The results of some of the studies show that business environment and employability challenges are constraints to inclusive growth, while others studies in Nigeria have focused on inclusive growth as a means of poverty alleviation and financial development. Therefore, empirical investigation of the determinants of inclusive growth in Nigeria is indeed necessary.

3. Data, Model and Methodology

3.1. Model of Study

Macroeconomic theory has identified various factors that influence inclusive growth, while scholars such as [7, 8, 21] asserted that these factors include; human capital, population, foreign direct investment, natural resources, trade openness, fixed investment, credit to GDP, government consumption, inflation, GDP volatility, infrastructure quality, REER deviations and many others. Given our desire to account for the determinants of inclusive growth in Nigeria, this study adapts the model of [7] as modified by [11] which is predicated on the social opportunity function.

The inclusive growth function which incorporates output growth performance as well as distribution of economic growth is specified as follows;

$$\bar{y}_t^* = \alpha_\circ + \beta_1 \bar{Y}_t + \beta_2 X_t + \varepsilon_t \quad (3.1)$$

In the above equation $\bar{y}_t^*$ indicates inclusive growth, which is measured by the GDP per person employed as a measure of productive employment; $\bar{Y}_t$ is the initial level of income; X_t is the vector of control variables while ε_t is the error term. For the purpose of this study, the determinants of inclusive growth considered for Nigeria are initial trade openness (TOP), foreign direct investment (FDI), expenditure on education (EDUEX), gross fixed capital formation (GFCF), population growth (POPG), general government financial consumption expenditure (GGFCE), and inflation (INF) to reflect the internal stability. Therefore, the equation is reformulated as;

$$\begin{aligned} GDPPPE = {} & \alpha_\circ + \beta_1 GDPPC + \beta_2 EDUEX + \beta_3 FDI \\ & + \beta_4 GGFCE + \beta_5 GFCF + \beta_6 INF + \beta_7 POPG + \beta_8 TOP + \varepsilon_t \end{aligned} \quad (3.2)$$

In equation (3.2), inclusive growth which is measured by gross domestic product per person employed is used as the dependent variable. Gross domestic product per capita is used to capture the initial level of income, while expenditure on education is captured as a ratio of GDP. Foreign direct investment, government consumption expenditure, capital formation, and trade openness are also measured as a ratio of GDP. On the other hand, observations on inflation and population growth are collected as annual percentages.

3.2. Methodology

Autoregressive Distributed Lag (ARDL) Bound Testing Approach

Several econometrical methods have been proposed for investigating long-run equilibrium (cointegration) among variables. However, this study utilizes the autoregressive distributed lag (ARDL) modelling approach which was

initially proposed by [34]. The main advantage of ARDL modelling lies in its flexibility with small sample study and it can be useful when the variables are of different order of integration.

In estimating the long-run relationship, a two-step procedure is utilized. Without having any prior information about the direction of relationship, If the first step predicts that there is a long-run relationship among the variables, the error correction version of ARDL framework [13] pertaining to the variables represented in equation (3.2) is formulated and specified as follows:

$$\begin{aligned}\Delta \ln GDPPPE_t = {} & \alpha_\circ + \sum_{i=1}^{n}\beta_1 \Delta \ln GDPPPE_{t-i} + \sum_{i=1}^{n}\beta_2 \Delta \ln GDPPC_{t-i} + \sum_{i=1}^{n}\beta_3 \Delta EDUEX_{t-i} + \sum_{i=1}^{n}\beta_4 \Delta FDI_{t-i} \\ & + \sum_{i=1}^{n}\beta_5 \Delta GGFCE_{t-i} + \sum_{i=1}^{n}\beta_6 \Delta GFCF_{t-i} + \sum_{i=1}^{n}\beta_7 \Delta INF_{t-i} + \sum_{i=1}^{n}\beta_8 \Delta POPG_{t-i} + \sum_{i=1}^{n}\beta_9 \Delta TOP_{t-i} \\ & + \varphi_1 \ln GDPPPE_{t-1} + \varphi_2 \ln GDPPC_{t-1} + \varphi_3 EDUEX_{t-1} + \varphi_4 FDI_{t-1} + \varphi_5 GGFCE_{t-1} \\ & + \varphi_6 GFCF_{t-1} + \varphi_7 INF_{t-1} + \varphi_8 POPG_{t-1} + \varphi_9 TOP_{t-1} + \varepsilon_t\end{aligned} \tag{3.3}$$

Where, *ln* represents natural logarithm, Δ is the first difference operator, and $\alpha_\circ$ is the drift component. The expression with summation sign (β_1 - β_9) represents the short-run dynamics of the model, while the coefficients (ϕ_1 - ϕ_9) represents long-run relationship and ε_t is the serially uncorrelated disturbance with zero mean and constant variance.

In order to investigate the existence of the long-run relationship among the variables in the system, the bound tests approach developed by [13] is employed. This test is based on Wald or F-statistic and follows a non-standard distribution. If the calculated F-statistics is below the lower bound critical value, the null hypothesis of no cointegration ($\phi_1 = \phi_2 = \phi_3 = \phi_4 = \phi_5 = \phi_6 = \phi_7 = \phi_8 = \phi_9 = 0$) is accepted. If it is greater than the appropriate upper bound critical values, the null hypothesis is rejected implying cointegration. However, if it lies within the lower and upper bounds, the result becomes inconclusive.

In the next step, after establishing the existence of the cointegration between variables, the following long-run model for economic growth can be estimated:

$$\begin{aligned}\ln GDPPPE_t = {} & \varphi_1 \ln GDPPP_{t-1} + \varphi_2 \ln GDPPC_{t-1} + \varphi_3 EDUEX_{t-1} + \varphi_4 FDI_{t-1} \\ & + \varphi_5 GGFCE_{t-1} + \varphi_6 GFCF_{t-1} + \varphi_7 INF_{t-1} + \varphi_8 POPG_{t-1} + \varphi_9 TOP_{t-1} + \varepsilon_t\end{aligned} \tag{3.4}$$

The lag orders of the variables are chosen by using the appropriate Akaike Information Criteria (AIC) or Schwarz Bayesian Criteria (SBC) to determine the optimal structure for the ARDL specification. After the estimation of the ARDL (m, n, o, p, q) specification and the calculation of the associated long-run multipliers, the following error correction model is formulated in order to estimate the short-run dynamics.

$$\begin{aligned}\Delta \ln GDPPPE_t = {} & \alpha_\circ + \sum_{i=1}^{n}\beta_1 \Delta \ln GDPPPE_{t-i} + \sum_{i=1}^{n}\beta_2 \Delta \ln GDPPC_{t-i} + \sum_{i=1}^{n}\beta_3 \Delta EDUEX_{t-i} \\ & + \sum_{i=1}^{n}\beta_4 \Delta FDI_{t-i} + \sum_{i=1}^{n}\beta_5 \Delta GGFCE_{t-i} + \sum_{i=1}^{n}\beta_6 \Delta GFCF_{t-i} + \sum_{i=1}^{n}\beta_7 \Delta INF_{t-i} \\ & + \sum_{i=1}^{n}\beta_8 \Delta POPG_{t-i} + \sum_{i=1}^{n}\beta_9 \Delta TOP_{t-i} + \lambda ECM_{t-1} + \varepsilon_t\end{aligned} \tag{3.5}$$

Where: β_1 - β_9 are the short-run parameters and λ is the speed of adjustment parameter which is expected to be less than zero. ECM is the lagged error correction term obtained from the estimated cointegration model of equation (3.5). To establish the stability of the long-run and short-run coefficients, the CUSUM and CUSUMSQ tests to the residuals of equation is applied in order to examine if the two statistics stay within the 5 % significant level.

3.3. Data Sources

This study is based on the annual time series data covering the period from 1981 till 2014, which comprises 34 data points. The data were obtained from the World Bank, World Development Indicators (WDI, 2016).

4. Empirical Results and Discussion

4.1. Descriptive Statistics

Logarithmic transformations of variables are very popular in econometrics because many economic time series data exhibit a strong trend and taking the natural logarithm of a series effectively linearizes the exponential trend (if any) [35] Since this paper is dealing with time series data, we preferred to take log of some variables to avoid cumbersomeness in the modelling. The descriptive statistics in Table 1 for variables under consideration revealed that the growth rate of gross domestic product per person employed and initial income per capital are 3.93% and 2.73% respectively. However, the average value for government expenditure on education, foreign direct investment, gross fixed capital formation, government financial consumption, inflation, population growth and trade openness (as a ratio of GDP) are 1.57, 3.08, 9.54, 12.66, 20.03, 2.58 and 51.99 respectively.

The statistics of skewness which is a measure of asymmetry of the distribution of the series around its mean indicated that all the variables except lnGDPPPE and TOP are positively skewed, implying that these distributions have long right tails. Also, the Kurtosis which measures the peakedness or flatness of the distribution of the series revealed none of the variables are normally distributed. Although EDUEX, FDI, GFCF AND INF are leptokurtic (peaked relative to normal) while lnGDPPPE, lnGDPPC, GFCE, POPG and TOP are platykurtic suggesting that the distribution is flat relative to the normal. Finally, the Jarque-Bera which measures whether the series is normally distributed or not rejects the null hypotheses of normal distribution for EDUEX, FDI, GFCF and INF while it accepts for lnGDPPPE, lnGDPPC, GGFCE, POPG and TOP.

For the correlation matrix, the principal diagonal showed the relationship between a variable and itself, while the values outside the principal diagonal showed the relationship between variable and other variables. Taking gross domestic product per person employed (GDPPPE) as the dependent variable, the results show that variables such as lnGDPPC, FDI, POPG and TRADE are positively related to lnGDPPPE while others are negatively related.

Table 1. Descriptive Statistic

	lnGDPPPE	**lnGDPPC**	**EDUEX**	**FDI**	**GGFCE**	**GFCF**	**INF**	**POPG**	**TOP**
Mean	3.9299	2.7319	1.5854	3.0776	9.5367	12.656	20.029	2.5849	51.999
Median	3.9889	2.5607	0.8500	2.6490	8.2766	11.918	12.547	2.5763	54.438
Maximum	4.2903	3.5056	5.1052	10.833	17.944	35.221	72.836	2.7192	81.813
Minimum	3.4894	2.1849	0.8500	0.6637	4.8332	5.4589	5.3822	2.4950	23.609
Std. Dev.	0.2844	0.3766	1.3519	2.2645	3.5652	6.5003	18.107	0.0704	15.999
Skewness	-0.4845	0.7705	1.6056	1.7422	0.5975	2.0180	1.5824	0.2574	-0.2320
Kurtosis	1.7510	2.4314	4.0741	6.1662	2.2261	7.3507	4.2229	1.7209	2.1337
Jarque-Bera	3.5402	3.8225	16.244	31.402	2.8714	49.892	16.308	2.6935	1.3683
Probability	0.1703	0.1479	0.0003	0.0000	0.2379	0.0000	0.0003	0.2601	0.5045
Sum	133.61	92.884	53.905	104.64	324.25	430.29	680.995	87.886	1767.95
Sum Sq. Dev.	2.6691	4.6798	60.315	169.22	419.45	1394.39	10819.81	0.1637	8446.28
Observations	34	34	34	34	34	34	34	34	34

Correlation Matrix

	lnGDPPPE	**lnGDPPC**	**EDUEX**	**FDI**	**GFCE**	**GFCF**	**INF**	**POPG**	**TOP**
lnGDPPPE	1								
lnGDPPC	0.6062	1							
EDUEX	-0.7897	-0.1517	1						
FDI	0.1687	-0.4050	-0.4156	1					
GGFCE	-0.2687	-0.1041	0.5241	0.0587	1				
GFCF	-0.4261	0.1865	0.7716	-0.3659	0.3951	1			
INF	-0.1629	-0.4750	-0.0709	0.5698	0.0542	-0.0759	1		
POPGR	0.1663	0.7709	0.1638	-0.3592	-0.0775	0.4431	-0.3193	1	
TRADE	0.4134	-0.1537	-0.6024	0.3799	-0.3044	-0.4638	0.0234	-0.3242	1

4.2. Stationarity, Lag Length and Bound Test

The use of ARDL models does not impose pre-testing of variables for unit root problems because this estimation can accommodate I(0) and I(1) variables, or mutually cointegrated variables. However, one drawback of the ARDL approach is that it cannot be estimated with I(2) series. Therefore, unit root tests are conducted in this study to find out if there are mixtures in the order of integration of our variables. The presence of a unit root implies that the time series under investigation is non-stationary; while the absence of a unit root shows that the stochastic process is stationary. The order of integration of the time series was investigated by applying the Augmented Dickey and Fuller test and Phillips Perron (PP) test as presented in table 2.

Both ADF and PP tests suggest that lnGDPPPE, lnGDPPC, GGFCE, INF, POPG and TOP variables exhibit unit roots at level, whereas they become stationary at the first difference, while ADF and PP Test for FDI, and GFCF exhibit stationarity at level and first difference respectively. So also, EDU test value is found greater than the McKinnon critical values at level. It is therefore surmised that all the variables can be well characterized as I(0) and I(1) process at 5 percent significant level.

Since the computation of F-statistics for co-integration is very much sensitive to lag length. The results of both Akaike Information Criterion (AIC) and Schwartz-Bayesian Criterion (SBC) criteria are similar, thus a lag order of 2 is selected. The total number of regressions estimated following the ARDL (p,q,r,s) method is $(p+1)^k$, where p is the maximum number of lag order to be used and k is the number of variables in the equation. As p=2 and k=8, the total number of regressions to be estimated are 6561. Given the existence of a long run relationship, we use ARDL co-integration to estimate the parameters, with a maximum order of 2, to minimize the loss of degrees of freedom.

The results of the bounds testing approach for a long run relationship produces a calculated F- statistic of 13.57 (see table 4). This is higher than the critical value of upper level of bounds value of 3.39 and lower bounds value of 2.22, implying the null hypothesis of no co-integration cannot be accepted, thus indicating there is indeed a cointegration relationship among the variables at the 5 per cent level of significance.

Table 2. Result of stationarity test for the variables

Variables	T-statistic				
	I(0)		I(1)		
	ADF	PP	ADF	PP	Order of Integration
lnGDPPPE	-2.3848	-2.4661	-5.6646***	-5.6672***	I(1)
lnGDPPC	-2.3521	-3.7989*	-6.6648***	-8.8777***	I(1)
EDUEX	-5.1302***	-4.1858**	-2.6980	-1.4140	I(0)
FDI	-3.4033*	-3.3102*	-7.8737***	-17.7847***	I(1)
GFCF	-3.4552*	-3.5651*	-5.6559***	-3.8455**	I(1)
GGFCE	-2.9489	-2.8894	-6.7541***	-6.7893***	I(1)
INF	-3.7027*	-2.6353	-5.2056***	-9.7482***	I(1)
POPG	-0.8854	-0.3056	-2.3451**	-4.3366***	I(1)
TOP	-2.1707	-2.0007	-7.9422***	-7.9722***	I(1)

Note: * significance at 10%, **significance at 5%, ***significant at 1%. The optimal lag order for ADF test is determined by AIC, while the bandwidths for PP tests are determined by the Newey-West Bartlett kernel.

Table 3. Lag length Criteria

Lags Order	LogL	LR	FPE	AIC	SC	HQ
0	-512.8403	NA	73.62264	32.67752	33.13556	32.82935
1	-166.5215	454.5434	2.03e-05	17.28260	22.32106	18.95271s
2	107.6844	188.5165*	3.81e-09*	6.394728*	16.01362*	9.583118*

Table 4. Cointegration Test

Level of Significance	Critical Values		Wald Test (F-Value)
	Lower Bound	Upper Bound	
10%	1.95	3.06	
5%	2.22	3.39	13.571
2.5%	2.48	3.70	
1%	2.79	4.10	

4.3. ARDL Estimation

In selected long run ARDL (1, 2, 0, 2, 1, 0, 1, 1, 0) model, the maximum lag length is set out by using Schwarz Bayesian Criteria (SBC) and the normalized long run coefficient estimates are reported in Table 5.

In table 5, the coefficients of the independent variables show the percentage change in the dependent variable due to change in independent variables. The coefficient of initial income per capita (lnGDPPC) is 0.846 suggesting that an increase in initial capital income will cause an 84% increase in inclusive growth in the long-run. This is consistent with the study of [8]. Interestingly, education expenditure has a negative impact on inclusive growth in Nigeria which is contrary to the findings of [7], while gross fixed capital formation and trade openness do not have a discernible impact on inclusive growth in the long-run. Consistent with [7], government consumption and inflation have significantly negative impact on inclusive growth through its detrimental impact, while the table further reveals that an increase in population growth by 1 percent leads to 5.17 percent reduction in inclusive growth. This is also consistent with the findings of [8] whose study suggested that African countries (including Nigeria) need to make use of their rising population as a blessing and not as threat.

4.4. Short-Run Dynamics

Table 6 presents the results of the short-run parameters along with that of the error correction term.

Table 5. Long run Coefficients, dependent variable is lnGDPPPE

Panel A: Long Run Coefficients			
Variables	Coefficients	Std. Error	T-Scores
lnGDPPC	0.8457***	0.0684	12.3716
EDUEX	-0.1664**	0.0644	-2.5857
FDI	0.2334***	0.0488	4.7818
GGFCE	-0.0598**	0.0200	-2.9866
GFCF	0.0134	0.0105	1.2773
INF	-0.0081**	0.0032	-2.5228
POPG	-5.1740***	0.6804	-7.6047
TOP	-0.0009	0.0026	-0.3479
C	17.3013***	1.5379	11.2496
Panel B (Diagnostic Checking)			
Adjusted R-Squared= 0.98		R Squared= 0.99	
LM Test = 5.89(0.51)		Jarque-Bera= 0.10(0.95)	
White= 2.9(0.99), ARCH = 1.40(0.23)		D.W = 2.58	

Note: *** show significance at 1% level and ** show significance at 5% level.

Table 6. Error Correction Model

Variable	**Coefficient**	**Std. Error**	**t-Statistic**
D(lnGDPPC)	0.1103	0.1176	0.9380
D(lnGDPPC(-1))	-0.3203**	0.1316	-2.4337
D(EDUEX)	-0.1259*	0.0603	-2.0864
D(FDI)	0.0444**	0.0183	2.4334
D(FDI(-1))	-0.0895***	0.0136	-6.5659
D(GGFCE)	-0.0163*	0.0083	-1.9564
D(GFCF)	0.0101	0.0082	1.2371
D(INF)	0.0031**	0.0014	2.2899
D(POPG)	1.2821	1.0974	1.1683
D(TOP)	-0.0007	0.0020	-0.3470
CointEq(-1)	-0.7565***	0.1174	-6.4446

Note: ***, **, * show significance at 1%, 5% and 10% respectively.

Basically, the previous year's inclusive growth has a significantly negative effect on the current inclusive growth in the short run, while a 1 percent increase in education expenditure will reduce inclusive growth by 0.3. As opposed to the long run, population growth has no significant effect on inclusive growth in the short run, while inflation has a positive effect on inclusive growth. The role of government consumption on inclusive growth still remains negative, while capital formation has no significant effect both in the short and long run. In addition, the coefficient of foreign direct investment has both positive and negative effect on inclusive growth in the short run, while the effect of trade openness remains positive but insignificant.

The error correction coefficient, estimated at -0.757 is highly significant and negative as expected, which imply a very high speed of adjustment to equilibrium. The highly significant error correction term further confirms the existence of a stable long-run relationship.

4.5. Stability Tests

These results demonstrate that the short-run model passed the diagnostic tests. There is no evidence of autocorrelation at 5% confidence level and that the model passes the test for normality, the error term is also proved to be normally distributed. There is no existence of white heteroscedasticity in the model. For testing the stability of the long-run coefficients alone with the short-run dynamics, the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) are applied. A graphical illustration of CUSUM and CUSUMSQ is exposed in Figures 1 and 2. The plots of both the CUSUM and the CUSUMSQ are within the boundaries, and, hence these statistics prove the stability of the long-run coefficients of the repressors that have an effect on inclusive growth in Nigeria. The model appears to be stable and properly specified given that none of the two tests statistics go outside the bounds of the 5 percent level of significance.

STABILITY TESTS

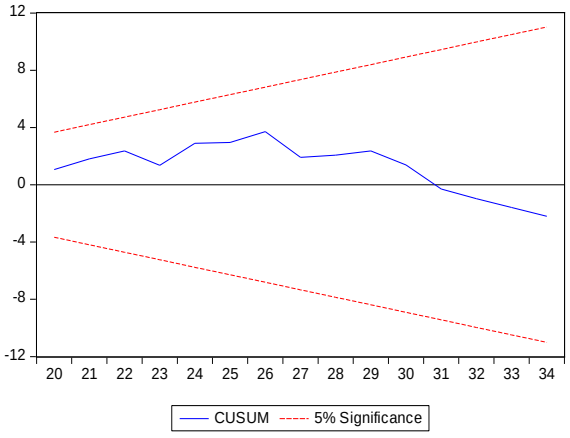


Figure 1. CUMSUM Test

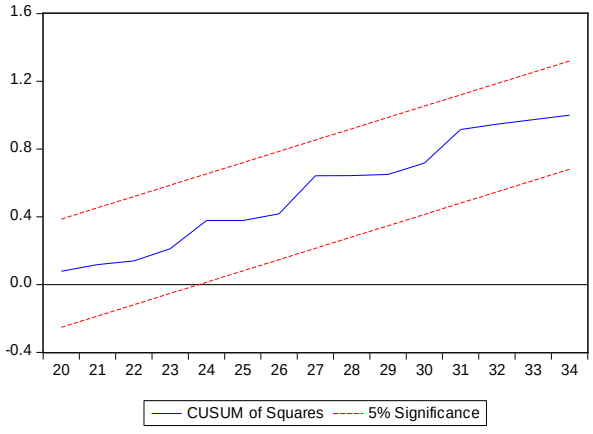


Figure 2. CUMSUM of squares

5. Conclusions and Policy Recommendations

The prospect of having an inclusive growth in Nigeria has caused serious concern to policy- makers, academics, and foreign donor agencies. This paper investigates the determinants of inclusive growth in Nigeria through the application of the autoregressive distributed lag (ARDL) and error correction model (ECM) during the period of 1981-2014. The results from ARDL indicate that there is co-integration between inclusive growth and explanatory variables such as initial income, trade openness, foreign direct investment, government expenditure on education, gross fixed capital formation, population growth, government consumption expenditure, and inflation. The associated equilibrium correction model was also significant, confirming the existence of long-run relationships.

After analyzing an over parameterized regression model, a parsimonious result was obtained from sequential reduction judged by SBC. The result of the ECM reveals that initial income, FDI, capital formation, inflation, population growth, expenditure on education and government consumption are determinants of inclusive growth in Nigeria. However, with the exception of the initial income and FDI, the aforementioned variables have negative impacts on the inclusiveness of growth in the long-run, while inflation has a positive effect on growth in the short-run but a negative effect in the long-run.

Therefore, the policy implications of our findings are that, government should work at improving macroeconomic stability so as to increase the inflow of FDI, while they also work at reducing the inflation rate by embarking on tight fiscal and monetary policies. Furthermore, in order to maximize the effect of population growth, the government needs to allocate adequate finance aimed at improving the

quality of the population (through improvement in health and education), which will bring about innovative and technology advancement needed for growth; and that another decade does not go by in which a rich Nigeria grows richer and the poor do not progress.

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