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EFFECT OF DEMOGRAPHIC STRUCTURE ON ECONOMIC GROWTH IN NIGERIA*

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As an increased population adds to the labour force, it is expected that it would stimulate economic growth. This study evaluated the effect of demographic structure on economic growth in Nigeria over the period of 1970 to 2018. It examined the effects of active, young and aged populations on economic growth, using ex-post facto research design, with data on the World Bank Development Indicators. The Vector Error Correction Model (VECM) estimation technique revealed that the active population and young population with coefficients of 3.45 and 16.82 respectively, exerted positive impacts on economic growth. In contrast, the coefficient of -3.63 for the aged population implied a negative impact on economic growth. The study concluded that demographic structure is significant in influencing economic growth. A need arose for the government to develop economic policies that would promote economic growth in labour-intensive sectors to absorb the expected growth of the active population.

KEYWORDS: Demographic age structures, population structure, active population, economic growth.

INTRODUCTION

Marriage is expected to be an institution where parties involved enjoy the privilege of sharing friendship, love, companionship, cooperation, trust, openness and intimacy. However, some mar

Nigeria's rapid population growth rate of 2.44% as of 2016 and an estimated population of one hundred and ninety-nine million people as of 2019 (CBN, 2019) presents a potential labour force expansion, which theoretically is expected to translate to increased economic growth. However, historical data reveals a consistent increase in population and real GDP: in 1960, the population of Nigeria was estimated to be about 45.137 million people, while her real GDP stood at \$61.73 billion, in 1970, Nigeria's population rose to about 55.981 million people and her real GDP stood at \$95.185 billion, in 1980, Nigeria's population was 73.46 million people with real GDP of \$151.252 billion. In 2000, Nigeria's population rose to 122.352 million people while its real GDP was \$169.2 billion, and in 2010 it stood at 158.578 million people while its real GDP stood at \$363.359 billion (World Bank, 2019). This indicates the country has experienced a continuous rapid population growth rate and economic growth on average. Several efforts have been made by the government to address the demographic explosion and to bring about sustainable economic growth, including the first population policy of 1988 and the national policy on population and sustainable development of 2005. However, these policies failed to deliver on their targets of a reduction in the fertility rate, a reduction in the rate of early marriage as well as a reduction in population growth. Again, since gaining independence in 1960, Nigeria has explored four 5-year development plans, one structural adjustment program, two 3-year rolling plans, and four visions and strategies including the recently launched Economic Recovery and Growth Plan (ERGP). Disappointingly, despite all the various policy initiatives the country has adopted, they have not delivered the much-expected results. Rather, the country is still battling with mounting developmental challenges.

Nigeria has not properly invested in its current and future labour force, considering the fact that each age bracket has different consumption and savings behaviour which affects investment. The various consumption and savings behaviour either spurs economic growth or restricts economic growth. Also, Nigeria has not developed its oil and gas industries to produce long-term growth in both jobs and GDP, nor has it diversified its economy (Orji et al., 2019). Will Nigeria's current and future population composition be a benefit or a burden? How might Nigeria's relative share of working-age persons (15-64) and dependents (under 15 and 65 and above) contribute to long-term economic growth?

It is on this premise that this study seeks to answer the following questions: (a) what is the effect of active population on economic growth in Nigeria? (b) What is the effect of the young population on economic growth in Nigeria? (c) What is the effect of the aged population on economic growth in Nigeria?

Effects of demographic change on economic growth have been widely researched abroad and a bit in Nigeria with different methodologies and with mixed results, none of the studies reviewed to the best of the researchers' knowledge was able to determine the effect of the different age structure on economic growth in one study in Nigeria. Few studies used the youth and old dependency ratios as measures of demographic changes. This study deviated from other studies by using the age structure of the Nigeria population (the young population (0 -14), the active population (15 – 64) and the aged population ages 65 and above) in their total population (in millions) as measures of demographic changes. This study showed the significance of the birth rate and death rate in Nigeria over the years, to determine the period of demographic transition that began in Nigeria. The methodology Vector Error Correction Model and the span of the study are the gaps. The main objective of the study was to ascertain the effect of demographic structure on economic growth in Nigeria.

First, Ademola (2019) studied the relationship between economic growth and demographic dividend in Nigeria from 1970 to 2017 using the vector autoregressive (VAR) approach and found that innovation in gross enrollment contributed to the variation in economic growth. The study found that improvements in education and learning helped to reduce fertility and by extension enhanced productivity. In the same vein, Ogunjimi and Oladipupo (2018) examined the dynamics of demographic structure and economic growth in Nigeria from 1981 to 2016 using the autoregressive distributed lag (ARDL) model estimation technique and the Granger causality approach. The study found the existence of a long-run relationship between changes in demographic structure and economic growth. The study also revealed a negative relationship between the aged population and economic growth and a positive relationship between the young population and economic growth in Nigeria both in the short run and in the long run. Also, the Granger causality test revealed bidirectional Granger causality between the aged population and economic growth, and unidirectional Granger causality between the young population and economic growth in Nigeria.

Ogbuabor *et al.* (2018) investigated the relationship between population growth and economic development in Nigeria from 1980 to 2016 using the OLS method and found that population growth slowed down economic development in Nigeria. Hence, they recommended policies that will control population growth. Ademola and Saibu (2017) investigated the relationship between population change and economic growth in Nigeria using a modified ordinary least square estimation method and found that population change has a positive significant effect on economic growth in the long run.

Orji *et al.* (2019) investigated the impact of demographic changes on economic performance in Nigeria from 1970 to 2016. The result of the VAR model showed that fertility levels remained high while the death rate dropped in infant mortality in Nigeria. The result also showed that population growth had a negative impact on economic performance in Nigeria. Sánchez-Romero, Abio, Patxot and Souto (2018) examined the contribution of demography to economic growth in Western European countries from 1850 to 2000 using the OLS estimation technique. The study found that about a 17 per cent increase in per capita income from 1850 to 2000 in Western European countries was due to the demographic transition. About half of the demographic contribution was due to an increase in average productivity per worker which emanated from the change in the population structure and the rise in the household's saving rate. The remaining half was explained by the higher growth rate of workers relative to the total population.

Wongboonsin and Phiromswad (2017) investigated the empirical linkages between demographic structure and economic growth in hundred and twenty-two countries from 1960 to 2010 using a panel regression analysis and the study found that an increase in the share of middle-aged workers has a positive effect on economic growth through institutions, investment and education channels. Also, an increase in the share of the ageing population was seen to have a negative effect on economic growth through institutions and investment channels. These findings were for developed countries. For developing countries, the study found weak evidence of negative effect of the share of young workers on economic growth through investment, financial market development and trade channels. Ma and Guo (2017) studied the relationship between the structure of the Chinese population and GDP per capita from 1978 to 2006 using the Johansen cointegration

test and vector error correction model. The study found that in the long run labour population had a positive effect on economic growth and a negative effect in the short run while urbanization had a negative and positive impact on economic growth in the long run and short run respectively.

Cruz and Ahmed (2016) examined the impact of demographic change on growth, savings, and poverty in developing countries from 1960 to 2006 using a wide range of econometric techniques ranging from first difference ordinary least square, fixed effect panel regression and generalized method of moments (GMM). The study found that on average, a one per cent increase in the share of the working-age population led to a 1.5 per cent increase in GDP per capita growth, a 0.78 per cent increase in savings and about 0.75 per cent decrease in the poverty rate. Gideon *et al.* (2019) examined the impact of population growth on economic growth in Kenya from 1963 to 2009. VAR estimation technique was adopted in establishing this relationship. The finding of the study revealed a positive relationship between population growth and economic growth in Kenya. Abdullah *et al.* (2015) studied the relationship between economic growth and population growth in Bangladesh from 1980 to 2005 using the OLS estimation method and found that economic growth and population were both negatively correlated and that an increase in population would have a negative impact on the economic growth of Bangladesh. The study recommended family planning to help curtail the population explosion in Bangladesh to overcome the negative effect of increasing population on economic growth. Ngangue and Manfred (2015) investigated the impact of life expectancy on economic growth in developing countries over the period 2000 to 2013 using a panel regression analysis and found that improvement in life expectancy had positive effects on economic growth in developing countries.

Thuku *et al.* (2013) examined the impact of population change on economic growth in Kenya from 1963 to 2009 using the vector auto-regression (VAR) estimation technique. The study found that population growth and economic growth were both positively correlated and that an increase in population would positively impact the economic growth of Kenya. Liu and Hu (2013) investigated the relationship between demographic change and economic growth in China from 1983 to 2008 using a fixed effect panel regression analysis and found that the share of the working-age population is positively correlated with economic growth while the birth rate has a negative impact on economic growth.

Ranganathan et al. (2013) conducted a study on the implications of demographic transition on economic growth by testing the validities of various theories of demographic transition using a non-linear dynamic model for cross-country data. The OLS method was used as the data estimation technique. The study found that a decrease in fertility rate had a positive effect on GDP. Huang and Xie (2013) studied the relationship between population growth and economic growth under the framework of the simultaneous structural equation model the GMM found that current population growth negatively affected economic growth in the short run while a lagged period of population growth positively affected economic growth and on the long run, population growth did not have a significant effect on economic growth.

Yao et al. (2013) examined the relationship between economic development and population growth using cointegration analysis and found that population had a significant impact on GDP per capita. The study concluded that the working-age population relative to the total population did not have a strong influence on GDP per capita and that the contribution of the working-age population to economic growth was not as significant as expected in China. Choudhry and Elhorst (2010) studied the relationship between demographic transition and economic growth using data from seventy (70) countries including China, India and Pakistan, and covering a time scope of 1961 to 2003. The OLS was used for the estimation, it revealed that GDP per capita was positively related to the growth differential between the working-age population and the total population and negatively related to child and old-age dependency ratios. The study also found that demographic transition was responsible for about 46 per cent of economic growth in China, 39 per cent of economic growth in India, and 25 per cent of economic growth in Pakistan. The study also forecasted a positive effect of the demographic transition on economic growth in India and Pakistan over the period of 2005 to 2050 while for the same period, the demographic transition is expected to have a negative effect on China's economic growth. Li and Zhang (2007) examined the impact of the birth rate on economic growth in twenty-eight provinces in China using a panel regression analysis and found that the birth rate had a negative impact on economic growth.

In studying the effects of demographic change on economic growth in Nigeria, major theories on economic growth are reviewed as they relate to the study. They include; the demographic transition theory, exogenous growth theory, endogenous growth theory, the Solow-Swan growth theory and the structural change theory. The Demographic Transition Theory (DTT) was first developed by Warren Thompson in 1929 and has since evolved. It is also called the theory of population stages since it explains the effects of changes in birth and death rates on the growth of the population. DTT is a transition in patterns in a country's demographics such as a gradual shift from high birth and high death rates to lower rates simultaneously as a country passes through stages from primarily agricultural and pre-industrial economy into industrial and technologically advanced production. It can be stated that economic development leads to a better and more efficient use of factor endowments. The transition model can be divided into four: Stage I: high mortality and fertility levels and more or less stable birth and death rates; best examples here are low productive agricultural economies; Stage II: Decline in mortality, changes related to public health and modernization, still high birth rates leading to population boom; Stage III: Changes related to urbanization, higher standard of living, more or less stable mortality level; Stage IV: Low mortality and fertility levels and more or less stable birth and death rates.

Robert Solow in 1956 propounded the exogenous growth theory which is an extension of Harrod-Domar's growth model to include labour (working age population) as a factor of production and also the introduction of technology to the growth model. The theory posits that economic growth occurs as a result of factors that are outside the influence of the economy, that is, exogenous factors like rate of population growth, rate of technological progress, etc and not a factor like savings rate in the economy (Jhingan, 2007). According to the theory, in the long run, economic growth is determined by technological progress which is an improvement of old capital or introduction of new capital. The theory assumes that labour force growth in relation to population growth and productivity growth is enhanced through improvement in technology. Thus, the mix of technological progress with an increase in labour quality and quantity leads to output growth. Precisely, solow swan growth theory posits that labour, capital and technology are the three factors necessary for the growth of any economy.

Relating the theory to the production function, it posits that the accumulation of capital within an economy and how people use that capital is important for economic growth. This further implies that the relationship between capital and labour of an economy determines its output. In other words, it is believed that technology is thought to augment labour productivity and increase the output capabilities of labour. Therefore, the production function of Solow swan growth theory is used to measure the growth and equilibrium of an economy.

The Endogenous growth theory is attributed to Paul Romer (1986) who took a different perspective from the exogenous growth theorists to explain factors that influence economic growth in a nation. According to Romer, savings, ideas, technology and human capital play important roles in bringing about rapid growth in a country's economy. The endogenous growth theorists believe that economic growth comes as a result of an interplay of factors that are within the system or entirely endogenous and not factors outside the system or exogenous. These endogenous factors are the rate of investment in the economy, the size of capital stock and the stock of human capital, that is, knowledge. The endogenous growth theory is often called the new theory because it emphasizes ideas and knowledge as non-diminishing factors of production (Jhingan, 2007). The theory states that investment in human capital in the form of education and training leads to the production of quality workforce which is a key determinant of economic growth. This is because the improvement in the quality of labour will lead to increased productivity of both the labour and capital because workers who have been trained will become more productive.

METHODOLOGY

The ex-post facto research design was adopted; it is also called causal-comparative research design. The data was sourced from the World Bank Development Indicators (WDI) With regards to model specification, the study adopted an eclectic approach involving the demographic transition theory, Solow-Swam growth theory and the endogenous growth theory and augmented with the variables in line with the hypotheses of this study. The Endogenous growth theory propounded by Romer (1986) holds that ideas, human capital and technology are essential for the growth of an economy. However, Barro (1990) augmented and modified the analysis of the endogenous growth model to incorporate a public sector with government spending and taxation.

Barro (1990) begins with an endogenous growth model that builds on constant returns to a broad concept of capital. The household in a closed economy seeks to maximize utility, and the population which corresponds to the number of workers and consumers is constant.

Each household producer has the access to the production function:

$$Y = f(K) \dots \dots \dots (1)$$

Where; Y is output and K is capital

Given the firm's production function:

$$Y(i) = AK(i)^\alpha L(i)^\beta \dots \dots \dots (2)$$

Where A is the total factor productivity. Technology A, depends on capital stock. The higher the capital stock the more the economy is able to use new technologies.

$$A = BK^\alpha \dots \dots \dots (3)$$

Where K is the aggregate level of capital stock and B is the positive externality. Imposing across firms and substituting in the production function, we get the aggregate production function:

$$Y = BKL^\beta \dots \dots \dots (4)$$

The Augmented Barro (1990) model adds public spending and it is stated thus:

$$Y = BK^\alpha L^\beta G^\lambda \dots \dots \dots (5)$$

Where;

K = capital

L = labour

B = positive externality imposed across firms in the economy

K and L are substitutes

α = share of output capital

β = share of labour

λ = share of government revenue

G = the value that is augmented to represent other variables as; GCF, BR, BR², DR, DR², CPI.

Therefore, the model for this study is specified thus:

$$RGDPC = F(TACP, YP, AGP, GCF, BR, BR^2, DR, DR^2, CPI) \dots \dots \dots (6)$$

Equation is then transformed into its econometric form, thus specified as:

$$\text{Log (RGDPPC)} = a_0 + a_1\text{Log(TACP)} + a_2\text{Log(YP)} + a_3 \text{Log (AGP)} + a_4 \text{Log (GCF)} + a_5\text{BR} + a_6\text{BR}^2 + a_7 \text{DR} + a_8 \text{DR}^2 + a_9 \text{CPI} + e_t \dots\dots\dots(7)$$

Where:

RGDPPC = Real GDP per capita in thousands dollar (a measure of economic growth)

GCF = Gross capital formation (a proxy for investment) in million naira

TACP = Total active population (ages 15-64years) in millions

YP = Young population (ages 0-14) in millions

AGP = Aged population (ages 65 and above) in millions

BR = Birth rate (%)

BR²= Square of birth rate

DR = Death rate (%)

DR²= Square of death rate

CPI = Consumer Price Index (%)

e_t is the error term or disturbance term. a₁, a₂, a₃, a₄, a₅, a₆, a₇ and a₈ are the respective elasticities or coefficient of the independent variables. a₁, a₄, a₅, > 0; a₂, a₃, a₆, a₇, a₈, a₉ < 0

RESULTS

The results of the unit-root test, Co-integration Test and the Vector Error Correction were presented in this section.

Unit Root Test

Table 1 presents the unit root test based on the Augmented Dickey-Fuller (ADF) test. The result of the unit root test using the ADF test as shown in the table presented showed that the variables were not stationary at level. Therefore, the null hypothesis of no unit root cannot be rejected. However, the series was stationary when it was differenced once.

This implies that the series was integrated into order I(1). Given that the variables are mutually integrated, that is the variables are either I(0) or I(1), the standard VAR model estimation at level is not suitable in this case. The vector error correction (VECM) is therefore suitable and hence, the specified model is estimated in the VAR variant.

Table 1: Unit Root Result using Augmented Dickey-Fuller (ADF) test

Variable	Level	Critical value at 5%	1 st difference	Critical value at 5%	Remarks
GDPC	-0.628678	-2.925169	-5.387858	-2.925169	I(1)
GCF	-1.633102	-2.928142	-4.517082	-2.925169	I(1)
BR	-1.650925	-2.928142	-3.168793	-2.926622	I(1)
DR	-2.108030	-2.928142	-3.606963	-2.936942	I(1)
AGP	3.572019	-2.938987	-2.9756	-2.9350	I(1)
YP	4.406863	-2.936942	-2.827311	-2.609066**	I(1)
TACP	1.737984	-2.935001	-3.353644	-3.192902**	I(1)
CPI	1.595357	-2.926622	-2.891621	-2.605836**	I(1)

Source: Author's Computation

Note: ** shows that the variables are significant at 10%

Co-integration Test

A co-integration test is normally carried out to determine the existence or non-existence of a long-run relationship among the variables in the model. The Johansen co-integration technique which is based on the trace test and the maximum eigenvalue statistics was used in determining whether or not the variables are co-integrated. The results of the trace and maximum eigenvalue test revealed the existence of nine and nine co-integrating equations respectively, in the model. This implies that there is a long-run relationship between demographic changes and economic growth in Nigeria.

Table 2: Co-integration result

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None*	0.981067	888.7139	239.2354	0.0001
At most 1 *	0.974366	706.2392	197.3709	0.0001
At most 2 *	0.935343	537.7026	159.5297	0.0000
At most 3 *	0.906574	411.7246	125.6154	0.0000
At most 4 *	0.857662	302.6774	95.75366	0.0000
At most 5 *	0.800355	212.9982	69.81889	0.0000
At most 6 *	0.720939	138.8824	47.85613	0.0000
At most 7 *	0.670551	80.17140	29.79707	0.0000
At most 8 *	0.425968	29.09601	15.49471	0.0003
At most 9	0.074528	3.562787	3.841466	0.0591

Trace test indicates 9 cointegratingeqn(s) at the 0.05 level *
denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No of CE(s)	Eigenvalue	Max-Eigen Statistics	0.05 Critical Value	Prob.**
None*	0.981067	182.4747	64.50472	0.0000
At most 1 *	0.974366	168.5366	58.43354	0.0000
At most 2 *	0.935343	125.9780	52.36261	0.0000
At most 3 *	0.906574	109.0472	46.23142	0.0000
At most 4 *	0.857662	89.67923	40.07757	0.0000
At most 5 *	0.800355	74.11582	33.87687	0.0000
At most 6 *	0.720939	58.71099	27.58434	0.0000
At most 7 *	0.670551	51.07539	21.13162	0.0000
At most 8 *	0.425968	25.53323	14.26460	0.0006
At most 9	0.074528	3.562787	3.841466	0.0591

Max-eigenvalue test indicates 9 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Author's Computation, 2019

Vector Error Correction Result

Table 3: Vector Error Correction Resu

Sample (adjusted): 1972 2018			
Included observations: 47 after adjustmen			
	Coeffici	Std. Error	Statistic
CointEq1	0.149120	0.076435	-1.950650
D(LRGDP)	0.210540	0.195056	-1.079390
D(LGCF)	0.0255	0.01172	2.166948
D(LCPI)	0.027420	0.077650	0.353239
D(LAGPI)	-3.630292	1.010501	-7.27840
D(LACPI)	3.459045	5.549250	0.622699
D(LYH)	16.81658	5.118891	3.285649
C	-14.25496	5.26911	-2.704010
BR	0.723900	0.336399	2.151931
BR2	-0.008750	0.037532	-0.233310
DR	0.054380	0.123072	0.441885
DR2	0.005530	0.002757	2.003620
R-squared	0.79832	Mean dependent	0.00496
Adjusted R-squared	0.73237	S.D. dependent	0.05510
S.E. of regression	0.04859	Akaike info crit	-2.9948
Sum squared res	0.08264	Schwarz crit	-2.5224
Log likelihood	82.3796	Hannan-Quinn crit	-2.5224
F-statistic	6.19580	Durbin-Watson stat	1.97755
Prob(F-statistic)	0.03819		

Source: Author's Computation, 2019

The result of the vector error correction model (VECM) is presented in table 3 as shown in the table, the error correction variable has the expected negative coefficient of 0.149120 and statistically significant. This implies that the previous year's error would be corrected in the following year at an adjustment rate of 14.91 per cent; indicating a low speed of adjustment from the disequilibrium in the short run to equilibrium in the long run. The high value of the adjusted R-square of 0.732371 showed that the model has a good fit and high explanatory power.

Specifically, the adjusted R-squared of 0.732371 indicates that about 73 per cent of the total variation in the dependent variable has been explained by the independent variables.

The F-statistic value of 6.19580 showed that on the overall, the model is statistically significant at the five per cent level of significance. This is because the probability value of the F-statistics of 0.038193 is lesser than 0.05 at the five per cent level of significance. This therefore means that the explanatory variables have a joint impact on the dependent variable during the evaluation period. While the Durbin-Watson statistics of 1.977 shows the presence of no auto-correlation. Analysis of the short-run coefficients showed that one period lagged value of real gross domestic product per capita exerted a negative impact on economic growth. However, this is not in line with the study's a priori expectation. This implies that a one per cent increase in the one period lagged value of real GDP per capita led to a reduction in economic growth by 0.21 per cent. The result further revealed that one period lagged values of gross capita formation and consumer price index influenced economic growth positively. All things being equal, a one per cent increase in one period lagged values of gross capital formation and consumer price index led to an increase in economic growth by 0.025 and 0.027 per cent respectively.

Furthermore, one period lagged value of the aged population was found to have a negative relationship with economic growth implying that, a one per cent increase in the aged population caused a decline in the growth of the economy by 3.63 per cent. While the one period lagged value of active population and young population exerted positive relationships with economic growth. Specifically, a one per cent increase in previous periods of active and young population resulted in 3.45 and 16.81 per cent increase in economic growth respectively.

Birth rate was found to have a positive relationship with growth while the squared of birth rate exerted a negative impact on growth. Specifically, a one per cent increase in birth rate led to a 0.72 per cent increase in economic growth while a one per cent increase in the squared of the birth rate resulted in a decrease in economic growth by 0.008 per cent. Similarly, the death rate had a positive impact on economic growth while the squared death rate had a negative impact on economic growth. Specifically, a one per cent increase in the death rate led to a rise in economic growth by 0.05 per cent while a per cent increase in the squared of death rate led to a fall in economic growth by 0.005 per cent.

The economic implication of the positive relationship between birth rate and economic growth suggests that Nigeria is characterized by a relatively high life expectancy and good health status. This therefore increases economic growth because an increase in birth rate increases the labour force. Again the healthier the population is, the higher their productivity while the negative relationship between the squared of birth rate and economic growth could be explained by overpopulation putting pressure on the available resources. This population explosion could lead to higher levels of unemployment, lower productivity and reduced national output.

FIG 1: GRAPH SHOWING THE OPERATION OF DEMOGRAPHIC TRANSITION IN SELECTED COUNTRIES

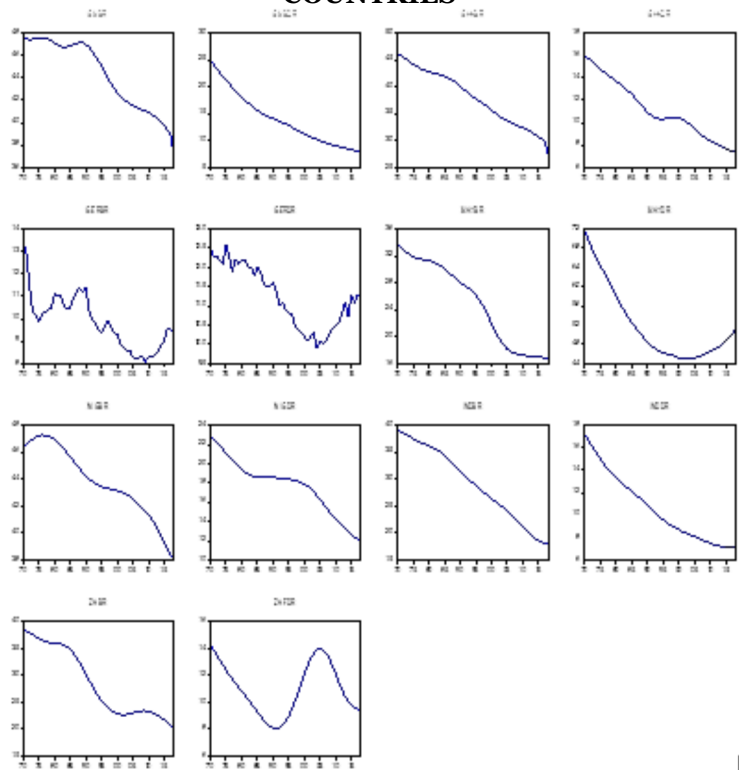


Figure 1 shows the graphical display of data for seven countries namely; The Gambia, Ghana, Germany, Malaysia, India, South Africa and Nigeria that DTT has already begun to operate with respect to birth rate, death rate or both. In this study, our focus is on Nigeria. It can be observed from the graphical representation that Nigeria has been experiencing a decline in birth rates and death rates over the years. Therefore, we can infer from the graph that a demographic transition has begun in Nigeria.

Discussion of Findings

This section is based on the objectives of the study and the findings of other researchers.

Objective 1: To examine the effect of active population on economic growth in Nigeria

Analysis of the result to capture objective 1 showed that active population had a positive impact on economic growth in Nigeria within the period under review. This result is in line with the study's a priori expectation. It is expected that the more active a population is, the higher its chances to function as active participants in the process of economic growth. Again, it is expected that Nigeria should enjoy rapid economic growth as her active population generally grows at faster rates than the total population, making room for the positive effect of the growing active population to overshadow the negative effect of the overall population growth. A lot of factors may be attributed to this positive relationship between the active population and economic growth in Nigeria.

One reason may be attributed to the fact that within the age group of the active population, there is a mix of younger workers and experienced workers, which is likely to produce the most productive environment. The reason has to do with skill complementarity. While experienced workers have greater firm-specific human capital and more skills learned on the job, younger workers, on the other hand, bring with them new ideas and general human capital embodied in formal education. Again, it is observable in Nigeria that fertility rates are declining and as such the proportion of the working-age population grows, relative to the economically dependent (young and aged) population.

This change in the age composition creates a window of opportunity during which the country can potentially raise its level of savings and investment (which is otherwise referred to as demographic dividend). This of course translates into the growth of the economy.

The finding of this study concerning the effect of active population on economic growth is in agreement with the findings of Wongboonsin and Phiromswad (2017), Song (2013) and, Liu and Hu (2013) who found that an increase in the middle-aged workers increased economic growth, but contradicts the study of Yao et al (2013) who found that working age population and economic growth had a negative relationship in Asian countries. It is also very important to state at this point that active population does not imply that this category of persons is working. Those who are actively working are termed as the positive middle-aged population, while those who are not actively engaged are termed as the negative middle-aged population. Economic growth however will be associated with the positive middle-aged population and not the other way around. Therefore, we can presume that a major reason why the result showed a positive relationship between active population and economic growth in Nigeria could also be that the percentage of those who are working within the age category of 15-64 years is higher than those who are not working within the same age category.

Objective 2: To determine the effect of the young population on economic growth in Nigeria.

Analysis of the result to capture objective 2 showed that the young population had a positive impact on economic growth in Nigeria within the period under review. In other words, the higher the growth of the people between ages 0 to 14 years in Nigeria, the higher the chances of the economy growing. This result is contrary to the study's a priori expectation. It is expected that the young population should negatively affect economic growth because this age category is considered dependent and as such consumes more than it produces and depends on the output and savings generated by the active population. However, this depicts the true picture of Nigeria. A lot of factors may be attributed to this positive relationship between the young population and economic growth in Nigeria.

Concerning demand, these age bracket (0-14 years), tend to consume more goods which is beneficial to the firms. And also markets are expanding to meet up with the consumption of these age groups. Another factor that comes to mind is that Nigeria is a country where labour is prevalent and children are left to fend for themselves. This result implies that the contribution of these children to productive and commercial activities in Nigeria is significant. However, this finding is not in line with the findings of Safdari and Mehrizi (2011) as well as Choudhry and Elhorst (2010) who found that the age group of 0 to 14 years had a negative impact on economic growth.

Objective 3: To ascertain the effect of aged population on economic growth in Nigeria

Analysis of the result to capture objective 3 showed that the aged population had a negative effect on economic growth in Nigeria within the period under review. In other words, the higher the growth of the people between ages 65 and above in Nigeria, the lower the chances of the economy growing. This result is in line with the study's a priori expectation. It is expected that the aged population should negatively affect economic growth due to the decline in the labour participation rate and the negative effect should even be magnified through the increase in social security and the slowdown in productivity growth. Nonetheless, few reasons can be attributed to this negative relationship between the aged population and economic growth in Nigeria.

Generally, People aged 65 years and above usually have different needs and behaviours than younger individuals. Older individuals tend to work and save less, meaning that they offer less labour and capital to economies. They also require more health care and often rely on social pensions for a large part of their income. As older populations become larger and politically stronger, adopting certain policies (such as cutting health and pension benefits) will prove difficult. So, as their numbers increase, they place further demands on government resources, family resources and personal savings, and as such, contribute little or nothing to the economy. The rapid ageing of the population in Nigeria means that the people, to some extent, will become old before they become rich, given the level of poverty in the country. This will cut short their ability to consume certain goods and services which can increase the total level of demand in the country.

Their low-income level means that the government generates little or no revenue from taxes since a larger proportion of them cannot pay. Hence, their contribution to economic growth is minimal.

Furthermore, it is important to also state that apart from the population, Nigeria is endowed with highly educated individuals who mostly are unfortunately in the diaspora, even though the country is increasingly experiencing a shortage of professionals due to human capital flight. A large fraction of these people are above 65 years of age. If the government cannot harness this external human capital alongside the internal ones, then it will also be difficult to direct the growth trajectory of the country. However, this finding is in line with the findings of Safdari and Mehrizi (2011) who found the impact of the aged population on economic growth to be negative. It however contradicts the work of Bloom and Reenen (2010) who found out that the aged population was significant in boosting economic performance in Asia.

Objective 4: To examine the effect of birth rate and death rate on economic growth in Nigeria

Analysis of the result to capture objective 4 showed that birth and death rates have a positive effect on the growth of the economy within the period under review. In other words, the higher the number of births and deaths, the higher the chances of the economy experiencing increased growth. The study agrees and disagrees at the same time with the study's apriori expectation. It is expected that the higher the birth level the higher the potential for economic growth while a higher level of death rate is expected to bring down the level of growth in the Nigerian economy. This is because a higher level of births implies a higher potential labour force and by extension, improved economic growth if well harnessed, while a higher level of deaths recorded implies a lower potential labour force and decreased economic growth. The economic implication of this positive relationship between birth rate and economic growth suggests that Nigeria is characterized by a relatively high life expectancy and good health status. This therefore increases economic growth because an increase in birth rate increases the labour force. Again, the healthier the population is the higher their productivity. This contradicts the works of Aidi et al (2016) and Li and Zhang (2007) who found birth rate reduces the level of growth in the economy.

Again, the positive relationship between the death rate and economic growth explains that Nigeria has been able to harness the potential of the few labour force by augmenting it with an improved level of technology and support for entrepreneurship to help reduce the level of unemployment. This is seen in the number of assistance given to small and medium-scale enterprises as well as empowerment programmes and schemes rolled out to help the unemployed become productive. One could attribute these supports as one of the possible reasons why an increase in death rate (decreased labour force) could increase economic growth through several individual businesses set up by the proportion of the population who have been beneficiaries of government support. However, this result also does not agree with the work of Aidi et al (2016) who found mortality to negatively influence economic growth

CONCLUSION

The study investigated the effect of demographic structure on economic growth in Nigeria, the findings revealed that the aged population had a negative impact on economic growth in Nigeria which is in line with apriori expectation. This implies that an increase in the age bracket of 65 and above will hurt the economy as well as the standard of living of an average Nigerian. However, the young and active population impacted positively on economic growth in Nigeria, though the young population was not in line with apriori expectations. This implies that as the categories of people within the age brackets 0 to 14 and 15 -64 years increased, Nigeria's economy experienced growth and the standard of living of the people was enhanced. Furthermore, an examination from the VECM estimates also revealed that the birth rate and death rate over the years in Nigeria had played a significant role in improving the standard of living of the people. However, the impact of having the birth rate and death rate doubled (i.e., the square of birth rate and death rate) was detrimental to the growth of the Nigerian economy. With respect to demographic transition in Nigeria, the trend in fertility and mortality was graphed as shown in Figure 8. The graph revealed a falling trend in birth rate and death rate from high levels in the early 1970s to low levels through to the 2000s. This is an indication that the demographic transition had begun in Nigeria.

By implication, we can say that the level of education and awareness about the benefit of a decrease in birth rate (through family planning and other contraceptives) and its implication on the reproductive health of women of childbearing age has increased, and the knowledge of other modern medicines, like vaccines for polio, measles, chicken pox, meningitis, tuberculosis, hepatitis B, yellow fever, etc has led to the decline in death rate in the country.

RECOMMENDATION

The following recommendations were made based on the findings of the study:

- (I) The positive coefficient of active population suggests that an increasing number of the age categories led to an increase in economic growth. The study therefore recommends that the government should develop economic policies that promote economic growth in sectors that are both labour-intensive and can contribute to employment and GDP growth, such as manufacturing, retail, technology and service, to be able to absorb the coming growth in the working age population.
- (ii) The positive coefficient of the young population suggests that an increasing number of this age category (0-14) led to an increase in economic growth. The study therefore recommends that the government should invest in this age category especially in terms of education to adequately prepare them for higher-skilled jobs. Education for girls, especially at secondary and higher levels is a key development strategy because it increases the number of skilled adults who can participate in the labour force.
- (iii) The negative coefficient of the aged population suggests that an increasing number of the age categories (65 years and above) led to an increase in economic growth. The study therefore recommends that the government should provide opportunities for the elderly to remain in the workforce by making it easier for people past the age of 65 to keep working, and a better way of doing that will be to raise their retirement age.

NOTES

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REFERENCES

- Abdullah, Shah , Sargani, Ghulam, Ali, Asad and Siraj, Waseem (2015). The Effect of Increase in Population on the Economic Growth of Bangladesh. *Developing Country Studies*, 5(17), 87-94.
- Ademola, Young (2019). Economic Growth and Demographic Dividend Nexus in Nigeria: A Vector Autoregressive (VAR) Approach. *Asian Social Science*, 15(2), 37-59.F
- Ademola, Folake and Saibu, Olufemi (2017). Does Population Change Matter for Long Run Economic Growth In Nigeria? *International Journal of Development and Sustainability* 6(12), 1955-1965.
- Aidi, Hakeem; Emecheta, Chisom. and Ngwudiobu, Ikenna M. (2016). Population Dynamics and Economic Growth in Nigeria. *Journal of Economics and Sustainable Development*, 7(15), 16-24.
- Barro, Robert (1990). Government Spending in a Simple Model of Endogenous Growth. *The Journal of Political Economy*. 98(1), 103-125.
- Bloom, Nicolas & Reenen, Van John (2010). Why do management practices differ across firms and countries?. *Journal of economic perspectives*, 24(1), 203-224.
- Central Bank of Nigeria (CBN, 2019). *Quarterly Report and Statement of Account for the month of January – March*.
- Choudhry, Misbah and Elhorst, Paul (2010). Demographic Transition and Economic Growth in China, India and Pakistan. *Elsevier: Economic Systems*, 34, 218–236.
- Cruz, Marcio. and Ahmed, Amer (2016). On the Impact of Demographic Change on Growth, Savings, and Poverty. *The World Bank Group's Global Monitoring Report*. Retrieved from <https://elibrary.worldbank.org/doi/abs/10.1596/1813-9450-7805#:~:text=An%20increase%20of%20one%20percent,age,on%20savings%20and%20poverty%20reduction.>

- Eli, Tartiyus; Mohammed, Inuwa., and Amade, Peter. (2015). Impact of Population Growth on Economic Growth in Nigeria. *Journal of Humanities and Social Science*. 20(4), 115-123.
- Gideon, Kiguru; Gachange, Paul., and Ogbere, Almadi (2019). The Impact of Population Change on Economic Growth in Kenya. *International Journal of Economics and Management Sciences*. 2(6), 43-60.
- Huang, Tai-Hsin and Xie Zixiong. (2013). Population and Economic Growth: A Simultaneous Equation Perspective. *Applied Economics*, 45, 3820-3826.
- Iqbal, Khalid; Nazia, Yasmin and Yaseen, Muhammad.(2015). Impact of Demographic Transition on Economic Growth of Pakistan. *Journal of Finance and Economics*. 2015; 3(2):44-50.
- Jhingan, M.L. (2007). *The Economics of Development and Planning*, 39th edn. Delhi : Misha enterprises
- Li, Hongbin. and Zhang, Junsen (2007). Do High Birth Rates Hamper Economic Growth? *Review of Economics and Statistics*, 30, 67-80.
- Liu, Shenglong and Hu, Angang (2013). Demographic Change and Economic Growth: Theory and Evidence from China. *Elsevier: Economic modelling*, 35, 71-77.
- Ma, Haiying and Guo, Panpan (2017). The Dynamic Econometric Analysis of Population Structure on Economic Growth in China. *Advances in Computer Science Research (ACSR)*, 1860-1864. [https://10.2991/emim-17.2017.379](https://doi.org/10.2991/emim-17.2017.379)
- Ngangue, Ngwen and Manfred, Kouty (2015). The Impact of Life Expectancy on Economic Growth in Developing Countries. *Asian Economic and Financial Review*, 1(4). 653-660
- Notestein, Frank (1945). Population — the Long View, In: Theodore W. Schultz, Ed., *Food for the World*. Chicago: University of Chicago Press.
- Ogbuabor, Jonathan E; Udo, Godwin and Onuigbo, Fidelia. (2018). Population growth and economic development in Nigeria. *Saudi Journal of Business and Management Studies*, 1348-1354.
- Ogunjimi, Joshua and Oladipupo, Dauda (2018). Dynamics of Demographic Structure and Economic Growth in Nigeria. *MPRAMunich Personal RePEc*, 94988. Retrieved from https://mpra.ub.uni-muenchen.de/94988/1/MPRA_paper_94988.pdf

- Orji, Anthony; Ogbuabor, Jonathan; Nwanosike, Dominic and Anthony-Orji, Onyinye (2019). Demographic Changes and Economic Performance in Nigeria. An empirical Investigation. *Theoretical and Practical Research in the Economic Field*. 10(1), 16-27.
- Romer, Paul (1986). Increasing Returns and Long run Growth. *The Journal of Political Economy*. 94(5), 1002-1037.
- Ranganathan, Shyam; Swain, Ranjula and Sumpter, David. (2013). The Demographic Transition and Economic Growth: Implications for Development Policy. *Palgrave communications*.
- Safdari, Mehdi & Mehrizi, Masoud A. (2011). External debt and economic growth in Iran. *Journal of economics and international finance*, 3(5), 322-327.
- Sánchez-Romero, Miguel; Abio, Gemma; Patxot, Concepció and Souto, Guadalupe (2018). Contribution of Demography to Economic Growth. *Springer*, 9, 27-64. Retrieved from <https://doi.org/10.1007/s13209-017-0164-y>.
- Solow, Robert. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics*. 70 (1), 65-94.
- Song, Sijia (2013). Demographic Changes and Economic Growth: Empirical Evidence from Asia. *Honors Projects*, .1-35. Retrieved from https://digitalcommons.iwu.edu/cgi/viewcontent.cgi?article=1121&andcontext=econ_honproj
- Thuku, Gideon K; Paul, Gachanja and Almadi, Obere (2013). The Impact of Population Change on Economic Growth in Kenya. *International Journal of Economics and Management Sciences*. 2 (6), 43-60.
- Wei, Zheng and Hao, Rui (2010). Demographic Structure and Economic Growth: Evidence from China. *Journal of Comparative Economics* 38, 472-491.
- Wongboonsin, Kua and Phiromswad, Piyachart (2017). Searching for Empirical Linkages Between Demographic Structure and Economic Growth. *Elsevier: Economic Modelling*, 60, 364-379.
- World Bank (2019). World Development Indicators, Database (WDI). *Washington D.C: World Bank*. Retrieved from <https://databank.worldbank.org/source/world-development-indicators>.

- Yao, Wanjun; Kinugasa, Tomoko and, Hamori, Shigeyuki (2013). An Empirical Analysis of the Relationship Between Economic Development and Population Growth in China. *Applied Economics*, 45, 4651-4661.
- Zhang, Haifeng; Zhang, Hongliang., and Zhang, Junsen (2014). Demographic Age Structure and Economic Development: Evidence from Chinese provinces, *Journal of Comparative Economic*

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