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Validating the Effectiveness of Demographic Dividend Transmission Mechanisms on Economic Growth in Nigeria

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Abstract

This paper determined and quantified the impact of demographic dividends on economic growth in Nigeria by investigating the interactions between demographic dividend transmission mechanisms and economic growth in the country. Data on working-age population ratio, savings rate, and education were obtained from the World Development Indicator database (1980-2014), while data on unemployment rate were obtained from various issues of Central Bank of Nigeria Statistical Bulletin. Unit root test was performed on each of the variables using Augmented Dickey Fuller (ADF) to test for the level of stationarity, while cointegration test was performed to determine the existence of long run relationship among the variables. The study applied Vector Auto Regression (VAR), exploring the method of impulse Response and variance Decomposition in analyzing the data. The result of the unit root showed that the variables were stationary after first differencing, while the cointegration test confirmed the existence of long run relationship among the variables. The analysis, suggests a significant and an expansionary effect of working-age population ratio on economic growth. Also, by implication, an increase in employment rate spurs economic growth in the long run but insignificantly, while savings rate, and educational rate were shown to be weak in their impact on economic growth with unstable sign. The study therefore suggests that concerted efforts should be made by the government of Nigeria through her policies at influencing fertility rate to decline more rapidly thereby increasing the working-age population ratio. A broad set of employment generating policies that can help abridge unemployment and improve labor conditions for young adults should be implemented, and also there should be an adequate and appropriate reformation of the Nigerian financial sector to mobilize savings for productive use, while spending on education should also be made effective in raising the human capital of the educated.

Keywords: Transmission- mechanism, effectiveness, demographic dividend, economic growth.

Introduction

Many researchers in population economics have devoted much of their works to identifying the importance and effect of the changes in age structure of population on economic growth of nations and regions. This is because each age group in a population behaves differently with distinct economic consequences. For the people in their youthful age require intensive investment in health and education; the people in the prime-age adult supply labor and saving; while the aged people require health care and retirement income. So, when the relative size of each of these groups in a population changes, so does the relative intensity of the economic behaviors (Bloom et. Al. 2001,2003;Song 2013).

In most developing countries, as public health improves, mortality rate especially among infant declines dramatically leading to high population growth rates because of the lag between mortality and fertility rates. However, with further decline in the mortality rate, the fertility

rate consequently declines because of the increased rate of survival of children, thereby reducing the rate of growth of the population. As the number of infant declines due to further reduction in the fertility rate, a "youth bulge" then begins to mature into working age. This "youth bulge" combined with fewer dependent children and elderly is capable of spurring economic growth if the right policies are put in place. In particular, when there is expanded employment opportunity for the growing labor force, and there is reduction in the government's unproductive investment on the growing little children, this is capable of ushering in increases in a country's total economic growth and income per person. These gains that can accrue to the nation as the result of changes in a country's age structure in favor of increased working-age to dependent population are referred to as "demographic dividend". The most important among the identified mechanisms through which the demographic dividend could be delivered are labor supply, employment opportunities, savings, and human capital.

The labor supply effect has to do with the inevitable development into youth of the baby boom generation, and more women that are likely to enter the workforce as the engagement of women in taking care of babies decline. The demographic transition also encourages the growth of savings as the proportion of the population that is working relative to the dependent population has increased, thus improving a country's prospects for investment and growth. The demographic transition effects on investments in human capital begin with changes in mortality rate that results in a population that lives longer and stays healthier. A longer life expectancy causes fundamental changes in the way people live which impacts attitudes to education. As life expectancy increases, parents are likely to choose to educate their children to more advanced levels. The result of this educational investment is that the labor force as a whole becomes more productive leading to higher national income.

The reaping of the demographic dividend through the noted mechanisms is however not automatic and it is time-limited. Without the right policy environments, countries will miss the opportunity of securing high economic growth but will instead face costly penalties such as rising unemployment, higher crime rates, political instability and many people facing destitution in their old age (Bloom 2003). The governments have to play the role of creating enabling environment by, making the labor market sufficiently flexible enough to absorb the expanded labor supply; by providing adequate saving mechanisms and making people to have confidence in the domestic financial markets; and also by enacting macroeconomic policies that permit and encourage investment. The development of the human capital skill of the labor force is also a crucial thing to be done.

One of the most salient features of Nigeria's economy is that it has stagnated since 1980, the GDP per capita in 2006 was almost the same as it was in 1980 (Bloom, et al. 2015). Bloom, et al.(2015) also showed that, part of the drag on Nigeria's economy has been its demography and institutions which are mediocre in African terms and poor when compared to countries from other regions. Also, factors such as regional and ethnic inequalities, very low levels of investment in education and health, and a culture of youth violence were noted among others as posing significant challenges to Nigeria's ability to benefit from its demographic transition.

The data on Nigeria demonstrates a high youth dependency ratio which, when combined with the aged dependency ratio, gives an overall dependency ratio of about one to one (CIA World Fact book). This implies that, for every supposedly active productive person in the population in the working age group of 15 to 64 years, one other person is dependent. This is a relatively large figure compared with the situation in the developed countries with the highest dependency ratio of about one child to three adults of the working age groups.

Despite the fact that the labor force is an asset in its capability to enhancing productivity and growth, Nigeria has ironically been plagued by the problem of unemployment which has become a major issue in the country. The unemployment problem has been growing at an alarming rate, and it is more pronounced among the youthful age group between the age of 15 and 24 years. The unemployment rate of Nigeria was shown to have increased from 12.60% in 2002 to 19.7% in 2008 (NBS/CBN Surveys, 2007and 2008). Bloom, Finlay, Humair, Mason, Olaniyan, and Soyibo, (2015) recommended that for Nigeria to be able to harvest the potentialities

inherent in its population growth, the country needs to create 10,000 job yearly between 2010 and 2016.

Also, a trend analysis of the ratio of total savings to GDP in Nigeria shows that the saving rate has been fluctuating over time. The savings/GDP ratio which was 2% in 1960 increased to 7.8% and 11.6% in 1970 and 1980, respectively. In 1990 and 2000, it declined to 11.1% and 8.4% respectively. Later, in 2011, the savings/GDP ratio in Nigeria stood at 17.4% (CBN, 2011). The consideration of the demographic realities in Nigeria will help the policymakers to adopt measures that can accelerate the country's demographic transition and magnify her demographic dividend. Alternatively, Nigeria could experience a demographic drag on its economy if the policy makers fail to implement right policies in reaping the dividend inherent in its population.

This study is therefore designed to examine the interactional relationships between the demographic dividend mechanism, and economic growth in Nigeria with a view to deriving implications for policy direction.

Literature Review

Empirical evidences differ between developed and developing countries on the economic outcomes of the relationship between demographic dividend and the channels of transmission.

Little and Triest (2002) examined the probable impact of demographic change on U.S labor markets by reviewing the population ageing, and increased immigration. Their regression results show the existence of a negative relationship between United States productivity growth and the growth rate of the working-age population. Their results gave some grounds for hoping that the low rates of labor force growth that the United States would experience early in that century would be accompanied by relatively high rates of productivity growth.

Pench (2000) demonstrated that shocks from the labor supply and public finances for social security would negatively affect economic growth rates in the European Union and Japan by 0.5 percentage points and the United States by 0.25 percentage points.

Feldstein (1995) who was one of the people who earlier sound the wake-up call among economists about the effects of ageing in 1980s, argued that the combination of increased longevity and a reduced birth rate would directly reduce the growth rate of the European economies by slowing the growth of the capital stock and by weakening the productivity of the labor force. It was then suggested by the estimates of UN's population projection that the projected increase in elderly dependency ratios and the projected decline in the share of the working – age population in advanced countries could result in slowing per capita GDP growth by an average of ½ percentage points by 2050.

Bloom and Williamson (1998) found that population dynamics explain almost 20 per cent of the growth observed in Europe over the time period of 1965-1990. They proposed the distinct channels through which demography may influence growth as the labor force, savings and investment. Bloom and Canning (2001a) however, included a third channel through which demography may affect economic growth as educational enrolment and human capital. They consequently found a significant interaction between demographic variables and policies. Good policies, they asserted could lead to higher growth and that the impact of demographic change is greater when institutions are of higher quality. Similarly, Bloom, Canning and Sevilla (2003b) stressed that open economies, a flexible labour force and modern institutions are necessary for a country to actually reap the demographic dividend.

The East Asian nations have been noted among countries that have experienced the most success in "reaping" the demographic dividend produced by changes in their demographic transition. In the case of China, it was said that changes in the population age structure had reduced population dependency and enhanced the productiveness of the population. The increased levels of economically active population and employment have produced an economic surplus and helped China approach a high saving rate. High saving rate which is helpful for capital formation, and which drives economic growth is referred to as the second demographic dividend. Their saving rate which was initially more than 30 percent increased to 45.9 percent in 2004. It was suggested that the demographic dividend would continue to make a contribution to China's

economic growth before the turning point would be reached in 2013 when the dividend would become debt.

Increase in human capital investment through public and private financing would be the major source of China's economic growth in the long run. Commenting on the implications of human capital development for economic growth in China, Isola and Alani (2012) as in World Bank (1997) showed that China in less than two decades achieved what it took other countries to accomplish in centuries when over 170 million of the 270 million Chinese living in absolute poverty in 1978 were raised above the poverty threshold. China went from lack- luster growth of 3.9% before the reforms to 8 to 9.5% after the reforms. This significant share of China's growth was attributed to the accumulation of human capital.

As for the population-saving link, Mason (1988) noted that although reduced fertility and slower population growth have contributed to the macroeconomic objective of increased saving in a number of countries but the adverse impact of population growth on saving is by no means universal. Abiara and Arosanyin (2014) studied the determinants of personal savings in Ilorin Metropolis in Nigeria with the objective of examining their savings culture. Using the modified logit model and Ordinary Least Square (OLS), their study concluded that age distribution, income and wealth are directly proportional to personal savings in Ilorin metropolis. In the same way Keho (2012) tested whether the age dependency ratio exerts a negative effect on the domestic savings rates for 16 African countries using annual data. His analysis applied the bounds test of cointegration and the modified Granger causality test to avoid the pre-testing bias associated with standard unit root and cointegration tests. The bounds test showed evidence of cointegration for 11 countries, while the causality analysis revealed that dependency ratio causes savings rate negatively in nine countries, and positively in two countries. This implies that changes in non-working population size are important in explaining the future path of the domestic savings rate in Africa.

Extract from the Report of the United Kingdom Royal Commission on Population, showed a study which was conducted on the economic impact of global demographic change for the period of 1960-2000. The results indicated that per capita GDP growth was positively correlated with changes in the relative size of the working-age population, but negatively correlated with changes in the elderly population. Demographic change was found to influence Investment through its impact on savings. Current account balance as economic growth indicator was found to be positively related to the relative size of the working-age population while it was negative related to the elderly dependency ratio.

In Nigeria, Omuju and Abraham (2014) contended that the increase in the population of the youth may undermine development of the nation if the challenges facing the youths are not addressed. They identified these challenges as including problems of youth unemployment, lack of economic opportunities, lack of access to basic education, high HIV prevalence rate, and high poverty rate. As a way of soliciting for youth empowerment in the attainment of the demographic dividend, they recommended that the government should create employment and economic opportunities, provide educational and health facilities, and combat poverty in order to ensure that the bulging youth population translates into economic growth and development.

Bloom et.al. (2015) used a cross-country growth model to quantify the economic growth opportunity created by Nigeria's demographic transition, focusing particularly on labour productivity and investment in Nigerian's human capital. Using a cross-country growth model and an original analysis of Nigeria's economic lifecycle, they estimated that Nigeria's potential demographic dividend could raise per capita income by 30% or more by 2030, increase the size of the economy to 3 times of the current size, and lift around 32 million additional people out of poverty by 2030. They highlighted that some principal challenges in achieving these benefits are unemployment, low job productivity, and low levels of human capital.

Ashraf *et.al.*(2011) also showed that a decrease in Nigeria's fertility rate by one child per woman could boost GDP per head by13% over 20 years, due largely to the reduction in dependency effect. There is the intuition that jobs matter for development and the vast majority of national

development strategies look to employment generation as a major channel for poverty reduction as noted by Umoru and Yaqub (2013). They therefore adopted the newly developed bounds testing approach to co-integration in their study on employment and growth link over the sample period of 1975 to 2012. They showed that both the short-run and long-run growth effects of employment in Nigeria are significant and positive. Their results in particular revealed that for a one-percentage point increase in employment, 0.568 percent real GDP growth rate was induced in the long-run. This corroborates Umo's position that the unutilized large quantum of human resources in Nigeria due to non-availability of employment opportunities has the possibility of impeding the country's growth prospect (Umo 2007).

The importance of a well-educated labor force to the well-being of a nation's economy is supported by a wealth of statistical evidence. Awopegba (2001) established the link between education and selected human development indicators in Nigeria. She noted that under-development of Nigeria could be attributed partly to the unplanned efforts towards the development of human capital through education and training which has made the country to be scored low by the United Nations in terms of its human development indicators. Also, Oluwatobi and Ogunrinlola (2011) examined the relationship between human capital development efforts of the Government and economic growth in Nigeria by finding out the impact of government recurrent and capital expenditures on education and health in Nigeria and their effects on economic growth. Using secondary data while adopting augmented Solow model, their result shows that there exists a positive relationship between government recurrent expenditure on human capital development and the level of real output, while capital expenditure is negatively related to the level of real output. The study therefore recommended appropriate channeling of the nation's capital expenditure on education and health to promote economic growth. Likewise, Isola and Alani (2012) examined the contribution of different measures of human capital development to economic growth in Nigeria using growth account model which specifies the growth of GDP as a function of labor and capital. Based on the estimated regression and a descriptive statistical analysis of trends of government commitment to human capital development, they found that though little commitment had been accorded health compared to education, empirical analysis showed that both education and health components of human capital development are crucial to economic growth in Nigeria.

The reviewed studies and many others had established significant relationship between demographic dividend and economic growth. However, the debate continues until today despite the already vastly rich literature due to the fact that the findings are rather inconclusive and inconsistent depending on data, statistical methods and model specifications. Thus, this study will increase the frontier of knowledge by using the most updated data on Nigeria (considering her population challenges) to quantify the feedback responses of economic growth to mediums of demographic dividend transmission using Vector Auto Regression. These combined feedback interactions have not been addressed by any of the reviewed studies.

Research Methods

A Vector Auto Regression (VAR) model was employed to examine the dynamic relationship between the variables of economic growth and demographic dividend transmission mechanisms. With the modelling of Vector Autoregression, it is possible to scrutinize the dynamic interaction between a set of n variables. Because working-age population ratio could have important implications on economic growth directly and indirectly, it is possible from this study to draw inferences regarding causality between economic growth rate, working-age population ratio and other links of impact such as savings rate, human capital accumulation, and employment rate.

A VAR model describes the evolution of a set of k variables (called endogenous variables) over the same sample period (t = 1, ..., T) as a linear function of only their past evolution.

A (reduced) p-th order VAR, denoted VAR(p), is shown as: $yt = c + \varphi 1yt - 1 + \varphi 2yt - 1 + \ldots + \varphi pyt - p + \varepsilon t$……..(1)

where $E(\varepsilon_t) = 0$; $E(\varepsilon_t\varepsilon_\tau) = \begin{cases}\sigma 2 \\ 0\end{cases}$ for $t = \tau$

otherwise

This can be extended to describe the dynamic interactions among a set of variables in an (n × 1) vector yt: $yt = c + \varphi 1yt - 1 + \ldots + \varphi pyt - p + \varepsilon t$ …..(2)

where **c** is a k × 1 vector of constants (intercept), Φi is a k × k matrix (for every i = 1, ..., p) and ε_t is a k × 1 vector of error terms, the i-periods back observation y_{t-i} is called the i-th lag of y. Thus, a pth-order VAR is also called a VAR with p lags.

Each variable is regressed on a constant and p of its own lags as well as on p lags of each of the other variables in the VAR. The VAR model that will be estimated in this study can be formalized in vector and matrix form in the following manner:

$$y_t = \alpha + \beta . \text{GDPGR}t + \sum_{j=1}^{p} \Phi_j y_{t-j} + \varepsilon_t \quad ..(3)$$

where $y_t = (\text{WKPOP}t, \text{SAV}t, \text{UNEMP}t, \text{ENROL}t, \text{LIFEEXP}t,)$ is a transposition of (5x1) column vector, $\text{GDPGR}t$ represents the growth rate of the economy at time t, $\alpha = (\alpha_1,\alpha_2,\alpha_3, \alpha_4, \alpha_5)'$ is a constant vector, and $\beta = (\beta_1,\beta_2,\beta_3,\beta_4,\beta_5)'$ is a coefficient vector that measures the impact of the growth rate of other endogenous variable on economic growth rate, Φ_j is the coefficient matrix for lagged explanation variables, while e_t is an error vector. A lag of 3 is chosen using AIC, while 1 (one) is chosen using SBIC as the best lag order.

The demographic dividend transmission mechanism was measured by working-age population ratio (WKPOP), savings as ratio of GDP (SAV), employment rate (proxied by unemployment) (UNEMP), and human capital development variables (ENROL and LIFEEXP), while GDP growth rate (GDPGR) measured the rate of economic growth.

All the data in this study with the exception of unemployment rate were sourced from the World Development Indicators. Data on unemployment was sourced from various publications of Central Bank of Nigeria Statistical Bulletin and National Bureau of Statistics (NBS). The annual time series data cover the period of 1980 to 2014 on the country.

The techniques adopted in the study started with the exploration of the unit root test of all the variables which are included in the study with the use of Augmented Dickey-Fuller (ADF) test to determine whether the series are stationary or not.

Results and Discussion

The unit root test established that two out of the six included variables in the models are stationary at level, while the remaining four variables became stationary after the first differencing (see Table 1). The I(0) variables are GDP per capita (GDPGR) and working-age population (WKPOP), while the I(1) variables are savings (Sav), unemployment (Unempl) (used to proxy employment rate), primary school enrolment (enroll), and life expectancy (lifeexp).

Table 1:Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variables	Form	P-value	ADF test statistics with		Critical-Value at 5%		Order of Integration
			Constant	Constant & Trend	Constant	Constant & Trend	
GDPGR	Level	0.0013	-4.42	-5.52	-2.95	-3.55	I(0)
WKPOP	Level	0.0023	-4.27	-5.08	-2.97	-3.58	I(0)
LIFEEXP	Level	0.9685	0.20	-0.55	-2.96	-3.56	I(1)
	First Difference	0.0006	-4.74	-5.25	-2.96	-3.56	
ENROL	Level	0.3761	-1.80	-1.96	-2.96	-3.56	I(1)
	First Difference	0.0029	-4.15	-4.02	-2.96	-3.56	
UNEMP	Level	0.9634	-0.13	-1.46	-2.95	-3.55	I(1)
	First Difference	0.0000	-6.88	-7.25	-2.95	-3.55	
SAV	Level	0.7828	-0.88	-0.77	-2.96	-3.56	I(1)
	First Difference	0.0010	-4.58	-4.70	-2.96	-3.56	

Source: Author's computation

Table 2: Cointegration Result

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.841547	140.3821	95.75366	0.0000
At most 1 *	0.574983	81.42860	69.81889	0.0045
At most 2 *	0.505438	54.04857	47.85613	0.0117
At most 3 *	0.475819	31.51792	29.79707	0.0314
At most 4	0.171273	10.84854	15.49471	0.2210
At most 5 *	0.140283	4.836882	3.841466	0.0278

Trace test indicates 4 cointegrating eqn(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 Statistic	0.05 Critical Value	Prob.**
None *	0.841547	58.95354	40.07757	0.0001
At most 1	0.574983	27.38004	33.87687	0.2436
At most 2	0.505438	22.53065	27.58434	0.1944
At most 3	0.475819	20.66937	21.13162	0.0579
At most 4	0.171273	6.011660	14.26460	0.6117
At most 5 *	0.140283	4.836882	3.841466	0.0278

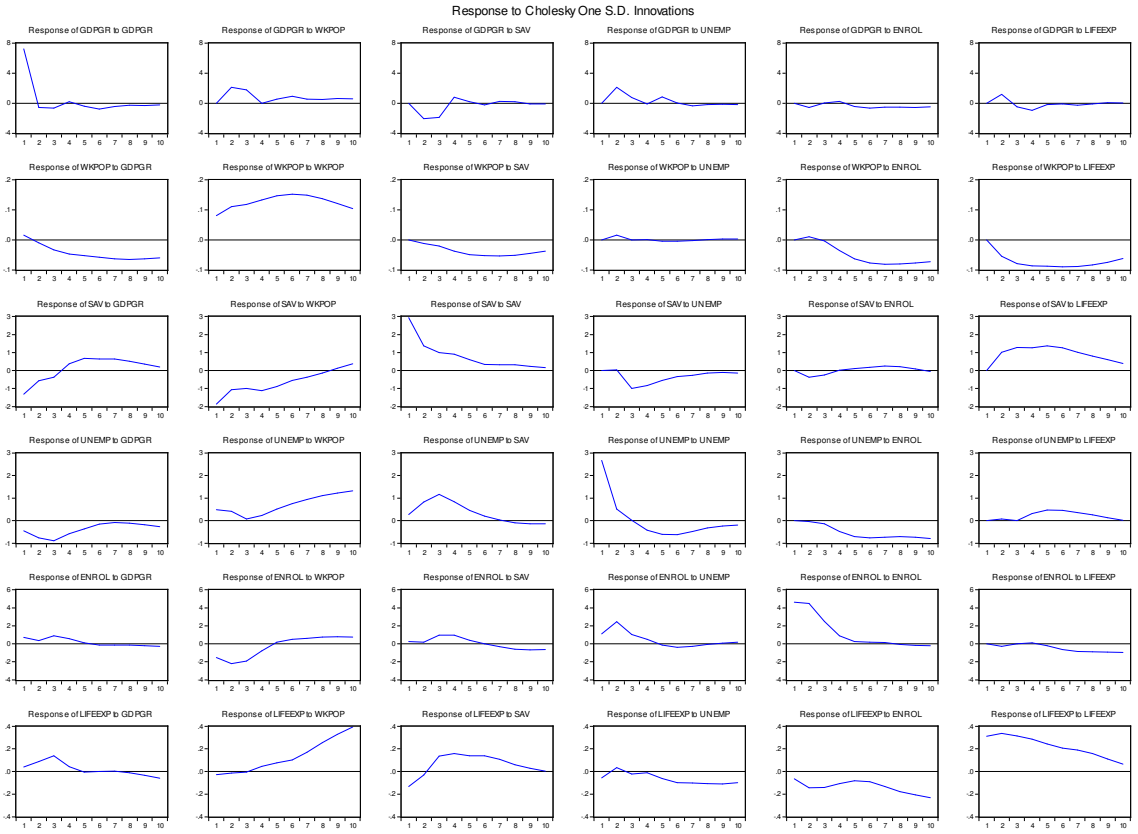
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The cointegration test result in both the Rank Trace Test and Maximum Eigenvalue Testshowed that there is not less than 1 cointegrating relations as reflected in the comparison between the statistics and the critical values on Table 2.

The results of the estimates of the Impulse Response Function as presented on figure 1 shows the time horizon on the horizontal axis (i.e the number of years that have passed after the impulse has happened), while the vertical axis measures the response of the dependent variables to shocks in the error term. The estimates of the variables were measured in rates approximating the rate of change of those variables in response to a one standard deviation shock in each of the endogenous innovations. While the interpretation of the result relies heavily on the magnitude and signs of the estimates, the signs of the estimates are considered more important. The magnitude shows the statistical significance while the signs show the desired economic content for the impact.

As shown in Figure 1 and Table 3a, the results of impulse response indicate that a positive shock to working-age population ratio (WKPOP) during the time horizon of 10 years, produced positive and significant response on economic growth rate (GDPGR) throughout the period of the horizon except the fourth period when it was negative and insignificant. It peaked in the second period. This result is consistent with what some renown authors in demography economics (Bloom, et al., 2003, Bloom et. Al, 2009, Bloom, et al., 2000; Mason, 2001)have established, that economies with demographic transition which produces changes in the population age structure that reduce population dependency relative to the economically active population has the potentialities of "reaping" the demographic dividend.

Figure 1: Impulse Response Function of each of the endogenous variables to Cholesky one S.D innovations.



The analysis also considered the indirect impact of the working-age population ratio on the economic growth through the different links of transmission during the period. These links are savings rate, human capital and employment rate. The result of the analysis shows that the direction of impact of a unit increase in the rate of savings on economic growth rate was weak during the period. It was immediately negative but significant for the first two periods and then continued to oscillate between positive and negative impact during the time horizon, peaking in the fourth period. The direction of impact of unemployment, enrolment, and life expectancy on economic growth follow the same pattern. A unit increase (decrease) in the rate of unemployment increased (decreased) the rate of economic growth immediately at the rate of 2.09 which is the highest rate during the period before it started declining in magnitude. Afterward, in the long run a unit increase in unemployment rate dampens the rate of economic growth but insignificantly. As for education variables, enrolment rate was immediately negative in its impact on the rate of economic growth before it became positive and then in the long run exerted negative impact. Life expectancy rate also oscillated between negative and positive influence and was insignificant in the long run (Table 3a).

Table 3b records the respective responses of savings, unemployment rate, enrolment rate, and life expectancy rate to positive innovations to working-age population ratio. It is shown that an increase in the working-age population ratio initially depresses the savings rate significantly but later in the long run enhances itbut insignificantly in the last 2 horizon periods. Unemployment rate was significantly and positively influenced by working-age population ratio throughout the period horizon. Education variables were immediately impacted negatively and later positively in the long run.

Table 3a: Response of GDPGR to shocks in WKPOP, SAV,UNEMP, ENROL and LIFEEXP

Period	GDPGR	WKPOP	SAV	UNEMP	ENROL	LIFEEXP
1	7.227853	0.000000	0.000000	0.000000	0.000000	0.000000
2	-0.552678	2.099608	-2.093502	2.095580	-0.594776	1.153721
3	-0.678337	1.752908	-1.869029	0.764256	0.028264	-0.477600
4	0.194930	-0.002668	0.786680	-0.084456	0.220750	-0.959825
5	-0.409283	0.545945	0.196082	0.845787	-0.435946	-0.219114
6	-0.797549	0.924465	-0.235065	0.036302	-0.661326	-0.079524
7	-0.458332	0.535561	0.218681	-0.361088	-0.517121	-0.279573
8	-0.291181	0.487094	0.159011	-0.185146	-0.525898	-0.103835
9	-0.332998	0.619575	-0.109561	-0.145251	-0.550030	0.041484
10	-0.231805	0.567753	-0.080429	-0.204479	-0.485698	0.019382

Table 3b: Responses of SAV,UNEMP, ENROL and LIFEEXP respectively to shocks in WKPOP

Period	WKPOP	WKPOP	WKPOP	WKPOP
1	-1.867033	0.478246	-1.511120	-0.029495
2	-1.067199	0.407006	-2.198902	-0.014427
3	-1.001633	0.071900	-1.895261	-0.005480
4	-1.123215	0.229516	-0.780063	0.044283
5	-0.883125	0.519913	0.183323	0.078194
6	-0.559853	0.749525	0.498013	0.102298
7	-0.367944	0.935581	0.616245	0.169860
8	-0.146298	1.101347	0.751473	0.255621
9	0.129963	1.223567	0.812047	0.328795
10	0.375789	1.328415	0.761004	0.392834

Table 4: Variance Decomposition of Gdpgr

Period	S.E.	Gdpgr	Wkpop	Sav	Unemp	Enrol	Lifeexp
1	7.227853	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	8.210646	77.94637	6.539155	6.501177	6.514093	0.524750	1.974455
3	8.674894	70.43825	9.941081	10.46594	6.611684	0.471149	2.071889
4	8.768568	68.99074	9.729825	11.04842	6.480451	0.524515	3.226051
5	8.851283	67.92114	9.929264	10.89196	7.272978	0.757336	3.227319
6	8.963046	67.02963	10.74701	10.69081	7.094373	1.282969	3.155208
7	9.019804	66.44691	10.96473	10.61546	7.165632	1.595566	3.211697
8	9.056811	66.00836	11.16456	10.55972	7.148983	1.919726	3.198648
9	9.102634	65.47929	11.51573	10.46815	7.102651	2.265569	3.168602
10	9.138850	65.02568	11.81060	10.39310	7.096531	2.530104	3.143988

To further explore the interaction between the economic and demographic variables, the Forecast Error Variance Decomposition (FEVD) analysis is also considered in addition to the results of the Impulse Response function. FEVD deals with the decomposition of forecast error in an endogenous variable into the component shocks to the endogenous variables in the models. The importance lies in the fact that whereas the Impulse Response reports the direction of the effect of the innovations to the affected variables, Forecast Error Variance Decomposition shows the explanatory contribution of the innovations in the considered variables.

Therefore, it is shown that economic growth own shock was having the greatest influence in the error variance. This is followed by the influence of working – age population ratio, savings, employment, and education variables in that order. The magnitude of the contribution of working-age population ratio ranges from 6.5 to 11.81, savings from 6.5 to 11.04, unemployment from 6.5 to 7.3, enrolment from 0.5 to 2.5, and life expectancy from 1.9 to 3.2 (Table 4).

The results in summary show that working-age population ratio as a direct transmission channel of demographic dividend significantly spurred economic growth during the period of the study, while the theoretical links of demographic dividend transmission mechanisms are found to be weak in their impact on economic growth as they are not stable in sign.

Previously, Aidi (2016) established a negative relationship between savings and economic growth in Nigeria using data for the period 1970 to 2014. The explanation that was adduced to this was that savings were not directed towards productive purpose in Nigeria, and that as savings continue to grow people might put less effort toward production thus reducing the overall total output in the country.

Also, Nigeria's educational system according to Dauda (2009) has been characterized by structural defects, inefficiency and ineffectiveness which place the country at its lowest ebb in human capital development and utilization. The educational system tended to produce more of those who lack job skills for employment than those the economy requires to remain vibrant. The emphasis has been on linear expansion in the size of the educational system without any broad and dynamic conception of the qualitative dimensions of the system. The result of this inadequate educational system include decreasing industrial capacity utilization, rising unemployment, rising poverty, and threats to social insecurity by the jobless youths (Borishade, 2001 cited in Uwatt, 2003).

Iwayemi and Jerome (1995) observed that the weak employment-growth nexus is attributable to the weakness of productivity growth over time as majority of workers are engaged in the informal economy.

Conclusion

This paper empirically explored the effectiveness of the theoretically linking channels of demographic dividend on the economic growth of Nigeria over a thirty-five-year sample period. The study examined the interactions among working-age population ratio, savings rate, employment rate, human capital, and economic growth. The empirical results show that working-age population ratio as a direct transmission mechanism of demographic dividend effectively and significantly impacted the economic growth of Nigeria during the period of the study. However, savings, employment, and human capital as the linking transmission mechanisms of demographic dividend were shown to be weak in their impact on economic growth as they were not stable in sign. These then suggest the need for concerted efforts by the government of Nigeria through her policies at influencing fertility rate to decline more rapidly thereby increasing the working-age population ratio. Spending on education should also be made effective in raising the human capital of the educated, while a broad set of employment generating policies that can help abridge unemployment and improve labor conditions for young adults should be implemented, and there should be an adequate and appropriate reformation of the Nigerian financial sector to mobilize savings for productive use.

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