Journal of Economics and Sustainable Development www.iiste.org
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.9, No.6, 2018

# Is There Prospect for Second Demographic Dividend in Nigeria?

Ademola Obafemi Young
Department of Economics, Mountain Top University, Ogun State, Nigeria

**Abstract**
This study assessed the prospect for second demographic dividend in Nigeria using time series secondary data spanning the period between 1970 and 2015. Employing Autoregressive Distributed Lag Model (ARDL) and TYDL Approach to Granger causality tests, the paper found the existence of cointegration among the variables. Furthermore, the results obtained revealed the existence of causality running from economic support ratio to household savings. Equally, the results found showed the existence of causality running from household savings to private investment. However, the null hypothesis that private investment does not granger cause economic growth is accepted. These results, thus, implied that although second dividend is under way in Nigeria but the dividend is not an automatic phenomenon. An optimal utilization of the dividend requires an integrated policy framework, appropriate policies, job creation and sustenance of the war on corruption.
**Keywords:** Demographic Transition; Demographic Dividend; Economic Growth.

## 1. INTRODUCTION

Dating back to Malthus' 1798 book on Principle of Population, different views have come up regarding the consequences of population dynamics on economic growth and development. Generally, there are three schools of thought to this debate, namely; the pessimistic, optimistic and neutral. The pessimists, whose ideas were grounded in the theory of diminishing returns to scale put forward by David Ricardo (Coale and Hoover, 1958; Ehrlich and Lui, 1997; Ehrlich and Ehrlich, 2009), argued that population change has negative impact on economic growth and development. However, the optimists (Boserup, 1981; Simon and Bartlett, 1985; Simon, 1981, 1986, 1990, 1996) contended that population pressure invokes technological changes leading to positive growth in the economy. Still, some studies (for instance, Bloom and Freeman, 1986; Thornton, 2001; Easterly and Levine, 1997, 2001, 2002) found no significant effects of population change on economic growth, giving rise to 'population neutralism'.

As a reconciliation to the three scenarios, some studies (for instance Kelley and Schmidt, 1994; Weeks, 2011) stated that the different perspectives of the relationship between population change and economic growth just reflect different phases a country goes through. A reversed U-shaped curve best explains this position that population growth tends to increase with economic growth at early stages of development while flattening out and eventually decreasing at higher levels of economic development. On the empirical side, however, more often than not, studies have failed to suggest an overall dominance of one view over the other.

To break the impasse in the population debate, more importantly, consequent upon demographic transition, understanding the nexus between population dynamics and economic growth has taken on immense importance in recent years. A body of empirical literature examining the macro economic implications of changes in age structures in particular working age population, after a decrease in fertility, on economic growth has emerged. Given fixed output per worker, labour force participation rates, and unemployment rates, a rise in the share of the working-age population will lead, as a matter of simple algebra, to an increase in output per capita. A phenomenon known as the first demographic dividend (which may be alternatively called the accounting effect of demographic dividend) and allude to an economic growth potential that is created by a rising share of working age people in a population. In other words, once the implicit assumption of a constant age composition of the population is dropped, demography matters for economic growth. Numerous studies have explored the implications of this proposition. Important forerunners in this respect are Bloom and Freeman (1988), Higgins and Williamson (1997), Bloom and Sachs (1998), Bloom and Williamson (1998), Bloom, Canning and Sevilla (2001) and Mason (2001).

In recent years, in contrast to this dominant focus on first demographic dividend, recent studies (see for instance Bloom and Canning, 2011; Prskawetz and Sambt, 2014) of the effect of changing age distributions have argued that behavioural forces of the demographic dividend that relate to savings matters for economic growth and have predictive power for future income development (figure 2 in the appendix 2). This is because during the window, firstly, consumption per effective consumer can rise at the same time that the share of GDP consumed declines, because of the more favourable age distribution. This means that a larger share of national output can be diverted from consumption into investment opportunities without sacrificing current living standards. Secondly, during the window the demand for resources to support old age consumption begins to emerge. These behavioural effects which operate through savings and capital deepening are called the second demographic dividend. In other words, the first dividend yields a transitory bonus while the second dividend is the result of transforming that bonus into greater assets and sustainable development. Numerous studies have explored the empirical implications of this proposition.

On the empirical front, studies are quite supportive of the predictions of the life cycle hypothesis and overlapping generation model, particularly with regard to the positive influence of the proportion of the population of working age on savings. However, in spite of wide discussion in the literature, the linkages (causality) between economic growth and savings, more often than not, still remains ambiguous with some studies supporting the conventional hypothesis of savings led to growth postulated by the classical growth theory together with the neoclassical Solow hypothesis while others lent credence to the Keynesian proposition and Carroll-Weil hypothesis that faster growth rate of real GDP caused higher growth rate of savings. Consequently, in the light of the empirical studies, it is evident that the discussion on the direction of causality between savings and economic growth as theorized by different schools of thought is inconclusive.

Thus, given the potential economic advantages of the second demographic dividend, this paper seeks to deepen our understanding of the circumstances of the dividend. In doing so, we focus on Nigeria. This focus is motivated by the fact that on the empirical side, studies (for instance Mason, Olaniyan, and Soyibo 2010; Reed and Mberu, 2014) have shown that Nigeria has indeed entered the demographic window of opportunity (i.e. that period of time in a nation's demographic evolution when the proportion of population of working age group is particularly prominent). However, despite the important role that behavioural forces of the demographic dividend that relate to savings, and hence to capital accumulation plays in the process of economic development, the focus of these literatures has been heavily biased towards demographic trends and their economic ramifications or the imbalanced between population and resources in general, and the implications of this imbalance in particular. In this paper, thus, we step back to take a look at the question, which has gone almost unnoticed by the literature focusing on the accounting effect of the demographic dividend, of whether the resources freed up by the first dividend during the demographic window can support investment in growth of output per capita in Nigeria. In other words, is there the prospect for second demographic dividend in Nigeria?

The paper is organized as follows. In the next section we present literature review followed by the analytical framework, method and used for the study. The estimation and discussion the results is presented next. We conclude with policy implications.

## 2. LITERATURE REVIEW

### *Empirical Literature on Working Age Population-Savings Nexus*

A key question in economics is whether changes in the age structure of the population affect macroeconomic variables such as aggregate consumption and the savings rate. Economic theory suggests that the influence could be substantial. The life cycle model of Modigliani for instance predicts that individuals' consumption and saving behaviour are functions of their age; an individual borrows as young, saves as middle-aged and dissaves when old (Modigliani and Brumberg, 1954; Ando and Modigliani,1963). Aggregating up, changes in the age distribution over time could hence induce variations in a nation's private saving rate. Numerous studies, with particular focus on the issue of positive influence of the proportion of the population of working age on saving, have explored the empirical implications of this proposition. For instance, macro-econometric studies by Kelley and Schmidt (1996), Higgins and Williamson (1997), and Toh (2001) find large, statistically significant effects of age structure on aggregate saving rates. Over the course of a demographic transition along the lines experienced in East Asia, estimates by Higgins and Williamson and by Toh imply that demographic change would have produced an increase in gross national saving rates by 43 and 45 percentage points, respectively. Analysis by Kelley and Schmidt implies a smaller but still enormous increase of 25 percentage points.

Lee, Mason and Miller (2000, 2001) show how aggregate saving rates and wealth change during the demographic transition, given that the life cycle considerations entirely determine saving before, during and after the transition. They simulate a model of the Taiwanese economy starting in 1800 to allow convergence to the steady state before the demographic transition begins. They report results for 1900–2050 and for 1950–2050 only to take into account the loss of capital during the World War II and report the results. The overall finding is that life-cycle saving behaviour through the demographic transition accounts for a substantial rise in the saving rate and for a high level of the saving rate in Taiwan.

Athukorala and Tsay (2003) have similar findings on the determinants of household saving in Taiwan. Using annual data for the period 1952–1999 they find that young dependency (the ratio of the population aged 19 and under to the population aged 20–64) and age dependency (the ratio of the population aged 65 and older to the population aged 20–64) have significant negative impacts on the Taiwanese household saving rate (the household saving rate is measured as a percentage of disposable income). These results are consistent with LCH and Leff's (1969) dependency hypothesis.

Using a lifecycle model, Modigliani and Cao (2004), Horioka and Wan (2007), Horioka (2010), Song and Yang (2010), and Bayoumi, Tong, and Wei (2012) find evidence of a significant relationship between saving rates and the age structure of the population. These authors show that China's age structure and saving rate have been related over a 50 year period. They suggest that the major systematic determinants of private saving rate are income growth and demographic structure of the economy. State level population policy after 1970s to limit the number of children per family resulted in 'drastic decline in the ratio of people under fifteen years to working population from 0.96 in the mid-70s to 0.41 at the turn of the century'. This structural shift of Chinese demography causes the saving rate to increase according to Modigliani and Cao.

Projecting forward, Kuijs (2006) expects China's savings to remain high until around 2020-25, as the negative impact on saving from a rising old-age dependency ratio is offset by the impact of a continued decline in the young age dependency ratio. After 2025 or so, when the former continues to increase but the latter stabilizes, the net negative effect on saving behaviour eventually becomes very substantial. Chamon and Prasad (2005) have a broadly similar conclusion. They also suggest that these effects could switch and become less ambiguous after around 2025, as the old-age population continues to rise and the working-age population becomes more dominated by low-saving younger cohorts. Similarly, Horioka and Terada-Hagiwara (2012) project China's savings rate to continue increasing until 2030, as its population ages relatively more slowly than a number of other Asian economies, with its population share of retirees crossing 14 percent (the accepted definition of an-aged society) only toward the end of this period.

Yasin (2008) investigates the impact of demography structure on national savings in fourteen emerging markets in the Middle East and North African region. The results, deduced from annual data over the period 1960-2001, are consistent with the implications of the life cycle hypothesis, particularly for the working and young population groups. In particular, the study find evidence for a significantly positive relationship between the percent of working group of the population and the private saving ratio in the majority of the countries studied. The results suggest that the larger the working ratio in the population, the higher the national saving ratio will be. Also consistent with the life cycle hypothesis, the empirical analysis reveals that the children proportion in the population is noticeably falling in most of these countries over the estimation period. Such a trend resulted in an equally marked increase in the percent of the working group in the population, with the latter being positively correlated with national savings. Taken together, these results imply that the prospective demographic structures in these counties contain valuable information for predicting future trends in national saving.

Horioka and Yin (2009) also concludes that Japanese household saving will continue to decline due to the rapid aging of its population. Based on projected changes in the fraction of the population in the prime savers cohort (40-59) around the world, Haldane (2010) and Bank of England (2011) find that medium-term pressures on global imbalances could triple over the next twenty years, with saving rates rising among surplus countries as their prime savers share rises and falling in deficit countries as their prime savers share declines (including in the United States and other developed economies).

Lugauer, Mark, and Curtis (2012) examine how changing demographics can explain much of the evolution of China's household saving rate from 1955 to 2009. The study undertake a quantitative investigation using an overlapping generation model in which agents live for 85 years. Agents begin to exercise decision making when they are 20. From 20 to 63, they work. From 20 to 49, they also provide for children. Dependent children's consumption enters into the parent's utility, and parents choose the consumption level of the young until they leave the household. Working agents transfer a portion of their labour income to their retired parents and save for their own retirement. Retirees live off of their accumulated assets and support from current workers. The study presents agents in the parameterized model with the future time-path of the demographics, interest rates and wages as given by the data and analyze their savings decisions. The simulated model accounts for nearly all the observed increase in the household saving rate from 1955 to 2009.

Joe, Dash, and Agrawal (2015) examines the impact of changing population age structure on economic growth in China and India. The analysis informs that, unlike China, India's savings and growth potential, as well as the magnitude and timing of its first demographic dividend, is adversely affected by the slow pace of fertility decline. The autoregressive distributed lag (ARDL) model-based long-run coefficient suggests that the contribution of the reduced dependency burden to overall per capita GDP growth during the analysis period is about 2–2.5 per cent per annum for China and about 1–1.5 per cent per annum for India. China also has a significant association between dependency ratio and savings, whereas such an association is expected to emerge in India. However, this relationship is also indicative of expected adverse consequences when the dependency ratio begins to rise and population ageing gains momentum. Therefore, following China's experience, it is argued that higher domestic savings and investments during the demographic dividend phase are critical to counter the adverse impact of population ageing and to ensure growth sustainability.

Studies have also employed the overlapping generations (OLG) framework to study saving. Brooks (2003) uses an overlapping generations (OLG) model to simulate the global demographic transition over the period 1770 to 2230. The population dynamics over this period are calibrated to match the historical and projected data. The study predicts a significant change in global saving-investment balance around 2010. Due to population aging, the European Union and North America are forecast to experience a significant shortage of saving. Curtis, Lugauer, Mark (2015) studies how changing demographics can explain much of the evolution of China's household saving rate from 1955 to 2009. They undertake a quantitative investigation using an overlapping generation model in which agents live for 85 years. Agents begin to exercise decision making when they are 20. From age 20 to 63, they work. From age 20 to 49, they also provide for children. Dependent children's consumption enters into the parent's utility, and parents choose the consumption level of the young until they leave the household. Working agents transfer a portion of their labor income to their retired parents and save for their own retirement. Retirees live off of their accumulated assets and support from current workers. The study present agents in the parameterized model with the future time-path of the demographics, interest rates, and wages as given by the data and analyze their saving decisions. The simulated model accounts for nearly all the observed increase in the household saving rate from 1955 to 2009.

***Empirical Literature on Savings-Economic Growth Nexus***

Empirically, the causal relationship between savings and economic growth has been established and widely discussed in the literature. Yet, in spite of wide discussion in the literature, the issue of the direction of causality between these variables still remains ambiguous with some studies supporting the conventional hypothesis of savings led to growth postulated by the classical growth theory together with the neoclassical Solow hypothesis while others are in favour of Keynesian theory and Carroll-Weil hypothesis that savings depend upon the level of output. For instance, Carroll and Weil (1994) base on the data of five-year average rates of economic growth in OECD member states and using Granger causality test, find that growth Granger causes saving, but not vice versa. Saltz (1999) investigated the direction of causality between savings and growth rate of real GDP for 18 Latin American and newly industrialized countries for the period 1960-1991. The results lent credence to the hypothesis that faster growth rate of real GDP caused higher growth rate of savings.

However, Attanasio, Picci and Scorcu (2000) questioned the reliability of the results obtained by Carroll and Weil (1994) because they use average data from five years instead of annual data which improves the precision and statistical importance of estimates. Attanasio *et al.* (2000) show that the findings of Carroll and Weil are not robust and the effects found are often weak. Moreover, when moving from the five-year averages that Carroll and Weil use to annual data, significance and causation of the estimates often changes. Using annual data also leads to more precision and robustness of the estimates. In their own analysis, Attanasio *et al.* (2000) conclude that lagged saving rates are positively related to investment rates. These investment rates negatively Granger-cause growth rates. Granger-causation from growth to saving was not found by Attanasio *et al*. (2000).

Using cross section data between 1960 and 1997 and Granger causality methodology, Anoruo and Ahmad (2001) analyzed the causal relationships between the growth rate of domestic savings and economic growth for 7 African countries (Congo, Cote d'Ivoire, Ghana, Kenya, Nigeria, South Africa and Zambia) by using VECM model and cointegration test. In their study, except for Nigeria, in all countries, it was recognized that saving rate and economic growth are co-integrated. The results of causality test showed that economic growth was Granger cause of saving rates for Ghana, Kenya, Nigeria, and Zambia, in return to this, for Congo, that saving rate was Granger cause of economic growth. Finally, in Cote d'Ivoire and South Africa, there is a two directional causality between two variables.

Krieckhaus (2002) conducted a study to see whether there is a link between public saving and economic growth in developing countries. He used a sample of 32 countries during the period 1960-1980 and included a case study of Brazil in his research. He found evidence that suggests that more public saving leads to higher economic growth. An increase in public sector savings affects national saving and national investment, which ultimately leads to economic growth. Governments can mobilize and allocate resources to efficient industrial sectors to stimulate growth.

Verma and Wilson (2005) examined the relationship between savings, investment, foreign inflows and economic growth in Indian using ordinary least square method and annual time series data from 1950 to 2001. The study revealed that savings and investment affect GDP in the long run while GDP has significant but small effects on household savings and investment in the short run. This means that the feedbacks to GDP are absent in the long run and only small in the short run. However, their results and findings did not support the Solow and endogenous growth theory which states that there is need to increase household savings and investment so as to encourage economic growth.

Mohan (2006) investigated the causal relationship between savings and economic growth in 13 countries by taking into consideration the income levels of different countries studied during 1960- 2001. The countries were divided into four different income levels: Low Income Countries (LICs), Low Middle Income Countries (LMCs), Upper Middle Income Countries (UMCs) and High Income Countries (HICs). By employing granger causality test, the results support the claim that causality runs from economic growth rate to growth rate of savings. In particular, the author submitted that the income level of a country plays an important role in determining the direction of causality between savings and economic growth. In general, the author reported that the empirical results were mixed in Low Income Countries (LICs) while the Keynesian theory of savings as a function of growth was confirmed Low Middle Income Countries (LMCs). Finally, whereas in the High Income Countries (HICs) (except Singapore), causality runs from economic growth rate to growth rate of savings, a feedback causal relation was more prevalent in the Upper Middle Income Countries (UMCs).

Verma (2007) investigated the relationship between savings, investment and economic growth in India from 1951 to 2004 using Autoregressive Distributed Lag (ARDL) Bounds Testing technique to test for Cointegration. The result of ARDL co-integration revealed that GDP, GDS and GDI have long-run relationship except when GDP is the dependent variable. The study also examine the long-run and short-run elasticities of the correlation between GDS, GDI and GDP growth. The result shows that savings do not cause growth, but growth causes savings, savings drive investment both in the short-run and in long-run and that investment is the driver of economic growth in India during the period. The overall results support the Carroll-Weil hypothesis that it is not savings that causes economic growth, but instead, it is growth that causes savings in India.

Sajid and Sarfaraz (2008) investigate causal relationship between savings and output in Pakistan by using quarterly data for the period of 1973:1 to 2003:4. The co-integration and the vector error correction techniques are used to explore causal relationship between savings and economic growth. The results suggest bi-directional or mutual long run relationship between savings and output level. However, there is unidirectional long run causality from public savings to output (GNP and GDP), and private savings to gross national product (GNP). The results also indicate that the speed of adjustment in case of savings is stronger than that of level of output. The overall long run results of the study favour the capital fundamentalist’s point of view that savings precede the level of output in case of Pakistan. The short run mutual relationship exists between gross domestic product (GDP) and domestic savings. The results also indicate unidirectional short run causality from gross national product (GNP) to national and domestic savings; and from gross domestic product (GDP) to public savings. The short run causality runs only from national savings to gross domestic product (GDP). So overall short run results favour Keynesian point of view that savings depend upon level of output.

Oladipo (2010) employed the Toda and Yamamoto methodology to analyse the direction of causal relationship between savings and economic growth in Nigeria between 1970 and 2006 the findings revealed that a unidirectional causality between savings and economic growth. However, Abu (2010) found out that causality runs from economic growth to saving, implying that economic growth proceeded and Granger causes saving. Adeleke (2014) revealed that there is bi-directional causality exists between Savings and Economic Growth in Nigeria. AbuAl-Foul (2010) examines empirically the long-run relationship between real gross domestic product (GDP) and real gross domestic saving (GDS) for Morocco (1965-2007) and Tunisia (1961-2007) using a newly developed approach to cointegration by Pesaran, Shin, and Smith (2001) that performs well with small samples and regardless of the orders of the respective time series (i.e., whether time series are I (0), I (1), or I (0)/I (1)). The empirical results reveal that in the case of Morocco a long-run relationship exists between the variables, while no evidence of long-run relationship to exist in the case of Tunisia. The Granger causality test supports bidirectional causality between economic growth and saving growth in Morocco. However, in the case of Tunisia, the results suggest that there is a unidirectional Granger causality between real GDP and real GDS and runs from saving growth to economic growth.

Jangili (2011) used granger causality test, Johansen co-integration test and vector error correction model to examine the direction of relationship between saving, investment and economic growth in India at both aggregate level and sectoral level for the period 1951 to 2008. The co-integration test result suggests that there exist co-integration relationship among all series with GDP except private corporate savings. The study also found that the direction of causality runs from savings and investment to economic growth collectively as well as individually and there is no causality from economic growth to savings and (or) investment. Mistzal (2011) analyzed the relationship between economic growth and saving by means of cointegration and causality tests in terms of 34 developed countries and 150 developing countries and transition economy. The results of analysis showed that there was a one directional relationship between economic growth and domestic savings in both developing counties and transition economies.

Budha (2012) employed the Autoregressive Distributed Lag (ARDL) approach to test for Cointegration, error correction and granger causality analysis in examining the relationship between the gross domestic savings, investment and growth in Nepal for the period of 1975 to 2010. The results of the study show that co-integration exists between gross domestic savings, investment and gross domestic product when each of them is taken as dependent variable. The result of the granger causality test revealed that there is short-run and long-run bidirectional causality between investment and gross domestic product as well as between gross domestic savings and investment. Nevertheless, no short-run causality is found between gross domestic savings and gross domestic product.

Bankole and Fatai (2013) examined the cause and effect relationship between savings and economic growth in Nigeria during the period 1980-2010. The authors employed Granger-causality and Engel-Granger cointegration techniques to analyze the relationship between savings and economic growth. The Granger causality test revealed that causality runs from savings to economic growth in Nigeria. Thus, the study accept the Solow’s hypothesis that savings precedes economic growth but reject the Keynesian theory that it is economic growth that leads to higher savings. The authors recommend that government and policy makers should employ policies that would accelerate domestic savings so as to increase economic growth.

Turan and Gjergji (2014) investigated the impact of savings on economic growth in Albania over the period of 1992 to 2012 using Johansen co-integration test and error correction model. The result revealed that savings and economic growth are co-integrated, therefore showing the existence of a stable long-run equilibrium relationship. In the case of Cambodia, Sothan (2014) investigated the causality between domestic savings and economic growth. The study does not find any casualty runs from either GDS to Growth or Growth to GDS, so the study concluded that GDS and Economic growth are independent of each other in Cambodia. However, Mohamed (2014) investigated the long run and short run relationships between private savings and economic growth in Bahrain between 1990 and 2013 and found that the economic growth could stimulate the private saving, and the private savings could accelerate the economic growth in the long run. In sum, from a theoretical perspective, the savings-economic growth causal nexus are inconclusive, as the juxtaposition of the Solow hypothesis and Keynesian theory shows. In addition to these theoretical discrepancies, even empirical evidences on the link were mixed.

## 3. ANALYTICAL FRAMEWORK

Theoretically, during the third phase of demographic transition a change in population age structure, particularly, the labour force (i.e. working age population) has a very direct, first-order effect on income and consumption that does not depend on behavioural responses. For instance, an increase in the population concentrated in the working ages, given output per worker, leads to an increase in income per capita. Further, holding the savings rate constant in addition to output per worker, an increase in the share of persons in the working ages leads to higher consumption per person. These effects can be written in the form of a simple model:

$$\frac{Y}{N} = \frac{Y}{L}\frac{L}{N} \tag{1}$$

$$\frac{C}{N} = \frac{C}{Y}\frac{Y}{L}\frac{L}{N} = c\frac{Y}{L}\frac{L}{N} = (1-s)\frac{Y}{L}\frac{L}{N} \tag{2}$$

where $\frac{Y}{N}$, $\frac{C}{N}$, $s$, $\frac{Y}{L}$, and $\frac{L}{N}$ are income per capita, per capita consumption, savings rate, income per worker and economic support ratio respectively. Let $gr[\ ]$ represents the growth rate, the relationship between consumption growth and growth in the economic support ratio can be readily represented as a simple transformation of equation (2):

$$gr\left[\frac{C}{N}\right] = gr(1-s) + gr\left(\frac{Y}{L}\right) + gr\left(\frac{L}{N}\right) \tag{3}$$

Hence, from equation (3) the first dividend is captured by $gr\left(\frac{L}{N}\right)$, an increase the economic support ratio. The second dividend is not a free lunch, however, because current generations must reduce their consumption in order to increase their wealth and achieve higher consumption in future periods. Suppose the consumption ratio $c$ and labour productivity $\left(Y/L\right)$ were unaffected by demography (that is the behavioural effect of demographic transition). Per capita consumption would vary directly with the support ratio. An increase in the support ratio, which occurs during the demographic transitions, would lead to higher consumption. Later when population ageing depresses the support ratio, consumption would decline. That would be the end of the story. The story is quite different and much more complex if the consumption ratio $c$ declines, as argue in the literature, as the support ratio rises. Current per capita consumption would rise by less than the support ratio, but saving rates would increase and by extension, raising investment in physical capital and correspondingly per capita income. In this response rests the possibility for a second demographic dividend that we will explore in this study. Thus, to provide an econometric model that will be used to investigate the prospect for second demographic dividend in Nigeria much of the analysis of households' consumption and savings decisions that will be done will be based on the life-cycle hypothesis (LCH) propounded by Modigliani and Brumberg (1954, 2005) which is augmented by certain improvements and extensions by taking into account the objective of the study.

According to this hypothesis, a representative individual maximizes her utility from life-time consumption, and savings are residuals reflecting differences between individual income and consumption. Following Xuchun and Baohua, (2012) and Samantaraya and Patra (2014), we may conceive an individual beginning with negative savings at a young age, accumulating savings during working age, and finally returning to dissaving as she retires. The LCH also implies that consumption smoothing leads to a humped-shape age path of wealth holding.

Using a simplified version of Modigliani's (1970) model, the saving function can be shown as follows:

$$s = y - c = \frac{L-t}{L_t} - \frac{(N-t)}{L_t} y^e - \frac{1}{L_t} a \tag{4}$$

where $s$ is savings of an individual, $y$ is current income of the individual, $c$ is current individual consumption, $L$ is lifespan of economic significance, $t$ is age of the individual, $L_t$ is remaining lifespan at age $t$, $N$ is earning span of the individual, $y^e$ is expected income of the individual and $a$ is initial assets. Thus, from equation (4), current savings of an individual are a linear and homogeneous function of current income, expected average income, and initial assets, with coefficients depending on the demographic profile of the individual. In the empirical literature on the analysis of determinants of saving equation (4) is extended from individual perspective to the saving function for entire economy by aggregating the saving behaviour of each of the individuals in the economy. Further, as regards the specification of dependent variable, several empirical studies take it as the ratio of saving to income. But this approach suffers from the limitation of implicitly imposing the "income homogeneity assumption;" that is, ceteris paribus saving is proportional to income. In reality, saving and income may not move in the same proportion and hence the arbitrary imposition of income homogeneity assumption may mislead coefficient estimates (Samantaraya and Patra, 2014). Therefore, this study specifies an unrestricted equation in which the dependent variable (i.e. household savings) has been taken in level form and the real GDP in level appears as one of the explanatory variables.

Moreover, in the theoretical literature on the analysis of determinants of saving, personal savings decisions are driven by several motives. In broad terms, these motives can be grouped into four categories: the need to build up assets to finance consumption after retirement, precautionary saving related to the uncertainty about the future, the desire to leave bequests to a subsequent generation, and saving for the acquisition of tangible assets or for large current expenditures. These saving motives, in turn suggest a large number of variables that may influence household saving decisions. Among the most commonly used in empirical studies are private investment, demographics, household wealth, unemployment, real interest rate, inflation rate, financial deepening, terms of trade, fiscal deficit, and many others. In essence, from both a theoretical and an empirical perspectives, the literature on household saving points to a number of potential important long-term determinants of the aggregate personal savings rate. Hence, by following the literature and also taking into account the objective of the study, to empirically examine the prospect for second demographic dividend in Nigeria the basic model that will be estimated consists of six variables written as follows:

$$HSAV = f(GRWAP, ESR, FDN, RGDP, PI) \tag{5}$$

where $HSAV$, $GRWAP$, $ESR$, $FDN$, $RGDP$ and $PI$ are household savings, growth rate of working age population, the ratio of the share of the working-age population to the overall population, financial deepening, real gross domestic product and private investment respectively. An econometric representation of equation (5) is then specified as follows:

$$\ln HSAV_t = \theta_0 + \theta_1(\partial \ln WAP_t) + \theta_2 \ln ESR_t + \theta_3 \ln FDN_t + \theta_4 \ln RGDP_t + \theta_5 \ln PI_t + \varepsilon_t \tag{6}$$

The above model (6) is thus used for the empirical exercise of assessing the prospect for second demographic dividend in Nigeria in the following sections.

## 4. DATA AND METHODOLOGY

### *The Bounds testing approach to cointegration*

The study employed ARDL Bound testing approach to cointegration to assess the prospect for second demographic dividend in Nigeria. As discussed in the previous section, we considered growth rate of working age population, the ratio of the share of the working-age population to the overall population, financial deepening, real gross domestic product and private investment as key determinants of household savings. There are various technique of conducting the cointegration analysis among time-series variables. The well-known methods are: the residual-based approach proposed by Engle and Granger (1987) and the maximum likehood-based approach proposed by Johansen and Julius (1990) and Johansen (1992). This study adopts the ARDL Bounds Testing Approach to Cointegration which appear to be suitable for our empirical exercise because of the following reasons. Firstly, the set of variables used in our empirical exercise is likely to be of a mix of (0) and (1) variables. Secondly, this approach is more suitable for the small and finite sample data period. Thirdly, given the nature of interrelation between savings, real gross domestic product and private investment, which are included in our model, the ARDL model is suitable to address possible endogeneity issue. As noted by Pesaran and Shin

(1998), “appropriate modification of the orders of the ARDL model is sufficient to simultaneously correct the residual serial correlation and the problem of endogenous regressors.”

In view of the above advantages, the augmented unrestricted error correction UECM-ARDL version of the model (6) specified earlier is expressed as follows:

$$\Delta \ln HSAV_t = \beta_0 + \sum_{i=1}^{g} \beta_{1i} \Delta \ln HSAV_{t-i} + \sum_{i=0}^{h} \beta_{2i} \Delta(\partial \ln WAP_{t-i}) + \sum_{i=0}^{j} \beta_{3i} \Delta \ln ESR_{t-i} + \sum_{i=0}^{k} \beta_{4i} \Delta \ln FDN_{t-i} + \sum_{i=0}^{l} \beta_{5i} \Delta \ln RGDP_{t-i} + \sum_{i=0}^{m} \beta_{6i} \Delta \ln PI_{t-i} + \lambda_1 \ln HSAV_{t-1} + \lambda_2 (\partial \ln WAP_{t-1}) + \lambda_3 \ln ESR_{t-1} + \lambda_4 \ln FDN_{t-1} + \lambda_5 \ln RGDP_{t-1} + \lambda_6 \ln PI_{t-1} + \varepsilon_{2t} \tag{7}$$

where, $\Delta$ denotes the first difference operator, $\beta_0$ is the intercept and $\varepsilon_{2t}$ is the error term. Again, from equation (3.38) in applying cointegration tests the study test the null hypothesis of no cointegration $H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$ against the alternative hypothesis

$$H_1 : \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0$$

Having estimated our unrestricted error correction ARDL models, the Wald test based on the standard *F*-statistic was computed to establish the co-integration relationship among the variables of interest. Due to limitations of the conventional Wald-test F-statistic, Pesaran, Shin and Smith (2001) have suggested two critical values (lower and upper bound) to examine the relationship. Therefore, if the computed *F*-statistic is less than the lower bound value, the null is not rejected. On the contrary, if the computed *F*-statistics is greater than the upper bound value, it implies existence of long-run relationship among the variables. Finally, if the computed *F*-statistics lies between the lower bound and upper bound, long run association between the variables becomes inconclusive.

However, prior to testing for cointegration among the variables, the study investigates the presence of unit roots among the variables using Augmented Dickey- Fuller (ADF) and Phillips-Perron (PP) unit root tests (Dickey and Fuller, 1979; Dickey and Fuller, 1981). The choice of these two test statistics is informed by the fact that both tests control for higher-order autocorrelation. Both tests statistics were done for two alternative specifications at 5% level of significance. First it was tested with intercept but no trend, and then it was tested with both intercept and trend. In addition, it was necessary to determine the appropriate lag length in order to avoid the problem of misspecification and loss of the degrees of freedom. To this end, VAR lag order selection criteria attributed to Hannan-Quinn information criteria (HIC), the Log Likelihood (LL), the Schwarz information criteria (SIC), Final Prediction Error (FPE) criteria and the Akaike information criteria (AIC) were considered.

***Toda-Yamamoto (1995) and Dolado-Lütkepohl (1996) TYDL approach to Granger causality test***

To complement the bounds test approach and derive inference regarding the direction of causality between saving and economic growth, the study use the methodology proposed by Toda and Yamamoto (1995) and Dolado-Lütkepohl (1996). This procedure has the advantage of not requiring pretesting for cointegration properties of the system. Thus it overcomes the pre-test biased associated with unit root and cointegration tests. More importantly, the Granger causality tests can be implemented regardless of the orders of integration of the underlying variables. Performed directly on the coefficients of the levels VAR, the TYDL methodology minimizes the risk associated with possibly wrongly identifying the orders of integration of the series, or the presence of cointegration relationship (Mavrotas and Kelly, 2001). The basic idea is to artificially augment the correct VAR order, k, with max *d* extra lags, where max *d* is the maximum likely order of integration of the series in the system. Thus, the augmented VAR representation of equation (6) is given below:

$$Y_t=\begin{bmatrix}\ln HSAV_t\\ \partial\ln WAP_t\\ \ln ESR_t\\ \ln FDN_t\\ \ln RGDP_t\\ \ln PI_t\end{bmatrix}=\begin{bmatrix}\theta_0\\ \lambda_0\\ \varpi_0\\ \beta_0\\ \alpha_0\\ \phi_0\end{bmatrix}+\sum_{i=1}^{k}\begin{bmatrix}\theta_{1i}\theta_{3i}\theta_{5i}\theta_{7i}\theta_{9i}\theta_{11i}\\ \lambda_{1i}\lambda_{3i}\lambda_{5i}\lambda_{7i}\lambda_{9i}\lambda_{11i}\\ \varpi_{1i}\varpi_{3i}\varpi_{5i}\varpi_{7i}\varpi_{9i}\varpi_{11i}\\ \beta_{1i}\beta_{3i}\beta_{5i}\beta_{7i}\beta_{9i}\beta_{11i}\\ \alpha_{1i}\alpha_{3i}\alpha_{5i}\alpha_{7i}\alpha_{9i}\alpha_{11i}\\ \phi_{1i}\phi_{3i}\phi_{5i}\phi_{7i}\phi_{9i}\phi_{11i}\end{bmatrix}\begin{bmatrix}\ln HSAV_{t-i}\\ \partial\ln WAP_{t-i}\\ \ln ESR_{t-i}\\ \ln FDN\\ \ln RGDP_{t-i}\\ \ln PI_{t-i}\end{bmatrix}+\sum_{j=k+1}^{k+d_{\max}}\begin{bmatrix}\theta_{2j}\theta_{4j}\theta_{6j}\theta_{8j}\theta_{10j}\theta_{12j}\\ \lambda_{2j}\lambda_{4j}\lambda_{6j}\lambda_{8j}\lambda_{10j}\lambda_{12j}\\ \varpi_{2j}\varpi_{4j}\varpi_{6j}\varpi_{8j}\varpi_{10j}\varpi_{12j}\\ \beta_{2j}\beta_{4j}\beta_{6j}\beta_{8j}\beta_{10j}\beta_{12j}\\ \alpha_{2j}\alpha_{4j}\alpha_{6j}\alpha_{8j}\alpha_{10j}\alpha_{12j}\\ \phi_{2j}\phi_{4j}\phi_{6j}\phi_{8j}\phi_{10j}\phi_{12j}\end{bmatrix}\begin{bmatrix}\ln HSAV_{t-j}\\ \partial\ln WAP_{t-j}\\ \ln ESR_{t-j}\\ \ln FDN_{t-j}\\ \ln RGDP_{t-j}\\ \ln PI_{t-j}\end{bmatrix}+\begin{bmatrix}\varepsilon_{1t}\\ \varepsilon_{2t}\\ \varepsilon_{3t}\\ \varepsilon_{4t}\\ \varepsilon_{5t}\\ \varepsilon_{6t}\end{bmatrix} \tag{8}$$

Equation (8) was then estimated using the Seemingly Unrelated Regression technique (Rambaldi and Doran, 1996). Hence, on the one hand the rejection of the null hypothesis of $\theta_{9i}=0$ implies that there is Granger causality from economic growth (proxied by real GDP) to household savings. Conversely, on the other hand if the null hypothesis of $\alpha_{1i}=0$ is rejected, then it is concluded that household savings Granger cause economic growth. Thus, implying bi-directional causality. Moreover, if the null hypothesis of $\theta_{5i}=0$ is rejected, then it is concluded that there is Granger causality from economic support ratio to household savings. Also, if the null hypothesis of $\phi_{1i}=0$ is rejected, then it is concluded that there is Granger causality from household savings to private investment. Further, the rejection of the null hypothesis of $\alpha_{11i}=0$ implies that there is Granger causality from private investment to economic growth (proxied by real GDP). Besides, if the null hypotheses $\alpha_{3i}=\alpha_{5i}=0$ is rejected, then it is concluded that labour force dynamics and economic support ratio respectively Granger cause economic growth. Finally, on the one hand the rejection of the null hypothesis $\alpha_{7i}=0$ implies that there is Granger causality from financial deepening to economic growth. Correspondingly, on the other hand, if the null hypothesis of $\beta_{9i}=0$ is rejected, then it is concluded that there is Granger causality from economic growth to financial deepening. Hence, suggesting bi-directional causality.

***Data Description***

The study made use of secondary data spanning the period between 1970 and 2015 sourced majorly from the publications of Central Bank of Nigeria Statistical Bulletin (2016), Africa Development Indicators (2016), and World Development Indicators (2017).

Following Leff (1969) and Bwalya (2005) and also by taking cognizance of the objective of study, $HSAV_t$ (defined generally as that part of household income not consumed) is obtained by logarithmic transformation of real household savings in Nigeria, which in turn was obtained from savings from commercial banks deposits due to dearth of specific data on household savings. Financial deepening $FDN_t$ implies the level of development and innovation of traditional and non-traditional financial services. This is proxied by the ratio of broad money to GDP. Private investment $PI_t$ is the amount of private business capital which is invested in domestic production either through the purchase of fixed property or inventory. Economic support ratio is defined as the ratio of the share of the working age population to the overall population. It is denoted as $\ln ESR$. $(\partial WAP)$ is the growth rate of working age population defined as those aged 15 to 64. Economic growth is measured by Real Gross Domestic Product $(RGDP)$ which is an inflation-adjusted measure that reflects the value of all goods and services produced in a given year, expressed in base-year prices.

## 5. EMPIRICAL RESULTS AND DISCUSSION

The order of integration of the variables was investigated first. The stationarity tests is performed first in levels and then in first difference to establish the presence of unit roots and the order of integration in all the variables. The results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) stationarity tests in Tables 1 and 2 in Appendix I that all the variables (the household savings, growth rate of working age population, economic support ratio, financial deepening, real GDP and private investment) are found to be integrated of order of one, i.e., I (1).

The second step entails the determination of the optimal lag length (*k*). As depicted in Table 3 in Appendix I the result indicates that all of the selection criteria, such as sequential modified LR test statistic (LR), the FPE, AIC, Schwarz Information Criteria (SC) and the Hannan-Quinn Information Criteria (HQ), selected the optimum lag length of four at 0.05% level of significance. Hence, the lag length of 4 will be used in estimating ARDL Bounds testing approach to cointegration test and VAR.

The next stage involved testing for the existence of a long run relationship among labour among the variables of interest. The ARDL bounds test for the presence of long-run relationships in equation (7) as reported in Table 4 in the Appendix I yields evidence of a long-run relationship among household savings, growth rate working age population, economic support ratio, financial deepening, real gross domestic product and wealth. As can be seen, the computed *F* statistic (***6.570384***), is greater than the upper bound value (***3.79***) of the 5% critical values resulting in the rejection of the null hypothesis of no long-run relationship between the examined variables. This evidence rules out the possibility of estimated relationship being spurious.

Furthermore, after specifying the level VAR model from equation (7), *k* is found to be four lags based on the usual information criteria stated earlier. The resulting VAR model is then tested for stability using standard diagnostic tests and the results as summarized in Table 5 in Appendix I show that there is no significant residual serial correlation or heteroskedasticity, while the normality tests show that the residuals are normally distributed. In addition, the plots of the inverse roots of AR characteristic polynomials presented in Figure 1 in Appendix II show that no root lies outside the unit circle and thus the VAR satisfies the stability condition.

Hereafter, following the TYDL procedure, the augmented VAR model (8) was estimated by applying modified Wald test (MWALD test) statistics to the first *k*th order of the VAR, i.e. the coefficients of the last lagged *dmax* vector are ignored. All the tests were conducted at 5% level of significance. Results of the causality tests are presented in Table 5 in Appendix II. Overall, Table 6 in Appendix I depicts the chi-square *($X^2$)*-test statistic obtained together with the estimated *p*-values and the results of causality tests. As can be seen from the table, the result not only validates the Keynesian's proposition but also supports the Carroll-Weil hypothesis, which states that saving typically follows, rather than precedes, economic growth but invalidates the Solow's prediction, as there exists a uni-directional causality running from economic growth to household savings. That is growth is found to Granger cause savings. This conclusion was arrived at based on the fact that their chi-square statistics were statistically significant at 5% as indicated by their p- values. This result corroborates the empirical findings of Sinha and Sinha (1998) for the case of Mexico, AbuAl-Foul (2010) for the Middle East and North Africa (MENA) countries;, Abu (2010) for the case of Nigeria; Sothan (2014) for the case of Cambodia; Hundie (2014) for the case of Ethiopia and Shahbaz and Khan (2015) for the case of Pakistan. However, it contradicts the finding of Oladipo (2009) for the case of Nigeria.

Moreover, as depicted in Table 6 in Appendix I, in relation to economic growth, the null hypothesis that economic support ratio does not granger cause household savings as well as the null hypothesis that household savings does not granger cause private investment are rejected, nonetheless the null hypothesis that private investment does not granger cause economic growth is accepted. An implication of these results is that although second demographic dividends is under way but the dividend is not an automatic phenomenon. In essence, the empirical results revealed that an optimal utilization of the dividend requires an integrated policy framework, appropriate policies and job creation. The success of four Asian Tigers (Hong Kong, Singapore, Taiwan and South Korea) provides very clear evidence. This result is in line with the empirical findings of Ogawa (2008), Mason and Lee (2012), Fang and Wen (2012), and Cai (2013).

Hence, in view of the above findings, appropriate policies that will enhance and accelerate economic growth in the country should be pursued. These include among others the following. Firstly, government should increase its investment in the provision of infrastructure like power, roads, education and so on. This will help to reduce the costs as well as increase the profitability of firms, thereby raising the economy's production of goods and services. Secondly, government should encourage the monetary authority like the Central Bank of Nigeria to reduce interest rate so that prospective investors can increase their investment and raise the nation's production capacity. Others measures include sustenance of political stability that the country current enjoys; encouragement of inflows of foreign direct investment; and sustenance of the war on corruption.

As can be seen from the p-values of the Modified Wald statistic, there is evidence of unidirectional causality running from labour force dynamics and demographic dividends to economic growth. Again, the empirical results revealed that Nigeria has entered the first demographic dividend phase. In line with this finding, therefore, the extent of the benefit of demographic dividend will largely depend on the economy's capacity to absorb and employ productively the additional workers. Also, education policies should be combined with labour policies that align the stock of human capital with growth-oriented demand. That is, there is also the need to establish a link between educational institutions and industries so that the former can effectively cater to the skill needs of the latter. This result corroborates the empirical findings of Bloom, Finlay, Humair and Steven (2010); Olaniyan, Soyibo and Lawanson (2012); and Reed and Mberu (2014) all for Nigeria.

Finally, a cursory look at the Table 6 in Appendix I shows that there is unidirectional causality running from financial deepening to economic growth in Nigeria. In other words Granger causality test indicated that causality runs from financial deepening to economic growth, but not in the opposite direction. Similar results were obtained Ewetan and Okodua (2013); Ohwofasa and Aiyedogbon (2013); and Torruam, Chiawa, and Abur (2013). In view of this finding, the study recommends that savings should be stimulated in order to place more funds in the hands of banks to intermediate investors seeking funds. Also, lending rate should be reasonable so as not to deter investors to borrow to embark on viable investment projects.

## 6. CONCLUSION AND POLICY IMPLICATIONS

This study examined the prospect for second demographic dividend in Nigeria spanning the period between 1970 and 2015 using bounds testing approach to cointegration, Toda-Yamamoto (1995) and Dolado-Lütkepohl (1996) approach to Granger causality tests. The results not only validate the Keynesian's proposition but also supports the Carroll-Weil hypothesis, which states that saving typically follows, rather than precedes, economic growth but invalidates the Solow's prediction, as there exists a uni-directional causality running from economic growth to household savings. That is growth is found to Granger cause savings. Moreover, in relation to economic growth, the results revealed the existence of causality running from economic support ratio to household savings. Equally, the results obtained showed the existence of causality running from household savings to private investment. However, the null hypothesis that private investment does not granger cause economic growth is accepted. An implication of these results is that although second demographic dividends is under way but the dividend is not an automatic phenomenon. A unidirectional relationship that runs from economic support ratio to household savings was also observed implying that age structure play an important role in explaining the long-run savings behaviour in Nigeria.

Thus, premised on the results, an optimal utilization of the dividend requires an integrated policy framework, appropriate policies and job creation. The success of four Asian Tigers (Hong Kong, Singapore, Taiwan and South Korea) provides very clear evidence. Besides, since the second demographic dividend is in part a consequence of the demand for resources to support old age consumption, the accumulation of wealth needs to occur early, in anticipation of aging, as does the implementation of appropriate economic policies. Nigeria must be willing to avoid situations that force the elderly to live with few resources or be overly dependent on families or public pensions. Instead, the country must enact policies that give workers adequate incentive to save and invest and thus prolong the demographic dividend.

### References

Abu, N. (2010). Saving-economic growth nexus in Nigeria, 1970-2007: Granger causality and co-integration analyses. *Review of Economic and Business Studies (REBS)*, (5), 93-104.

AbuAl-Foul, B. (2010). The causal relation between savings and economic growth: Some evidence from MENA countries.

Agunwamba, A; Bloom, D; Friedman, A; Ozolins, M; Rosenberg, L; Steven, D; & Weston, M. (2009). *Nigeria: The Next Generation—Literature Review*. Prepared for the Nigeria: The Next Generation Project, funded by the British Council Nigeria.

Alao, A. (2010). The politics and socio-economic dynamics of demography in Nigeria: the past and present in the future. Background paper for *Nigeria: The Next Generation* project.

Ando, A., & Modigliani, F. (1963). The" life cycle" hypothesis of saving: Aggregate implications and tests. *The American economic review*, *53*(1), 55-84.

Anoruo, E., & Ahmad, Y. (2001). Causal relationship between domestic savings and economic growth: Evidence from seven African countries. *African Development Review*, *13*(2), 238-249.

Athukorala, P. C., & Tsai, P. L. (2003). Determinants of household saving in Taiwan: growth, demography and public policy. *The Journal of Development Studies*, *39*(5), 65-88.

Attanasio, O. P., Picci, L., & Scorcu, A. E. (2000). Saving, growth, and investment: a macroeconomic analysis using a panel of countries. *Review of Economics and Statistics*, *82*(2), 182-211.

Bank of England, (2011). The Future of International Capital Flows, Financial Stability Paper No. 12 – December 2011 (William Speller, Gregory Thwaites and Michelle Wright).

Bankole, A. S., & Fatai, B. O. (2013). Relationship between savings and economic growth in Nigeria. *The Social Sciences*, *8*(3), 224-230.

Bayoumi, T., Tong, H., & Wei, S. J. (2012). The Chinese corporate savings puzzle: a firm-level cross-country perspective. In *Capitalizing China* (pp. 283-308). University of Chicago Press.

Bloom, D. E., & Freeman, R. B. (1988). Economic development and the timing and components of population growth. *Journal of Policy Modeling*, *10*(1), 57-81.

Bloom, D. E., & Williamson, J. G. (1998). Demographic transitions and economic miracles in emerging Asia. *The World Bank Economic Review*, *12*(3), 419-455.

Bloom, D. E., Canning, D., & Sevilla, J. (2001). *Economic growth and the demographic transition* (No. w8685). National Bureau of Economic Research.

Bloom, D. E., Humair, S., Rosenberg, L., Sevilla, J. P., & Trussell, J. (2013). A Demographic Dividend for Sub-Saharan Africa: Source, Magnitude, and Realization (= IZA Discussion Paper, No. 7855).

Bloom, D., Finlay, J., Humair, S., Mason, A., Olaniyan, O., & Soyibo, A. (2010, June). Prospects for economic growth in Nigeria: a demographic perspective. In *IUSSP Seminar on Demographics and Macroeconomic Performance, Paris, France*.

Bloom, D.E. and Sachs, J.D., (1998), *Geography, demography, and economic growth in Africa*, In Brainard, W.C. and Perry, G.L. (eds), Brookings Papers on Economic Activity, Vol. 2, 207-295.

Brooks, R. (2003). Population aging and global capital flows in a parallel universe. *IMF staff papers*, *50*(2), 200-221.

Budha, B. (2012). A multivariate analysis of savings, investment and growth in Nepal.

Bwalya, D. (2005). Determinants of Household Savings in Zambia. The University of Zambia School of Humanities and Social Sciences Department of Economics.

Cai, F. (2013). *Beyond Demographic Dividends* (Vol. 5). World Scientific.

Carroll, C. D., & Weil, D. N. (1994). Saving and growth: a reinterpretation. In *Carnegie-Rochester Conference Series on Public Policy* (Vol. 40, pp. 133-192). North-Holland.

Chamon, M., & Prasad, E. (2005). Determinants of household saving in China. *Photocopy. International Monetary Fund, Washington, DC.*

Curtis, C. C., Lugauer, S., & Mark, N. C. (2015). Demographic patterns and household saving in China. *American Economic Journal: Macroeconomics*, *7*(2), 58-94.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association*, *74*(366a), 427-431.

Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica: Journal of the Econometric Society*, 1057-1072.

Dolado, J. J., & Lütkepohl, H. (1996). Making Wald tests work for cointegrated VAR systems. *Econometric Reviews*, *15*(4), 369-386.

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.

Ewetan, O. O., & Okodua, H. (2013). Is There A Link Between Financial Sector Development And Economic Growth In Nigeria?. *International Journal of Financial Economics*, *1*(4), 108-118.

Fang, C., & Wen, Z. (2012). When demographic dividend disappears: growth sustainability of China. In *The Chinese Economy* (pp. 75-90). Palgrave Macmillan UK.

Guengant, J. P., & Kamara, Y. (2012). How can we capitalize on the demographic dividend? Demographics at the heart of development pathways: synthesis of studies conducted in WAEMU countries and in Ghana, Guinea, Mauritania and Nigeria.

Haldane, A. G. (2010). Global imbalances in retrospect and prospect. *Speech in November*, available at www.bankofengland.co.uk/publications/speeches/2010/speech468. pdf .

Higgins, M., & Williamson, J. G. (1997). Age structure dynamics in Asia and dependence on foreign capital. *Population and Development Review*, 261-293.

Horioka, C. Y. (2010). The (dis) saving behaviour of the aged in Japan. *Japan and the World Economy*, *22*(3), 151-158.

Horioka, C. Y., & Terada-Hagiwara, A. (2012). The determinants and long-term projections of saving rates in Developing Asia. *Japan and the World Economy*, *24*(2), 128-137.

Horioka, C. Y., & Wan, J. (2007). The determinants of household saving in China: a dynamic panel analysis of provincial data. *Journal of Money, Credit and Banking*, *39*(8), 2077-2096.

Horioka, C. Y., & Yin, T. (2009). Household savings rates and social benefit ratios: Country comparisons. In *Effects of Social Policy on Domestic Demand: Annual Conference* (pp. 63-75).

Hundie, S. K. (2014). Savings, investment and economic growth in Ethiopia: Evidence from ARDL approach to co-integration and TYDL Granger-causality tests. *Journal of Economics and International Finance*, *6*(10), 232.

Jangili, R. (2011). Causal relationship between saving, investment and economic growth for India–what does the relation imply?

Joe, W., Dash, A. K., & Agrawal, P. (2015). Demographic transition, savings, and economic growth in China and India. *Delhi. Online verfügbar unter: http://www.iegindia. org/workpap/wp351. pdf.*

Johansen, S. (1992). Cointegration in partial systems and the efficiency of single-equation analysis. *Journal of econometrics*, *52*(3), 389-402.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for money. *Oxford Bulletin of Economics and statistics*, *52*(2), 169-210.
Kelley, A. C., & Schmidt, R. M. (1995). Aggregate population and economic growth correlations: the role of the components of demographic change. *Demography*, *32*(4), 543-555.
Krieckhaus, J. (2002). Reconceptualizing the developmental state: public savings and economic growth. *World Development*, *30*(10), 1697-1712.
Kuijs, L. (2006). How will China's saving-investment balance evolve?
Lee, R. D., Mason, A., & Miller, T. (2001). Saving, wealth, and population. *Population matters: Demographic change, economic growth, and poverty in the developing world*, 137-164.
Lee, R., Mason, A., & Miller, T. (2000). Life cycle saving and the demographic transition: The case of Taiwan. *Population and Development Review*, *26*, 194-219.
Leff, N. H. (1969). Dependency rates and savings rates. *The American Economic Review*, *59*(5), 886-896.
Lugauer, S., Mark, N. C., & Curtis, C. R. (2011). Demographic Patterns and Household Saving in China. In *2011 Meeting Papers* (No. 529). Society for Economic Dynamics.
Mason, A. (2001). *Population change and economic development in East Asia: Challenges met, opportunities seized*. Stanford University Press.
Mason, A., & Lee, R. (2012). *Demographic dividends and aging in lower-income countries*. National Transfer Accounts Working Paper. Honolulu: East-West Center.
Mavrotas, G., & Kelly, R. (2001). Savings mobilization and financial sector development: the nexus/mobilisation de l'épargne et développement du secteur financier: les liens. *Savings and Development*, 33-66.
Modigliani, F. (1970). The life cycle hypothesis of saving and intercountry differences in the saving ratio. *Induction, growth and trade*, 197-225.
Modigliani, F., & Brumberg, R. (1954). Utility analysis and the consumption function: An interpretation of cross-section data. *Franco Modigliani*, *1*.
Modigliani, F., & Brumberg, R. (1954). Utility analysis and the consumption function: An interpretation of cross-section data. *Franco Modigliani*, *1*.
Modigliani, F., & Brumberg, R. H. (2005). Utility analysis and the consumption function: an interpretation of cross-section data (1954). The Collected Papers of Franco Modigliani.
Modigliani, F., & Cao, S. L. (2004). The Chinese saving puzzle and the life-cycle hypothesis. *Journal of economic literature*, *42*(1), 145-170.
Mohamed, S. A. E. (2014). Testing the relationship between Private Savings and Economic Growth in Bahrain. *Global Journal of Commerce and Management Perspective,* 4(6): 1-6.
Mohan, R. (2006). Causal relationship between savings and economic growth in countries with different income levels. *Economics Bulletin*, *5*(3), 1-12.
Ogawa, N. (2008). Population ageing and economic growth: The role of two demographic dividends in Japan. In *The demographic challenge: A handbook about Japan* (pp. 821-840). Brill.
Ohwofasa, B. O., & Aiyedogbon, J. O. (2013). Financial Deepening and Economic Growth in Nigeria, 1986-2011: An Empirical Investigation. *Journal of Economics and Development Studies*, *1*(1), 24-42.
Oladipo, O. S. (2010). Does saving really matter for growth in developing countries? The case of a small open economy. *International Business & Economics Research Journal (IBER)*, *9*(4).
Olaniyan, O., Soyibo, A., & Lawanson, A. O. (2012). Demographic transition, demographic dividend and economic growth in Nigeria. *African Population Studies*, *26*(2).
Pesaran, M. H., & Shin, Y. (1998). An autoregressive distributed-lag modelling approach to cointegration analysis. *Econometric Society Monographs*, *31*, 371-413.
Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, *16*(3), 289-326.
Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, *16*(3), 289-326.
Reed, H. E., & Mberu, B. U. (2014). Capitalizing on Nigeria's demographic dividend: reaping the benefits and diminishing the burdens. *Etude de la population africaine = African population studies*, *27*(2), 319.
Reed, H. E., & Mberu, B. U. (2014). Capitalizing on Nigeria's demographic dividend: reaping the benefits and diminishing the burdens. *Etude de la population africaine = African population studies*, *27*(2), 319.
Sajid, G. M., & Sarfraz, M. (2008). Savings and economic growth in Pakistan: An issue of causality. *Pakistan Economic and Social Review*, 17-36.
Saltz, I. S. (1999). An examination of the causal relationship between savings and growth in the third world. *Journal of Economics and Finance*, *23*(1), 90-98.
Shahbaz, M. Q., & Khan, R. E. A. (2015). Old wine in new bottles: saving–growth nexus: innovative accounting technique in Pakistan.

Sinha, D., & Sinha, T. (1998). Cart before the horse? The saving–growth nexus in Mexico. *Economics Letters*, *61*(1), 43-47.

Song, Z. M., & Yang, D. T. (2010). Life cycle earnings and saving in a fast-growing economy. *Chinese University of Hong Kong Working Paper*.

Sothan, S. (2014). Causal relationship between domestic saving and economic growth: Evidence from Cambodia. *International Journal of Economics and Finance*, *6*(9), 213.

Sothan, S. (2014). Causal relationship between domestic saving and economic growth: Evidence from Cambodia. *International Journal of Economics and Finance*, *6*(9), 213.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of econometrics*, *66*(1), 225-250.

Toh, M. H. (2001). Savings, capital formation, and economic growth in Singapore. In Mason A. Population change and economic development in East Asia: challenges met, opportunities seized. Stanford: Stanford Univ Pr. p 185–208.

Torruam, J. T., Chiawa, M. A., & Abur, C. C. (2013). Financial deepening and economic growth in Nigeria: an application of co-integration and causality analysis. In *3rd International Conference on Intelligent Computational System (ICIC'2013). April* (pp. 29-30).

Turan, G., & Gjergji, O. (2014). What is the impact of savings on growth? The case of a small open economy (Albania). *Mediterranean Journal of Social Sciences*, *5*(13), 360.

Verma, R. (2007). Savings, investment and growth in India: an application of the ARDL bounds testing approach. *South Asia Economic Journal*, *8*(1), 87-98.

Verma, R., & Wilson, E. J. (2005). Savings, Investment, Foreign Inflows and Economic Growth of the Indian Economy 1950-2001.

Xuchun, F., & Baohua, Z. (2012). China's Life Expectancy Growth, Age Structure Change and National Saving Rate‖. *Population Research*, *36*(4).

Yasin, J. (2008). Demographic Structure and Private Savings: Some Evidence from Emerging Markets. *African Review of Money Finance and Banking*, 7-21.

## Appendix I

### Table 1: Result for the Philips-Peron (PP) Unit Root

| **Philips-Peron (PP) test with intercept only** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Level** | | | | **1st Difference** | | | |
| | Test Statistic | Critical values | P-value | Remarks | Test Statistic | Critical values | P-value | Remarks |
| $\partial \ln PCR_t$ | -2.240232 | 1% -3.584743 | 0.2005 | --- | -4.970063 | 1% -3.588509 | 0.0002*** | I(1) |
| | | 5% -2.928142 | | | | 5% -2.929734 | | |
| | | 10% -2.602225 | | | | 10% -2.603064 | | |
| $\ln PCI_t$ | -2.220381 | 1% -3.584743 | 0.4672 | --- | -4.970063 | 1% -3.588509 | 0.0002*** | I(1) |
| | | 5% -2.928142 | | | | 5% -2.929734 | | |
| | | 10% -2.602225 | | | | 10% -2.603064 | | |
| $\ln ESR_t$ | -1.633966 | 1% -3.588509 | 0.4571 | --- | -6.783329 | 1% -3.592462 | 0.0000*** | I(1) |
| | | 5% -2.929734 | | | | 5% -2.931404 | | |
| | | 10% -2.603064 | | | | 10% -2.603944 | | |
| $\partial \ln WAP_t$ | -2.362273 | 1% -3.588509 | 0.1581 | --- | -12.44734 | 1% -3.592462 | 0.0000*** | I(1) |
| | | 5% -2.929734 | | | | 5% -2.931404 | | |
| | | 10% -2.603064 | | | | 10% -2.603944 | | |
| $\partial \ln POP_t$ | -2.412199 | 1% -3.592462 | 0.1444 | --- | -2.933158 | 1% -3.596616 | 0.0072*** | I(1) |
| | | 5% -2.931404 | | | | 5% -2.797614 | | |
| | | 10% -2.603944 | | | | 10% -2.604867 | | |
| $\ln GER_t$ | -2.928142 | 1% -3.584743 | 0.2005 | --- | -6.133095 | 1% -3.588509 | 0.0000*** | I(1) |
| | | 5% -3.304396 | | | | 5% -2.929734 | | |
| | | 10% -2.602225 | | | | 10% -2.603064 | | |
| **Philips-Peron (PP) test with trend and intercept** | | | | | | | | |
| $\partial \ln PCR_t$ | -4.034789 | 1% -4.175640 | 0.4567 | --- | -5.389602 | 1% -4.180911 | 0.0003*** | I(1) |
| | | 5% -3.513075 | | | | 5% -3.515523 | | |
| | | 10% -3.186854 | | | | 10% -3.188259 | | |
| $\ln PCI_t$ | -2.249117 | 1% -4.175640 | 0.4520 | --- | -7.041920 | 1% -4.180911 | 0.0000*** | I(1) |
| | | 5% -3.513075 | | | | 5% -3.515523 | | |
| | | 10% -3.186854 | | | | 10% -3.188259 | | |
| $\ln ESR_t$ | -1.910594 | 1% -4.180911 | 0.6322 | --- | -6.702731 | 1% -4.186481 | 0.0000*** | I(1) |
| | | 5% -3.515523 | | | | 5% -3.518090 | | |
| | | 10% -3.188259 | | | | 10% -3.189732 | | |
| $\partial \ln WAP_t$ | -2.467284 | 1% -4.180911 | 0.3420 | --- | -13.27652 | 1% -4.186481 | 0.0000*** | I(1) |
| | | 5% -3.515523 | | | | 5% -3.518090 | | |
| | | 10% -3.188259 | | | | 10% -3.189732 | | |
| $\partial \ln POP_t$ | -1.852720 | 1% -4.180911 | 0.6617 | --- | -16.79118 | 1% -4.192337 | 0.0000*** | I(1) |
| | | 5% -3.515523 | | | | 5% -3.520787 | | |
| | | 10% -3.188259 | | | | 10% -3.191277 | | |
| $\ln GER_t$ | -2.034796 | 1% -4.175640 | 0.5669 | --- | -6.797143 | 1% -4.180911 | 0.0000*** | I(1) |
| | | 5% -3.513075 | | | | 5% -3.515523 | | |
| | | 10% -3.186854 | | | | 10% -3.188259 | | |

Source: Author's computation using E-view 9 (2017)
***depicts that the variable is stationary at 5%

**Table 2: Result for the Augmented Dickey-Fuller Unit Root Test**

| **Augmented Dickey-Fuller (ADF) test with intercept only** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **Level** | | | | **1st Difference** | | | |
| | Test Statistic | Critical values | P-value | Remarks | Test Statistic | Critical values | P-value | Remarks |
| $\ln HSAV$ | 1.556357 | 1% -3.584743 | 0.9992 | --- | -5.173732 | 1% -3.588509 | 0.0001*** | I(1) |
| | | 5% -2.928142 | | | | 5% -2.929734 | | |
| | | 10% -2.602225 | | | | 10% -2.603064 | | |
| $\partial \ln WAP_t$ | -1.892574 | 1% -3.615588 | 0.3322 | --- | -2.943427 | 1% -3.621023 | 0.0015*** | I(1) |
| | | 5% -2.941145 | | | | 5% -2.929719 | | |
| | | 10% -2.609066 | | | | 10% -2.610263 | | |
| $\ln ESR$ | -1.313664 | 1% -3.610453 | 0.6136 | --- | -5.897632 | 1% -3.610453 | 0.0000*** | I(1) |
| | | 5% -2.938987 | | | | 5% -2.938987 | | |
| | | 10% -2.607932 | | | | 10% -2.607932 | | |
| $\ln FDN$ | -2.550446 | 1% -3.588509 | 0.1110 | --- | -4.886917 | 1% -3.588509 | 0.0002*** | I(1) |
| | | 5% -2.929734 | | | | 5% -2.929734 | | |
| | | 10% -2.603064 | | | | 10% -2.603064 | | |
| $\ln RGDP$ | -2.534051 | 1% -3.584743 | 0.1144 | --- | -6.162742 | 1% -3.588509 | 0.0000*** | I(1) |
| | | 5% -2.928142 | | | | 5% -2.929734 | | |
| | | 10% -2.602225 | | | | 10% -2.603064 | | |
| $\ln PI$ | 0.805311 | 1% -3.588509 | 0.9931 | --- | -4.455402 | 1% -3.588509 | 0.0009*** | I(1) |
| | | 5% -2.929734 | | | | 5% -2.929734 | | |
| | | 10% -2.603064 | | | | 10% -2.603064 | | |
| **Augmented Dickey-Fuller (ADF) test with trend and intercept** | | | | | | | | |
| $\ln HSAV$ | -1.878401 | 1% -4.180911 | 0.6487 | --- | -5.442536 | 1% -4.180911 | 0.0003*** | I(1) |
| | | 5% -3.515523 | | | | 5% -3.515523 | | |
| | | 10% -3.188259 | | | | 10% -3.188259 | | |
| $\partial \ln WAP_t$ | -2.073743 | 1% -4.211868 | 0.5489 | --- | -3.779892 | 1% -4.211868 | 0.0285*** | I(1) |
| | | 5% -3.529758 | | | | 5% -3.529758 | | |
| | | 10% -3.196411 | | | | 10% -3.196411 | | |
| $\ln ESR$ | -2.553072 | 1% -4.211868 | 0.3026 | --- | -5.015214 | 1% -4.219126 | 0.0012*** | I(1) |
| | | 5% -3.529758 | | | | 5% -3.533083 | | |
| | | 10% -3.196411 | | | | 10% -3.198312 | | |
| $\ln FDN$ | -2.548191 | 1% -4.180911 | 0.3048 | --- | -4.822699 | 1% -4.180911 | 0.0017*** | I(1) |
| | | 5% -3.515523 | | | | 5% -3.515523 | | |
| | | 10% -3.188259 | | | | 10% -3.188259 | | |
| $\ln RGDP$ | -2.209820 | 1% -4.175640 | 0.4728 | --- | -6.516206 | 1% -4.180911 | 0.0000*** | I(1) |
| | | 5% -3.513075 | | | | 5% -3.515523 | | |
| | | 10% -3.186854 | | | | 10% -3.188259 | | |
| $\ln PI$ | -2.800004 | -4.180911 | 0.2050 | --- | -4.579048 | 1% -4.180911 | 0.0034*** | I(1) |
| | | -3.515523 | | | | 5% -3.515523 | | |
| | | -3.188259 | | | | 10% -3.188259 | | |

Source: Author's computation using E-view 9 (2017)
***depicts that the variable is stationary at 5%

**Table 3: Optimal lag length selection criteria**

| Lag | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|
| 0 | 129.7433 | NA | 1.11e-10 | -5.892540 | -5.644301 |
| 1 | 565.7315 | 726.6469 | 6.06e-19 | -24.93959 | -23.20192 |
| 2 | 656.7912 | 125.7491 | 4.90e-20 | -27.56149 | -24.33438 |
| 3 | 743.3652 | 94.81910 | 5.94e-21 | -29.96977 | -25.25324 |
| 4 | 824.1399* | 65.38912* | 1.36e-21* | -32.10190* | -25.89594* |

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

**Table 4: Results of Bound Test Approach to Cointegration (Wald test)**

| **Level of Significance** $(\alpha\%)$ | **Critical value** | | **F-calculated / Computed F-statistic** |
|---|---|---|---|
| | **Lower bound I(0)** | **Upper bound I(1)** | |
| 10 | 2.26 | 3.35 | ***6.570384*** |
| **5** | **2.62** | **3.79** | |
| 2.5 | 2.96 | 4.18 | |
| 1 | 3.41 | 4.68 | |

**Source: Author's computation using E-view 9 (2017)**

**Table 5: VAR diagnostics.**

| Lags | Statistic | Prob. |
|---|---|---|
| **Residual serial correlation tests (LM-stats.)** | | |
| 1 | 42.26030 | 0.2187 |
| 2 | 31.56153 | 0.6797 |
| 3 | 42.56916 | 0.2092 |
| 4 | 29.91933 | 0.7523 |
| 5 | 40.71003 | 0.2708 |
| 6 | 38.64861 | 0.3509 |
| 7 | 41.45489 | 0.2449 |
| 8 | 29.50288 | 0.7696 |
| 9 | 21.97158 | 0.9681 |
| 10 | 33.21888 | 0.6016 |
| **Residual heteroskedasticity tests (Chi-stats.)** | | |
| **Joint** | 530.1582 | 0.2030 |
| **Residual normality tests (joint Chi-stats.)** | | |
| Skewness | 10.81224 | 0.0944 |
| Kurtosis | 9.241024 | 0.1605 |
| Jarque–Bera | 20.05326 | 0.0661 |

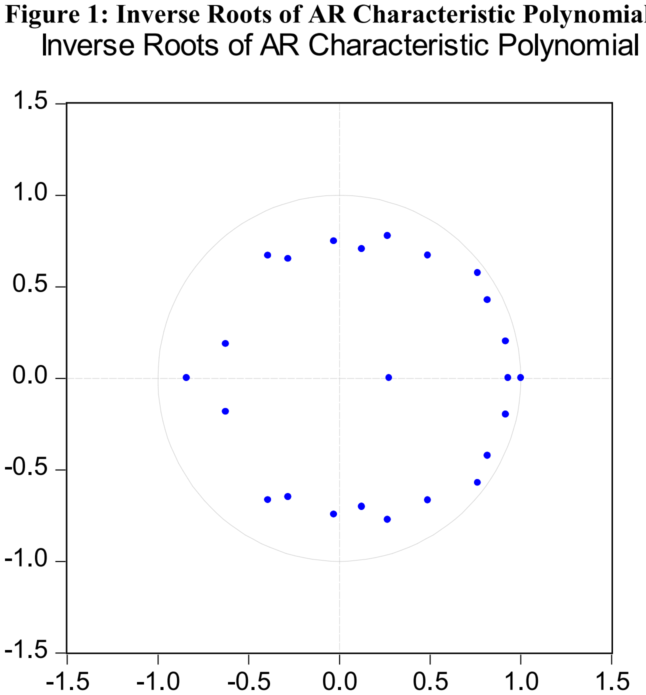
**Table 6: Granger Causality Tests based on TYDL approach**

| Null Hypothesis | Chi-Square ($X^2$) | P-Value | Conclusion |
|---|---|---|---|
| LNHSAV does not granger cause LNRGDP | 0.874631 | 0.9282 | Accept Ho |
| LNRGDP does not granger cause LNHSAV | 18.08177 | 0.0012 | Reject Ho |
| LNESR does not granger cause LNHSAV | 14.87687 | 0.0050 | Reject Ho |
| LNHSAV does not granger cause LNPI | 15.80495 | 0.0033 | Reject Ho |
| LNPI does not granger cause LNRGDP | 0.926393 | 0.9207 | Accept Ho |
| LNESR does not granger cause LNRGDP | 22.63953 | 0.0001 | Reject Ho |
| ∂LNWAP does not granger cause LNRGDP | 17.32214 | 0.0017 | Reject Ho |
| LNFDN does not granger cause LNRGDP | 11.98661 | 0.0175 | Reject Ho |
| LNRGDP does not granger cause LNFDN | 1.095441 | 0.8950 | Accept Ho |

**Source: Author's computation using E-view 9 (2017)**

**Appendix II**

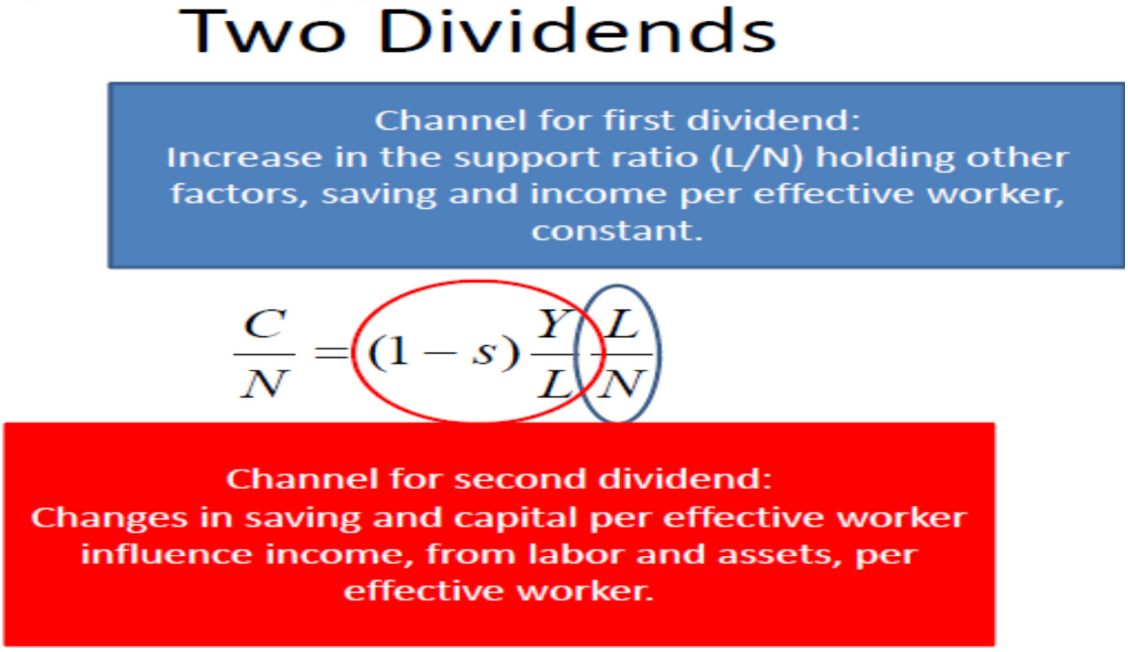
**Figure 1: Inverse Roots of AR Characteristic Polynomial of VAR Model**




**Source: Author's computation using E-view 9 (2017)**

**Figure 2: Channels of Demographic Dividends**




**Source: Mason (2007)**