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Dynamics of Savings-Growth Interactions in Nigeria (1980-2013)

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Abstract
This study explores the relationship between savings and income growth in Nigeria over the period 1980 – 2013. Literature revealed that a relationship is expected to exist between both variables but that some sort of controversies surrounded the direction of causality between them. Using an error correction analysis, it was discovered that a relationship does exist between both variables in Nigeria. The co-integration and ECM test revealed that a long-run relationship exists between both variables and was also able to provide the dynamics of the relationship. The granger causality test revealed that causality runs from income growth to savings in Nigeria. Implying rejection of the Solow's hypothesis of savings leads to income growth and acceptance the Keynesian hypothesis that income growth leads to savings.
Keywords: Savings, Growth, Investment

1. Introduction

Vast volumes of literature have come to a consensus that economies that are good savers are likely to grow faster, provided that an efficient financial system provides adequate financial intermediation and allows the transmission mechanism of savings to growth through investment to work (Nwosa and Saibu, 2012). A study by the World Bank concluded by noting that on average, developing economies with high savings tend to grow faster (World Bank, 1989). A United Nations publication also upheld this notion claiming that an increase in well channelled savings into productive investment is a crucial criterion for economic growth (UN Department of Economics and Social Affairs, 2005). We can therefore conclude that other things being equal, savings is a crucial macro variable for growth if it is used efficiently and judiciously. Ogunleye (2005) inferred that economic growth involves the steady process by which the productive capacity of the economy is increased overtime to bring about rising levels of national income and output. He further stated that economic growth results not only from the growth in quantity and quality of resources, capital accumulation, growth in productive population, and improved technology, but also from a social and political structure that is conducive to such change.

Early scholars on this topic like Lewis (1954) have claimed that the understanding of how an economy can increase its level of savings and investment to achieve higher growth is crucial to economic, thereby also showing the importance of capital accumulation. He further stated that the industrial revolution remains unexplainable without first explaining the relation between increased savings and national income. This then necessitates examination of the interaction between domestic savings and the economic growth of an economy. Moreover, the relationship that exists between savings and investment can have a remarkable impact on the economic state of a nation. Solow (1956) noted the crucial role of savings in economic growth. McKinnon (1973) and Shaw (1973) further emphasized the vitality of savings claiming that savings is not only crucial for economic growth, but also for development. Sinha and Sinha (1998) stated that increased savings raises the level of investment thereby accelerating economic growth. Kuznets (1973) established a strong association between growth performance and investment. Papapetrou (2009) noted savings remains a vital and more sustainable source of investment and capital accumulation. Therefore we can say economic growth is a function of capital accumulation which is a function of savings. In essence; economic growth is a function of savings.

However it is crucial to note that according to text book macroeconomics, the determinants of savings and investment differ. While the former largely depends on wealth and income level, the latter depends critically on risk and profitability levels (De Long 1992). This then generates discrepancies from the traditional relationship, as savings do not necessarily have to be invested domestically in a world of free capital mobility. For capital, if the risk and profitability level are not favourable. Capital would then flow to a more productive economy. This suggests that it is possible for an increase in domestic savings to only reflect in the economy's current account balance and not necessarily in the investment level and growth. Akinbobola and Ibrahim (2011) stated that savings becomes crucial for growth, as it is a major contributor to capital formation and accumulation by increasing the stock of capital. Saving is often said to be closely related to investment and economic growth (Singh, 2010). Nigeria in recent times has been experiencing an average economic growth rate of about 7%, which is impressive World Bank (2013). Umoru (2013) however claimed that Nigeria has been experiencing a lot of capital flight to developed countries in recent times. This research is thus designed to investigate the relationship of savings and economic growth using data covering years from 1980-2010, as well as explore its dynamics in Nigeria.

The recent pre-occupation with the dynamics of savings and economic growth has been motivated by the view that a shortfall in national savings would hinder investment, particularly capital formation, resulting in slow and unsustainable economic growth.

Although there appears to be a vast volume of existing literature on the savings – economic growth relationship globally, economists in recent times have become weary of generalizations and assumptions when it comes to issues relating to economic growth, as inter country peculiarities and variances affect different economies in different ways. Ernst and Young (2011) suggests the need for a new approach to growth issues especially in developing countries as generalizing may no longer be effective, since fast developing economies' patterns of growth have varied from each other and have not always followed the path of orthodox knowledge. Furthermore, this study becomes important at a time like this when Nigeria was recently upgraded to a middle-income state (OECD, 2013) which implies a reduction in the inflow level of aid, hence a need to encourage domestic savings and other sources of finance. This study is however anticipated to fill the existing knowledge gap on the relationship of saving and economic growth in the Nigerian context.

2. Literature Review

Savings is an important macroeconomic variable necessary for determining the rate of growth of an economy, thus, it arouses national interest. However certain discrepancies exist in the contextual connotation of the word "savings". Setting aside money to pay a debt is not an ideal term for savings as it is widely viewed; for example saving differs from savings, which is a stock concept, referring to money set aside. *The former refers to an increase in one's assets, an increase in net worth, whereas the latter refers to a part of one's assets, usually deposits in savings accounts, or to all of one's assets* Akomaye (1995).

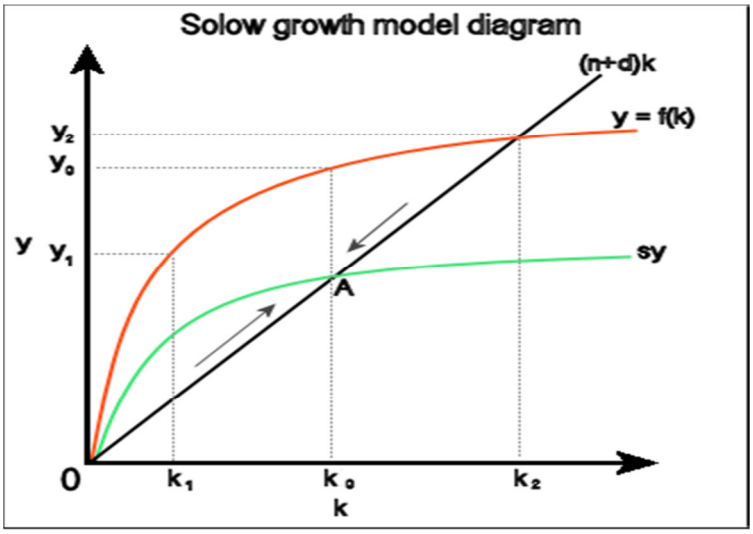
Past studies have shown that savings can simply be referred to as the restriction an economic unit places on disposable income expenditure. Conceptually, savings represent that part of income not spent on current consumption. Sinha and Sinha (1998) asserted that the role played by capital in the growth and development of a nation is quite valuable by stating that, the formation of capital depends on investment, which in turn depends on savings, thereby denoting that economic growth and development depend critically on savings.

Exogenous Growth

Theories of economic growth in the 1950s and 1960s influenced by the works of Solow (1956) and Swan (1956) were typified by a production function with capital and labour as inputs. Major assumptions of these theories included constant returns to return to scale and diminishing marginal productivity for inputs. These theories exhibited growth through capital accumulation but with exogenous changes. This however did not reflect sustainability and long run situations as this process had a limit (Myles, 2009).

This could be further explained mathematically by assuming a situation where an economy has a fixed labour force ($\tilde{L}$) and each unit of labour's work input is a fixed number of hours, with full depreciation of capital when ultimately utilized. The output(Y) produced is then shared between consumption (C) and capital stock (K) replacement. The production function can then be expressed as the equation $Y=A\ f\ (K, \tilde{L})$, and explained with the diagram below:

Figure 1: Solow Growth Model



Source: Myles, G. D. (2009), "Economic Growth and the Role of Taxation-Theory",OECD Papers,No.713 p8

Where: n=population growth rate, d=depreciation, k=capital per worker, y= income/output per worker.

$Y=Af(K, \tilde{L})$ explains the output level as capital increases with diminishing marginal productivity. Since Y= C + K, the curve height above 45° shows the consumption quantity, holding savings (S) as a constant fraction of

output (Y), S = sY. K_1 shows capital level where per capita consumption is at maximum consumption A. At this level, no increase in investment can raise consumption levels. Contrary to that, K_2 shows the capital level where all output is used as savings to replace depreciated capital stock, which however is not sustainable. This constitutes one of the major weaknesses of this model. Other weaknesses included the fixed labour input assumption which eventually will be self-defeating to increases in capital stock. Also a major drawback of this approach is its exogenous growth mechanism assumption which prevents the model from providing an explanation for the growth rates' most fundamental factor. Furthermore, due to its exogeneity, it means policies have little or no effect on growth (Myles 2009). Although, it explains that capital accumulation and therefore savings is crucial for growth, and as such savings, it limits the possibilities of exploring other determinants of growth.

Endogenous Growth

Scholars have however over the years been able to research and expand on growth models and have been able to include dynamic elements into them. Myles (2000), referred to endogenous growth models as models that incorporate both sustainable growth and can determine the said growth levels. The most basic of these models is known as the AK model which assumes capital (K) as the only production input, and also assumes constant returns to scale Y= AK. The model assumes output (Y) grows at rate of net investment (I) which is a function of savings (S), but overlooks the role of labour (L). The model assumes that as long as the average savings(S) is greater than average depreciation (D) on capital (K) then the economy experiences growth but if otherwise the economy shrinks.

A development on that led to a second set of models that assumed that capital increase should be matched with a proportional increase in other factor inputs. This then provides room for increased productivity of labour through investment in human capital development. Prominent among these scholars were Lucas and Romer. Romer (1990), and some others agreed that higher expenditures on research and development could lead to higher economic growth. Mankiw, et al (1992) augmented Solow's original model by including human capital and human capital accumulation in the production function. Weil (2009), however stated that technological growth requires investment. He however noted that the nature of this investment may vary from place to place. One thing which remains consistent with both exogenous and endogenous growth models is the crucial role of capital accumulation and investment, and therefore of savings.

Theories of Savings

There are various theories of savings that have been put forward by economists but for the purpose of this study; two important theories have been looked into namely:

Classical theory

Keynesian theory

Classical Theory

The classicists are famous for their belief in a self-regulating economy with self-adjustment mechanisms in the face of a slight disequilibrium. The foundation of such belief is tied to two cornerstones which are Say's law of supply and the Quantity theory of money.

The classicists believed in an economy of full employment where savings(S) and investment (I) are both equal, and assumed equilibrium between savings and investment.

S = I……. (1)

Both savings and investment are functions of the interest rate (r);

S = f(r)……. (2)

I = f(r)…….. (3)

Any time the economy is in disequilibrium it is assumed that the interest rate is the mechanism that brings both into equality.

S = f(r); and $\frac{dS}{dr} > 0$ …….. (4)

I= f(r); and $\frac{dI}{dr} < 0$ …… (5)

The rise in interest rate would raise savings and lower investment and also the converse holds true. If at any point in time saving is more than investment, the interest rate would fall, causing investment to rise and savings to decline until the two are equal (Jhingan, 1970).

The classical economists regarded the rate of interest as the factor that brings the demand for investment and the willingness to save into equilibrium with one another (Umoh, 2003). Uremadu (2007), based on the account of the classicists, suggested that the Savings-Investment equality necessary implies an aggregate savings and aggregate investment equality, though this view is debatable, and conclusively, an increase in savings by economic agents would generate a corresponding increase in investment. The interest rate serves as the price of

the cost of savings and borrowing of investible funds from the money market. At the equilibrium interest rate both savings and investment are said to be equal.

Keynesian Theory

Given that an individual's income is either spent or saved. Keynes wrote in his general theory that "saving and investment are necessarily equal in amount for the community as a whole, being different aspects of the same thing."

$S_t = Y_t - C_t$ ..... (6)

$I_t = Y_t - C_t$ ..... (7)

Therefore S=I ..... (8)

The theory of the absolute income hypothesis is that individual consumers determine the portion of current income (Y) they will devote to consumption(C) on the basis of their absolute level of income. This also holds true for the level of savings which is determined by the level of income.

Holding other factors constant, a rise in absolute income will lead to a decrease in the fraction of that income devoted to consumption, thereby causing a rise in savings. High income families are therefore believed to consume less and save more whereas low income families find that consumption needs absorb or even exceed their total incomes. As families move up the income scale, they save a larger fraction of their income at each higher income level.

Keynes (1936) confronted the view of the classicists regarding savings, interest rate and income by proposing that savings was dependent mainly on the level of income. The Keynesian model states that saving 'S' is a function of income (output) 'Y'. According to Keynes, savings was not very responsive to the level of interest (inelastic). He was of the opinion that people would dis-save even at a very high rate of interest if the level of income is below the breakeven point.

He further defined savings as the excess of income over consumption expenditure, given that income is equal to the value of current output; and that current investment (i.e. gross capital formation) is equal to the value of that part of current output, which is not consumed; savings is equal to the excess of income over consumption. Hence, Uremadu (2007) places the equality of savings and investment thus:

Income = Value of output = Consumption + Investment

Income = Consumption + Savings

Savings = Investment.

Keynes believed that on aggregate, the excess of income over consumption (otherwise called savings) cannot differ from the addition to capital equipment (i.e. gross fixed capital formation or gross domestic investment). The decision to consume or invest determines the volume of national income accumulated in a period. In the Keynesian view, therefore, rising income would result in higher savings rates. In actuality, savings is deemed complementary to the consumption function (Umoh, 2003).

The relationship between savings and income led to Keynes's (1936) formulation of the absolute income hypothesis. This hypothesis states that "men are disposed, as a rule and on the average, to increase their consumption as their income increases but not as much as the increase in their income." Consumers will spend only a part of the increase in their income on consumption and save the rest. Therefore, the total increase in income will be distributed proportionately less on consumption spending and more on personal saving. (i.e. marginal propensity to consume MPC<1 and declines as income increases).

From this hypothesis we are able to elicit a property of consumption and savings in relation to income; the greater the income, the lower the proportion consumed and therefore the Marginal Propensity to Consume (MPC) falls as income rises and the Marginal Propensity to Save (MPS) rises as income rises. Furthermore the Average propensity to consume falls as income rises.

Relationship between Savings and Income

Economic theories propose that a portion of gains realized from involvement in economic activities is to be kept back. When applied to capital investment, savings increase output (Olusoji, 2003). The conventional perception is that savings contribute to higher investment and hence higher GDP growth in the short run (Bacha, 1990 *et al*). The Lewis (1955) central idea of traditional development theory was that increasing savings would accelerate growth. Lewis (1970) states, 'the central problem in the theory of economic growth is to understand the process by which a community is converted from a five per cent to a twelve per cent saver".

The savings, investment and growth relationship has historically been very close; it is for this reason that Nwachukwu (2009) attributes the unsatisfactory growth performance of some developing countries to poor saving and investment. Early scholars of economics such as Solow (1956) stressed the importance of savings as it influences the rate of growth of an economy. An understanding of the nature of aggregate national savings behaviour is critical in designing policies to promote savings, investment and growth (Umoh, 2003)

Cesaratto (1999) suggests that it is very important to consider the conventional wisdom about economic growth. The idea that thrift is the main determinant of economic growth and the reward of parsimony is the long-run positive rate of profits which is equal in equilibrium to the marginal productivity of capital.

The examination of the relationship between saving and economic growth is very important because it provides useful information on which economic variable(s) that the government and relevant authorities need to control in order to attain the desired level of the targeted variable or variables. (Sajid *et al*, 2008).

Savings have been said to be a function of income, i.e. higher income induces more savings. The tabular representation of the relationship between savings and income could be called a saving schedule. Thus, given that all disposable income is not consumed, the fraction of each additional currency unit of disposable income not consumed is the marginal propensity to save i.e. the ratio of changes in savings to changes in income. Since all disposable income is either consumed or saved, it is logical to say that the marginal propensity to consume and the marginal propensity to save must be equal to unity (i.e. MPC + MPS = 1).

Average propensity to save can be defined as the proportion of income that is devoted to savings expressed as the ratio of total savings to total income. So the average propensity to consume is that part of total income consumed. From development theories, savings leads to investment, which also leads to capital formation and capital formation leads to profit which generates further income. Therefore higher savings generates higher income. Capital formation is very relevant for the analysis of the dynamics of savings and economic growth. The phases for increased output and income in the nation are itemized below

- the growth of savings in the economy
- mobilization of savings in an economy by financial institutions
- the use of savings for investment purposes

This brings about equality between Savings(S) and Investment (I)

In the analysis of national income, equilibrium in the real sector is achieved when injection equals withdrawals or investment equals savings. Savings is seen as a leakage. Keynes argued that deficiency of demand was responsible for the depression and the amount that is saved must be re-injected into the economy allowing for agents in the economy to increase their activities, leading to more output, income and employment.

Furthermore, if savings are not injected into the economy, it would lead to a fall in investment and consequently the national income. The IS (Investment-Savings) equilibrium is therefore attained at the point of equilibrium of total withdrawal with total injections. (S + T + M = I + G + X).

Akinlo (1998) was of the opinion that the process of capital formation depends on savings and the transformation of savings to capital formation entails three activities namely:

- an increase in the volume of savings so that resources can be made available for investment purposes
- the channelling of savings through the credit mechanism for the purpose of investing
- the act of investment in order to increase the capital stock

The findings of the endogenous growth models, as MRW (1992) stressed, amplifies the role of increasing both human and physical capital stock for economic growth. Akinlo (1998) suggests that these depend on savings therefore implying that saving is fundamental to economic growth and development.

Empirical Literature Findings

Aghevli *et al* (1990) found that the saving rate and investment in human capital were actually closely linked to economic growth. The fundamental argument regarding the relationship between financial conditions, savings and economic growth is hinged on the McKinnon-Shaw financial intermediation hypothesis (Soyibo, 1996). McKinnon et al (1973) were of the view that the accumulation of money balances was absolutely necessary for investment. Shaw et al (1973) on the other hand stressed the role of deposits. The average efficiency of investment is increased by an increase in the supply of credits through increased deposits resulting from high interest rates. Financial intermediaries further stimulate investment by their expertise in allocating depositors' funds efficiently.

Thus, the link between savings and growth as postulated by the McKinnon-Shaw hypothesis is investment. However, behaviorally savings and investment differ since transfer of savings to investment depends on a host of other factors other than the real interest rate (Fry et al, 1978). Although there appears to be a consensus that there is a relationship between savings and economic growth, the causal direction between both variables is debated by economists (Sajid and Sarfraz, 2008). Solow (1956) highlighted savings as crucial to economic growth in the short run on the assumptions of constant returns to scale, diminishing marginal returns on capital and exogenously determined technical progress. Shaw (1973) and McKinnon (1973) upheld this opinion claiming that savings is important for development and that an increase in savings will raise the investment level and translate into growth. Sinha and Sinha (1998) argued that increased savings led to increased capital formation and investment translating into economic growth. Jappelli and Pagano (1994) and Alguacil et al. (2002) also agreed with Solow (1956) reporting that increased savings led to economic growth. World Bank (1993) concluded that the differences between economic growth of developing and developed nations is the high rate of savings in developed economies. Olajide (2009) using a causality test approach found a unidirectional relationship and argued that the slow growth rate of Nigeria in earlier years could have been as a result of using savings to achieve growth without the growth translating to increased savings in Nigeria.

However, the Keynesians have argued that it is actually economic growth that translates to an increased

rate of savings, claiming that increased output level in an economy translates to increased income level, thereby boosting the savings level. Carroll and Weil (1994) claimed that savings is preceded by growth. Gavin et al (1997) were also in support of this view. An econometric examination of eighteen Latin American economies for the period of 1960 to 1991 concluded that economic growth precedes growth in savings (Saltz, 1999). Agarwal (2001) in an empirical investigation of a sample of Asian economies suggested that GDP growth preceded growth in the savings rate. Large volumes of empirical literature on the growth-savings relationship have made use of simple OLS estimation and cross-sectional data (Carroll and Weil, 1994). However, they may not have been sophisticated enough to verify a relationship of this nature. Some recent literature on this topic has attempted to use a Granger causality approach to verify the growth-savings relationship. However, most of them had to make use of rate of savings and economic growth data instead of saving and growth data in itself, in order to avoid unit root bias.

Sinha and Sinha (1998) concluded that economic growth Granger causes increased savings in most countries. Saltz (1999), Anoruo and Ahmad (2001), and Baharumshah et al (2003) were also in agreement with this finding. They all made use of time series for different countries. Mohan (2006), based on empirical findings, concluded that growth Granger causes savings in high income countries, but stated that in low income countries there was a mixed result. Andersson, (1999) used bivariate vector autoregressive (VAR) models to analyse the relationship between saving and GDP over a range of economies including Sweden, UK, and USA. The Granger non-causality test result suggested that the causal relationship direction for savings and output varies across economies.

From the foregoing debate, it therefore appears that although there is no convergence in empirical findings of economists on the nature of savings-growth relationship, it is expected for any economy that is growing to have savings. This then forms the basis of this research. Two major views of the relationship which this literature review has been able to identify are those of Solow (1956) who argued that growth of income (Y) is a function of savings(S) and Keynes who suggested that savings(S) is a function of growth(Y).

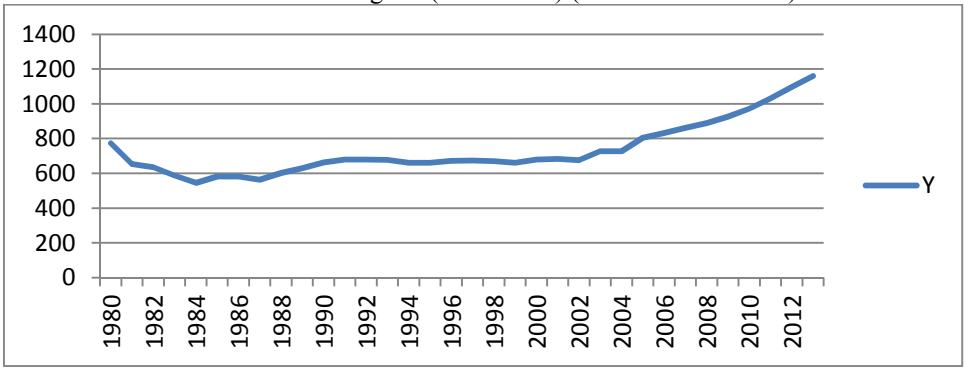
3. Methodology

For the purpose of this study, the use of quantitative methods was employed. Deductive quantitative methods was used as this work involve hypothesis testing of basic economic theory on savings and then use in the relationship existing between the variables in Nigeria. Descriptive data analysis will be used for clarity in understanding the nature of relationship between savings and growth. A few graphs and charts will be plotted to provide a clearer picture of data available. A unit root test will be carried out to know if the data used are stationary. A co-integration and Error Correction Model will then be used to identify the order of integration and find out the dynamics of the relationship, and a causality check to identify the causal relationship between the variables. The data used are from secondary sources as they are macro-data which are readily available. The secondary data used were obtained from secondary sources such as the World Bank data bank World Development Indicators (2014) and Central Bank of Nigeria annual Statistical bulletin (2014). The use of Microsoft Excel and Microfit5 statistical software was employed for statistical analysis.

4. Results and Discussion

Trend of National Income

Figure 2: Plot of Trend National Income in Nigeria (1980-2013) (constant 2005 USD)



Source: Generated by author based on data from World Bank WDI (2014)

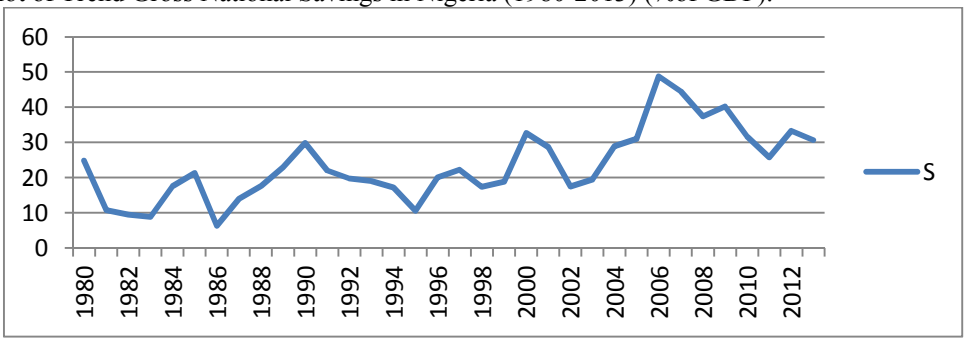
On average, aggregate income experienced a downward trend for a much of the 1980s, however from the latter part of the 80s, it experienced an upward trend and maintained this through the early part of the 90s. A rather undulating trend with upward tendencies followed to the mid-2000s followed a sharp upward trend.

Figure 2 captures the situation of economic growth in the country for the period of study. The country experienced a steady decrease in national income ranging between the years of 1980 to 1984. Pinto (1987)

claims that this could have been a back drop of the global oil glut experienced in the 70s. Nigeria's growth experienced a sharp rise in 1985 and then further declines through 1987. The economy's growth from 1988 maintained a steady seeming sharp upward trend until 1993. Akpan and Atan (2010) claimed that the initial fall could be explained by the new introduction of the Structural Adjustment programme which they claimed was initially resisted by Nigerians and later on by 1988 started to materialize into economic growth. This was maintained through 1993 which was the period when the Structural Adjustment Programme in Nigeria came to an end. However it witnessed a lot of undulation from 1994 through 2004. From 2005, the economy has however followed a sharp upward trend nature. The year 2004 witnessed the launching of the economic agenda tagged National Economic Empowerment and Development Strategy (NEEDS). The four goals of NEEDS are poverty reduction, wealth creation, employment generation and value re-orientation. The hope of the programme was to diversify the economy, boost non-energy exports, increase industrial capacity utilization, and improve agricultural productivity (Marcellus, 2009).

Trend of Gross National Savings

Figure 3: Plot of Trend Gross National Savings in Nigeria (1980-2013) (%of GDP).



Source: Generated by author based on data from World Bank WDI (2014)

On average the domestic savings generally exhibited a lot of undulation through the period of study, with sharp and sudden changes. The country experienced a steady decrease in domestic savings between the years of 1980 and 1983, with an average of 12.75 % national income; however it is worthy to note that 1980 had 20% while the remaining period had savings levels below 10% of GDP. The periods 1984 and 1985 however experienced a sharp upward turn in the savings proportion with 17.61% and 21.28% of GDP respectively. This coincided with the period of the implementation of the Structural Adjustment Programme. The year 1986 however had an exceptionally sharp fall in the savings level to about 6.30% which apparently is the lowest recorded in the period under consideration. The period 1987 to 1990 experienced a continuous rise in savings level with an average of 20.86% which is equally matched with increase in growth of the economy. There was a steady decrease from 1991 to 1995 with an average savings level of 17.20%, in this period which experienced the transition of military leadership to military dictatorship with a lot of skilled labour flight out of the country (Umobong and Akpan, 2013). The period 1996 through 2002 witnessed a lot of fluctuations in pattern of the savings level trend, with an average of 22.47%. From 2003 there was an upward movement through 2006 which recorded the highest savings level ever of 48.81%. 2007 and 2008 experienced continuous drops and had savings level of 44.47% and 37.42 respectively, while there was a rise in 2009 to about 40.21% and another sharp drop experienced in 2010 to 31.71%. Obamuyi (2010) recorded that the Central Bank of Nigeria (CBN) attempted to make the banking sector sound, stable, reliable, dependable and internationally competitive by embarking on the financial policy of recapitalization of banks. The policy, announced on July 6, 2004, directed that the minimum paid up capital of banks be increased from N2 billion to N25 billion, with effect from January 1, 2006. The result of this exercise brought the emergence of 25 groups of banks (now 24) whose funds were raised from strategies such as mergers, acquisition, floating of new shares.

It is however worth noting that after 2004, the country has been able to maintain a savings level above 30% which is above the 20% international benchmark set by the World Bank for developing economies. Nwachukwu (2009) noted the concern of development economists on the crucial roles of domestic saving mobilization in the sustenance and reinforcement of the saving-investment-growth chain in developing economies.

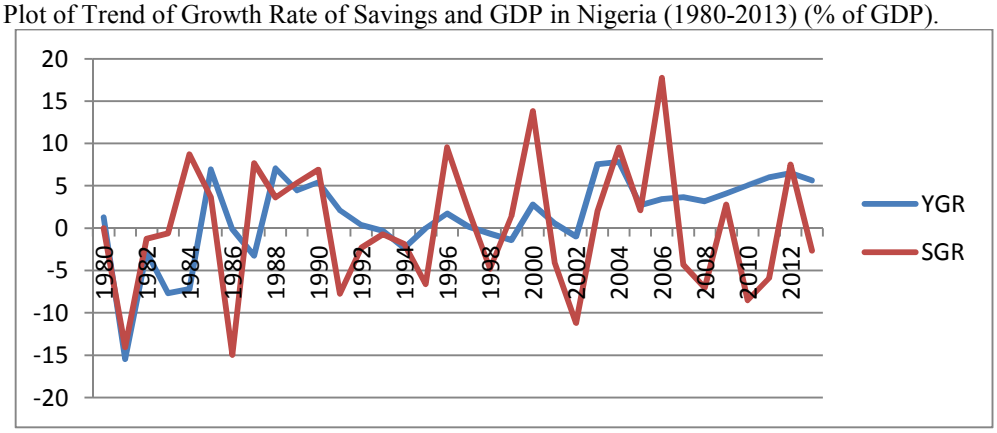
Table1: Correlation Matrix of Savings and Economic Growth in Nigeria.

	Y	S
Y	1.0000	.77289
S	.77289	1.0000

A correlation matrix, which is used to reveal the nature of relationship between variables, suggests a positive relationship between both variables. This confirms theory about the relationship between economic growth and savings (Grier and Tullock, 1989).

Trend of Growth Rate of Income and Savings

Figure 4: Plot of Trend of Growth Rate of Savings and GDP in Nigeria (1980-2013) (% of GDP).



Source: Generated by author based on data from World Bank WDI (2014)

A plot of the savings growth rate and GDP growth rate revealed a very undulating pattern between both variables in similar directions. While it is visible that the growth rate of savings exhibited more volatility than that of economic growth, they both moved in similar directions. This then suggests a uni-directional relationship nature between growth rates of both variables. Earlier researches on this subject, have however noted that it is often the case in most economies to have either a uni-directional or bi-directional relationship (Andersson, 1999), stating that there is no one specific direction for the relationship between GDP growth rate and savings growth rate as issue of causality varies.

Table 2: Correlation Matrix of Growth Rate of Savings and Economic Growth in Nigeria

	YGR	SGR
YGR	1.0000	.33935
SGR	.33935	1.0000

The correlation matrix gives a better picture of the relationship, as the graph above had earlier revealed that at every point where GDP growth rate was at a peak savings growth rate was also at its peak and vice-versa, indicating a positive relationship between both variables.

The approach used for the model is based on the assumptions of the Solow (1956) and Keynes (1936) hypothesis, which suggest that income growth(Y) is a function of savings (S), and savings (S), is a function of income growth (Y) respectively. The statistical formulation of the model can therefore be presented as follows:

MODEL ESTIMATION

The Keynesian model posits that saving (S) is a function of income growth (ΔY).

Thus, $S = f(\Delta Y)$ ---------- (9)

For the purpose of this study, the equation above is modified to derive the one below:

$GNS = \alpha o + \alpha 1 YGR + U$---------- (Keynes hypothesis, 1936) ---------- (10)

Solow argued that savings preceded economic growth.

Therefore, the growth model posits economic growth as a function of saving.

Thus, $\Delta Y = f(S)$ ---------- (11)

For the purpose of this study, the equation above is modified to derive the one below:

$YGR = \beta o + \beta 1 GNS + U$---------- (Solow's hypothesis, 1956) ---------- (12)

Where: GNS= Gross National Saving;

YGR=Income Growth

αo= constant

α1= coefficient estimate for GRY

β1= coefficient estimate for GNS

βo= constant term

U= Error Term

Time series data analysis of this nature is expected to have a constant variance and mean through time period with covariance which is independent of time. Meeting of these conditions infer that the data can be said to be stationary. In other words, if time has no effect on data and it regresses back to its mean in the long run then it is assumed that data is stationary. However, if these conditions are not met, it is concluded that data is non-stationary, as such rendering our test statistics irrelevant and inappropriate, thereby making the model unreliable. This problem is however often discovered by techniques ranging from graphical to unit root test, and addressed by derivation of an error correction model, which is done by differencing to the order of integration of the

variables (Gujarati and Porter, 2009).

Table 3: Unit root test for YGR

	Test Statistic	LL	AIC	SBC	HQC
DF	-4.8800	-78.1479	-80.1479	-81.5152	-80.5762
ADF(1)	-3.3237	-77.6679	-80.6679	-82.7189	-81.3103

95% published asymptotic critical value corresponding to ADF (0) = -2.9665

LL=Maximized log-likelihood; AIC = Akaike Information Criterion; SBC = Schwarz Bayesian Criterion; HQC = Hannan-Quinn Criterion

Table 4: Unit root test for GNS

	Test Statistic	LL	AIC	SBC	HQC
DF	-3.5189	-11.6448	-13.6448	-15.0121	-14.0730
ADF(1)	-3.2243	-11.6372	-14.6372	-16.6881	-15.2795

95% published asymptotic critical value corresponding to ADF (0) = -2.9665

LL=Maximized log-likelihood; AIC = Akaike Information Criterion; SBC = Schwarz Bayesian Criterion; HQC = Hannan-Quinn Criterion

The stationarity tests show that the variables (income growth and saving) are stationary at first difference at 5% critical values. Based on this, a co-integration test will be carried out to confirm the order of integration of the variables and also if a long run relationship exists between the variables, and therefore a basis for causality (Engle and Granger, 1987; Hendry, 1986; Granger, 1986). If the variables are found to be co-integrated, then it can be concluded that causality exists (Granger, 1988, Miller and Russek, 1990).

Using the Engle –Granger (EG) and Augmented Engle-Granger (AEG) tests, which require testing of residuals, the following hypothesis are then set up:

H_0= the variables are co-integrated

H_1= the variables are not co-integrated

Decision rule: t calculated > than t tabulated accept null hypothesis and conclude there is co-integration.

t calculated < than t tabulated reject null hypothesis and accept alternative and conclude there is no co-integration.

Table 5: Augmented Engle–Granger (AEG) Co-integration Test Result

	Test Statistic	LL	AIC	SBC	HQC
DF	-5.841	-75.6559	-75.6559	77.3395	-76.8700
ADF(1)	-4.5029	-75.6099	75.6099	-78.9772	-78.0382

LL=Maximized log-likelihood; AIC = Akaike Information Criterion; SBC = Schwarz Bayesian Criterion; HQC = Hannan-Quinn Criterion

From the above test, t calculated =-4.5029 and t tabulated=-2.93 at sample size 50 and 5% degree of freedom t calculated (-4.5029) > t tabulated (-2.93), therefore we accept null and reject alternative hypothesis and conclude that there is co-integration between variables.

This then implies that there is a long run relationship between savings and income growth. Also that causality exists between savings and income growth in Nigeria. Based on these, we can then find the causal direction as well as nature of the relationship between variables in the short and long run respectively.

Based on the findings, a granger causality test will be used to identify the causality between both variables.

The result of the test is thus presented in Table 6 and 7 below.

Where null and alternative hypothesis are H0 and H1 below respectively:

H0:δ=0 (Savings granger-causes growth in Nigeria.)

H1:δ≠0 (Growth granger- causes savings in Nigeria)

The decision rule for the test is the acceptance of the highest and most significant F-statistic and rejects the other.

Table 6: Test for H0

Dependent variable is GNS

Regressor	Coefficient	T-Ratio	[Prob]
INPT	1.3117	2.2816	[.031]
GNS(-1)	.56524	2.9461	[.007]
YGR(-1)	.0086048	.45293	[.654]
R	.0015898	.083843	[.934]

R-Squared=0.37472; R-Bar-Squared=0.30257; S.E. of Regression=0 .40994; F-Stat. = F (3, 26) 5.1937[.006] DW-statistic=1.8868

Table 7: Test for H1
Dependent variable is YGR

Regressor	Coefficient	T-Ratio	[Prob]
INPT	-9.2018	-2.7189	[.012]
GNS(-1)	3.3277	2.9461	[.007]
YGR(-1)	.050658	.45293	[.654]
R	1.0094	9.0419	[.000]

R-Squared = 0.78913; R-Bar-Squared =0.76480; S.E. of Regression= 2.4134; F-Stat.=F(3,26) 32.4323[.000] DW-statistic=1.8868

From the results of table 9 and 10, we reject Ho and accept H1 and conclude that income growth granger causes savings in Nigeria and that savings does not granger cause income growth in Nigeria. Therefore we can say savings depends on income growth, and accept the Keynesian hypothesis to be the case in the Nigerian economy. Deviations from the long-run relationship occur in the short run due to shocks in any of the variables. This leads to differences in the governing dynamics of short and long run behaviours of models. This then necessitates the understanding of short run interactions and how it adjusts in the long run equilibrium especially for policy making. To find the nature of relationship in the short run an error correction mechanism is employed. Using the findings gotten from the causality test, the long and short run relationship can then be found using the following equations:

GNS = αo + α1GRY + U---------- (Long-run relationship) ---------- (13)

Based on the co-integration test that suggests an order of integration of one (1) implying the variables become stationary after first differencing, the ECM model then becomes:

DGNS = αo + α1DGRY +R1+ U---------- (Error Correction Model) ---------- (14)

Where: DGNS = First Difference of Gross National Saving
DGRY = First Difference of Income Growth
R1 = First lag of residual

Table 8: Long run relationship
Dependent variable is GNS

Regressor	Coefficient	T-Ratio	[Prob]
INPT	2.9759	40.7022	[.000]
YGR	.057561	3.8554	[.001]

R-Squared =0.33887; R-Bar-Squared=0.31608; S.E. of Regression= 0.40013; F-Stat. = 14.8645[.001]; DW-statistic=1.1479

In the long run, the t-values are significant indicating that the importance of variables to the model. The positive coefficient confirms theory. F-value (14.8645[.001]) is significant, suggesting a generally good model. The DW-statistics (1.1479) is greater than the R-squared and quite significant as it is greater than 1, although the closer to 2 the better for the predictive ability of the model. The long run relationship can then be stated as:

GNS = 2.9759 + 0.057561 GRY + U

Table 9: Error Correction Model
Dependent variable is DGNS

Regressor	Coefficient	T-Ratio	[Prob]
INPT	. 3448E-3	.0053755	[.996]
DYGR	.035655	3.1536	[.004]
R1	-.52266	-3.1470	[.004]

R-Squared= 0.38578; R-Bar-Squared=0.34028; S.E. of Regression=0.35121; F-Stat.F(2,27)= 8.4790[.001] DW-statistic=1.9555

In the short run, the t-values are significant indicating that the importance of variables to the model. The positive coefficient confirms earlier studies like (Akinbobola and Taiwo, 2011). The error correction term represented as (RES1) has a negative sign with a moderate level of significance. This corresponds with its expected nature (Gujarati and Porter, 2009).

5. Conclusion

This study examines the relationship between economic growth and savings in Nigeria using a time series data for the period 1980-2013. The results gotten suggest a positive relationship exists both in the long-run and short-run between savings and economic growth in Nigeria using a descriptive and Error Correction Model (ECM). The causality test suggested a uni-directional causal relationship of growth granger causing saving in the economy. These results should however be interpreted with caution, as a larger data set would possibly increase its reliability. Disaggregation of savings and inclusion of other policy variables will increase the reliability and shed light on precisely what aspect of savings is most useful to economic growth in Nigeria.

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