Does savings culminate in economic growth? An investigation using cointegrating regression

Ime Okon Utuk
Department of Economics, Faculty ofSocial Sciences
Akwa Ibom State University, Obio-Akpa Campus, Nigeria.
utuk_ime2003@yahoo.com

Abstract

One of the most controversial areas in macroeconomics is the saving–growth nexus. This study is an attempt to examine this relationship in the case of Nigeria. Time series data over the period 1981 to 2020 were used. The analysis was based on Augmented Dickey–Fuller (ADF) test, Johansen cointegration test, Dynamic Ordinary Least Squares (DOLS) technique, and Pairwise Granger Causality tests. The results of the DOLS estimation techniques for cointegrating regression show a positive relationship between gross domestic savings (InGDS) and gross domestic product growth (InGDP) (economic growth) in the long run. The results supported the neoclassical viewpoint that saving rate is positively or directly related to the Gross Domestic Product. However, the Pairwise Granger Causality Tests showed no causality between InGDS and InGDP. Nonetheless, policy makers in the country need to stimulate savings the more in order to further increase economic growth. They should encourage the integration of the formal and informal sectors as this would have a strong positive impact on domestic savings. This will deepen the financial sector and assist in mobilizing the much needed savings that will engender investment and growth in Nigeria. In the same vein, policies should be pursued to reduce real interest rate so as to increase private sector investment.

Keywords: Savings, economic growth, cointegration, Dynamic Ordinary Least Squares.

Introduction

Economic growth can be defined as the increase or improvement in the inflation-adjusted market value of the goods and services produced by an economy over time (IMF, 2012). Nonetheless, saving is a process of setting aside a portion of current income for future use, or the flow of resources accumulated in this way over a given period of time (Encyclopaedia Britannica, 2022). Simply put, saving is income not spent, or deferred consumption (House, 2006). Saving may take the form of increases in bank deposits, purchases of securities, or increased cash holdings. The extent to which individuals save is affected by their preferences for future over present consumption, their expectations of future income, and to some extent by the rate of interest.

One of the most controversial areas in macroeconomics is the saving–growth nexus. This is because of divergent opinions in theories and mixed empirical results among researchers (Abu, 2010; AbuAl-Foul, 2010; Adeleke, 2014; Masih and Peters, 2010; Mohan, 2006; Odhiambo, 2014; Verhoef et al., 2014). In the theories, for example, the neoclassical school believes that higher savings lead to higher growth rates. This is plausible because increase in saving can stimulate economic growth through the mechanism of investment (Harrod, 1939; Domar, 1946; Solow, 1956; King and Levine,1994; Lewis,1955; and Romer, 1986).

Similarly, the United Nations Conference on Trade and Development "Development and Globalization: Facts and Figures -2004" emphasizes that the main factor in increasing in-country capital is the increase of savings and that, in that regard, developing countries should prioritize programs that promote domestic savings, in order for capital to be invested towards the most productive practices (Ribaj and Mexhuani, 2021).

The issue of saving–growth nexus is revisited due to the impressive savings and economic growth rates recorded among many developing countries in sub-Saharan African countries in the last one decade. In fact, African countries have been described as potential giants and hope for the world due to this recent macroeconomic performance (World Bank, 2015). Specifically, six sub-Saharan West African countries (Burkina Faso, Niger, Ghana, Sierra Leone, Liberia and Nigeria) have been described as the fastest growing economies in West Africa (African Development Bank, 2015; United Nations, 2015). Simultaneously, as these countries record impressive economic growth, most of them also record increase in savings (ADB, 2014; World Bank, 2016). However, this study only focused on Nigeria because it is an oil-rich country. It is expected that oil-rich countries should tend to save. Hence, it is imperative to find out whether the impressive economic growth recorded in Nigeria is partly a result of increase in savings or not. Also, to accept or reject the neoclassical viewpoint.

The rest of the study is structured as follows: The next section gives an overview of savings and economic growth in Nigeria. Section three deals with the literature review while section four addresses the issues relating to methodology, model specification, technique of analysis, data requirement, sources, etc. Section five handles empirical results and discussions. The study ends with summary, conclusion and suggestions in section six.

Growth and Savings in Nigeria: Overview

Nigeria has a dual economy with a modern segment dependent on oil earnings, overlaid by a traditional agricultural and trading economy. At independence in 1960, agriculture accounted for well over half of GDP, and was the main source of export earnings and public revenue. The oil sector, which emerged in the 1960's and was firmly established during the 1970's, is now of overwhelming importance to the point of over-dependence: it provides 20% of GDP, 95% of foreign exchange earnings, and about 65% of budgetary revenues (Nigeria High Commission, 2022).

V A cursory look at the Nigerian economy shows that growth rate in GDP stood at 3.4 per cent in 2005 and rose to all time high of 8.2 per cent in 2006, before falling to 6.3 per cent in 2008(World Bank, 2015). By 2010, it rose to 7.8 per cent before falling to 4.3 per cent in 2012 and rose again to 6.3 per cent in 2015 and became negative through the first and second quarters of 2017(World Bank, 2015). Between 2005 and 2015, growth rate in GDP averaged 6.03 per cent (World Bank, 2015). This makes Nigeria one of the fastest growing economies of the world. In 2021, Nigeria grew by 3.4%, the fastest expansion since 2014, better than central bank's estimate of 3% (Tradingeconomics.com, 2022a). On the other hand, gross domestic savings in Nigeria as a percentage of GDP stood at 20 per cent in 2005 and rose to 26 per cent in 2008. By 2010, it fell slightly to 25 per cent and rose again to 33 per cent in 2012. Between 2005 and 2012 it averaged 25 per cent (World Bank, 2013). Gross domestic savings (% of GDP) in Nigeria was reported at 21.66 % in 2020, according to the World Bank (Tradingeconomics.com, 2022b).

Literature Review

Theories of Economic Growth and Savings: Overview

Economic growth has been of particular interest to many economists in recent decades and a new set of ideas, called the new economic growth theory, have been generated. Here are some of these theories that relate savings and economic growth. Early economic growth theories go back to the studies of Harrod and Domar in 1939 and 1946 where economic growth was assumed to be determined mostly by the equilibrium path for an economy. Their model focused on the limited role of government in the economy and the role of savings as the main determinant of investment. They assumed that interest rates moved to an equilibrium level over time and then remained unchanged.

Due to these unreasonable and limiting assumptions, efforts were made by neo-classical economists, such as Solow and Swan in 1950, to study the relationship between economic growth and savings using a less limiting platform. The Solow model is based on a constant returns to scale production function with two inputs, labor and capital, substitution possibilities between inputs, and decreasing marginal productivity. In this model, growth takes place through capital accumulation and the stable growth rate is determined by the rate of technology progress, which is an exogenous variable. Although changes in the population growth and savings rates can alter the growth path, they have no effect on the long-run growth rate. Increases in the savings rate cause an upward shift in the long-run growth path instead of an increased growth rate.

Endogenous economic growth theory predicts that an increase in the savings rate leads to an increase in economic growth through its positive effect on investment and capital accumulation (Barro and Sala-i-Martin, 1995). Ramsey's Optimal Growth Model posits that saving increases cause increases in national income and accelerate the investment process (Romer, 2006). Saving is not exogenous in this model; it is determined endogenously by the optimization behavior of households and firms (Singh, 2010). Increases in the capital stock can only cause economic growth in the short-run but its effect is negligible in the long-run (Romer, 2006).

Review of Empirical Studies on Savings and Growth

A number of studies have looked into the nexus between savings and economic growth in developed and developing countries (Bacha, 1990; Agrawal, 2000; Jangili, 2011; Misztal, 2011; Mohamed, 2014; Turan and Olesia, 2014; Hundie, 2014; Verma, 2017; Patra, et al., 2017; Siaw et al., 2017; Joseph et al., 2019: Ajisafe and Okunade, 2020). A handful of studies in Nigeria context have also intensely investigated the relationship between savings and economic growth in the last few decades as presented in Table 1. However, the literature is not substantial and results are mixed. Given that Nigeria is one of the oil-rich sub-Saharan African fastest growing economies, therefore, it was pertinent to re-examine this relationship in Nigeria using recent data and employing a Dynamic Ordinary Least Squares (DOLS) methodology which is a robust single equation approach that corrects for regressor endogeneity by the inclusion of leads and lags of first differences of the regressors, and for serially correlated errors by a generalized least squares (GLS) procedure.

By investigating the effect of gross domestic savings alongside domestic credit to private sector by banks, gross capital formation, and net foreign assets on economic growth in Nigeria

using Dynamic Ordinary Least Squares and Granger causality test, the study has filled a gap in the literature.

Table 1: Empirical Studies on Nigeria

Authors	Period	Scope	Method	Key Findings
Anoruo and Ahmad (2001)	1960 -1997	Congo, Cote d'Ivoire, Ghana, Kenya, Nigeria, South Africa and Zambia.	Granger causality Methodology	In their findings, it was established that savings in all the countries except Nigeria are co-integrated and that economic growth Granger-causes the rate of growth of domestic savings in all the countries except Congo. There was a bi-directional causality in Cote d'Ivoire and South Africa.
Abu (2010)	1970 – 2007	Nigeria	Cointegration and causality tests	The study reported the existence of long-run relationship and uni-directional relationship running from economic growth to saving
Udousoro, Eko, and Ubong (2013)	1980 to 2010	Nigeria	Trivariate dynamic Granger causality model	They found that growth-led savings is predominant for Nigeria. In other words, there is uni-directional causality between savings and growth in Nigeria.
Olayiwola et al. (2021)	(1981 to 1999) and (2000 to 2019)	Nigeria	Multivariate VECM Causality	In the short run, they discovered that there was no significant causal relationship between savings and growth during the pre-democracy period but there exists a unidirectional causality running from savings to growth in the post-democracy period. However, they found a bidirectional causal relationship between savings and growth in the long run for both pre- and post-democracy periods.
Nwonye et al. (2022)	2011 to 2020.	Nigeria	Panel Least Squares Method	The result of the analysis shows that total savings has positive and significant effect on the gross domestic product of Nigeria. It was also observed that private consumption expenditure has a negative and insignificant effect on the gross domestic product of Nigeria. The study further revealed

				that gross fixed capital formation has a negative and significant effect on the gross domestic product of Nigeria. It was also observed that core credit to the private sector has positive and significant effect on the gross domestic product of Nigeria.

Source: Compiled by the authors.

Methodology

Model Specification

According to the Solow hypothesis, savings are a determinant of economic growth. In this way, economic growth is the function of savings, which can be presented by the formula below:

$$Y = \tilde{\eta}_0 + S\tilde{\eta}_1 + \mu_t \quad \ldots\ldots\ldots (1)$$

where: S = savings; Y = economic growth; $\tilde{\eta}_0$ = free term in the equation; $\tilde{\eta}_1$ = economic growth to savings sensitivity coefficient; μ_t = random component.

On the basis of equation (1), other factors are incorporated to assess the relation between economic growth and savings in Nigeria. As such, taking logarithm of both sides, the underlying econometric model can be specified as:

$$InGDP_t = \tilde{\eta}_0 + \tilde{\eta}_1 InGDS_t + \tilde{\eta}_2 InDCPS_t + \tilde{\eta}_3 InGCF_t + \tilde{\eta}_4 InNFA_t + \mu_t \quad \ldots\ldots\ldots (2)$$

Where the subscript t denotes the studied time period and μ denotes the error-term. The parameters $\tilde{\eta}_0$ and $\tilde{\eta}_i$ (i= 1,…,4) are the intercept and the coefficients to be calculated. The dependent variable lnGDP refers to the natural logarithmic form of the gross domestic product (GDP) growth (annual %) of Nigeria (proxy for economic growth). It is the annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. GDP is used as a proxy variable to measure Nigeria's overall economic growth level.

The variable lnGDS stands for the natural logarithm of gross domestic savings measured in terms of % of GDP. Gross domestic savings are calculated as GDP less final consumption expenditure (total consumption). The sign of $\tilde{\eta}_1$ is expected to be positive.

The variable lnDCPS refers to the natural logarithmic form of the domestic credit to private sector by banks in Nigeria (% of GDP). It actually refers to financial resources provided to the private sector by other depository corporations (deposit taking corporations except central banks), such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. The sign of $\tilde{\eta}_2$ is expected to be positive.

The variable lnGCF denotes the natural logarithm form of gross capital formation which is measured in terms of % of GDP.GCF is a proxy for gross domestic investment. Gross capital

formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.$\tilde{\eta}_3$ is expected to portray a positive sign.

Finally, the variable lnNFA stands for natural logarithmic form of net foreign assets (NFA) which refers to the net amount of foreign assets that a country owns or the total value of a country's foreign assets minus the total value of assets within a country that are owned by foreigners. They indicate whether a country is a net creditor or a net debtor. The sign of $\tilde{\eta}_4$ is expected to be positive as trade openness may contribute positively to the economic growth process.

All the variables are used in natural logarithmic form to attain more accurate empirical results. Using this natural logarithmic form has some advantages than using the level form of variables. The data used in this study are totally secondary in nature. They are annual time series data from 1981 to 2020. The choice of the period is because of availability of statistical data. The data were sourced from Index Mundi.com and other internet sources. Figure 1 shows the time series plot of the variables.

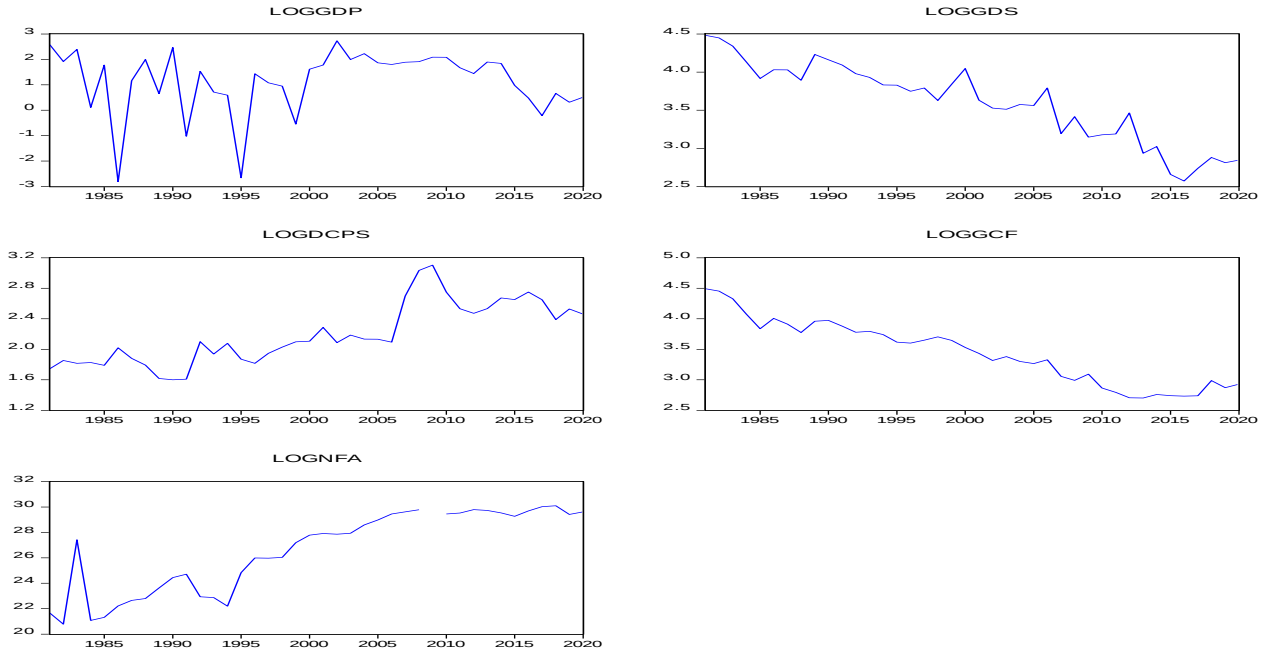


Figure 1: Time Series Plot of the Variables
Source: the authors.

Technique of Analysis

The econometric analysis starts with the identification of the stationarity of the considered variables in the econometric model. Stationarity (Unit root) test was done by using Augmented Dickey–Fuller (ADF) test (Dickey & Fuller, 1979). The testing procedure for the ADF test is:

$$\Delta_{yt} = \alpha + \beta t + p y_{t-1} + \delta_1 \Delta\gamma_1 + \ldots + \delta_{p-1}\Delta_{yt-p+1} + \varepsilon_t \quad \ldots\ldots\ldots\ldots (3)$$

Where α is a constant, β the coefficient on a time trend and the lag order of the autoregressive process. Imposing the constraints α =0 and β =0 corresponds to modelling a random walk and using the constraint β =0 corresponds to modeling a random walk with a drift.

Thereafter, Johansen cointegration test (Johansen, 1991) was applied to identify the long-run association among the variables. This is a procedure for testing cointegration of several, say k, I(1) time series. This test permits more than one cointegrating relationship so is more generally applicable. There are two types of Johansen test, either with trace or with eigenvalue, and the inferences might be a little bit different. The null hypothesis for the trace test is that the number of cointegration vectors is r = r* < k, vs. the alternative that r = k. Testing proceeds sequentially for r* = 1,2, etc. and the first non-rejection of the null is taken as an estimate of r. The null hypothesis for the "maximum eigenvalue" test is as for the trace test but the alternative is r = r* + 1 and, again, testing proceeds sequentially for r* = 1,2, etc, with the first non-rejection used as an estimator for r. Just like a unit root test, there can be a constant term, a trend term, both, or neither in the model. Furthermore, the study used Dynamic Ordinary Least Squares (DOLS) technique developed by Saikkonen (1992) and Stock and Watson (1993) to estimate the single cointegrating vector. This technique is a simple approach to constructing an asymptotically efficient estimator that eliminates the feedback in the cointegrating system. The method involves augmenting the cointegrating regression with lags and leads of ΔX_t so that the resulting cointegrating equation error term is orthogonal to the entire history of the stochastic regressor innovations:

$$y_t = X_t'\beta + D_{1t}'\gamma_1 + \sum_{j=-q}^{r} \Delta X_{t+j}'\delta + v_{1t} \qquad \text{.....(4)}$$

Under the assumption that adding q lags and r leads of the differenced regressors soaks up all of the long-run correlation between u_{1t} and u_{2t}.

Result and Discussion

The Augmented Dickey- Fuller unit root test was calculated for individual series to provide evidence as to whether the variables are stationary and integrated of the same order. The results of Augmented Dickey-Fuller (ADF) test for each variable appear in Table 6. The lag parameter in the ADF test is 9. It was automatically selected by Schwarz information criterion (SIC) to eliminate the serial correlation in residual. Included in the test equation was intercept (constant) on the basis of line plots of the variables in Figure 1. As shown in Table 5, the null hypothesis of a unit root can't be rejected for all series at 5% significance level. However, the unit root hypothesis is rejected for all variables in the first-differenced data. Therefore, we conclude that the series are integrated of order one. On that basis, a Johanson cointegration test is necessary to establish a long run relationship among the variables.

Table 2: ADF Unit root test.

Variable	Status	t-Statistic	Prob.*	Decision
lnGCF	Level	-1.908949	0.3249	
	First Difference	-6.798855*	0.0000	*I*(1)
lnGDP	Level	-2.054044	0.2636	
	First Difference	-4.571912*	0.0008	*I*(1)

InGDS	Level	1.253808	0.9979	
	First Difference	-6.050129*	0.0000	*I*(1)
InDCPS	Level	-1.632545	0.4568	
	First Difference	-5.401038*	0.0001	*I*(1)
InNFA	Level	-1.822697	0.3641	
	First Difference	-9.652450	0.0000	*I*(1)

Notes: ADF-Dickey DA, Fuller WA., (1979) unit root test with the Ho: Variables are I (1); *, ** and *** indicate significance at the 1%, 5% and 10% levels, respectively.
Source: the author

The null hypothesis of Johanson cointegration test states that Ho: no cointegration equation while H1:H0 is not true. This test was performed on the log transformation of the raw variables. Rejection criteria is at 0.05 level; Rejection of the null hypothesis is indicated by an asterisk sign (*); Reject the null hypothesis if the probability value is less than or equal to 0.05; Reject the null hypothesis if the Trace or Max-Eigen statistic is higher than the 0.05 critical value.

The result in Table 3 shows the outcome of the Johanson cointegration test. It reveals that the Trace and Maximum Eigenvalue statistics both reject the null hypothesis. This implies that there is long run relationship among the variables (cointegrated). Since the variables are cointegrated, they were represented equivalently in terms of a long run Dynamic Ordinary Least Squares (DOLS) framework.This methodology provides a check for the robustness of results and have the ability to produce reliable estimates in small sample sizes. The trend specification for this analysis included constant(level) and the results are presented on Table 4.

Table 3: Johanson Cointegration Test Result

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.745472	89.28261	69.81889	0.0007
At most 1	0.487367	41.39054	47.85613	0.1765
At most 2	0.247152	18.00372	29.79707	0.5658
At most 3	0.181467	8.067507	15.49471	0.4582
At most 4	0.029805	1.059034	3.841466	0.3034
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.745472	47.89207	33.87687	0.0006
At most 1	0.487367	23.38682	27.58434	0.1576
At most 2	0.247152	9.936217	21.13162	0.7507
At most 3	0.181467	7.008473	14.26460	0.4882
At most 4	0.029805	1.059034	3.841466	0.3034
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Compilation by the author

Given the major concern of this study which is to find the nature of relationship between savings and economic growth, the results of the DOLS estimation techniques for cointegrating regression show a positive relationship between InGDP and InGGDS. That means gross domestic savings is effective in enhancing the growth of gross domestic product in Nigeria. Specifically, a rise in gross domestic savings (InGDS) is found to increase the GDP growth level by 8.04%, on average, ceteris paribus and this result is statistically significant at 1% level of significance. Similar result was found from the study by Tang and Chau, 2009; Jagadeesh, 2015; Ribaj and Mexhuani, 2021; Olayiwola et al., 2021. Therefore, it can be inferred that the tendency of savings is important to the growth process of Nigeria. Thus, the importance of making these domestic savings into investment to increase the overall level of economic growth in Nigeria can be understood from these regression estimates.

A positive relationship between gross domestic investment (InGCF) and GDP growth reveal that gross domestic investment is effective in incrementing gross domestic product growth of Nigeria. The estimated elasticity value show that if gross domestic investment rises by 1%, it will increase GDP growth figure by 3.42%, on average, ceteris paribus. However, this result is statistically insignificant at any of the standard conventional significance levels. Therefore, InGCF is not conducive (is not a significant factor) in enhancing the economic growth of Nigeria. Meanwhile, Akinbiyi (2017) had reported that between 2007 and 2016, Nigeria's investment share of GDP declined from 18.7% to 12.6%, reaching the lowest level in the past two decades. In comparison to peers, Nigeria's investment rate lags the average of 23.3% recorded for sub Saharan African countries, and 28.9% for the BRICS (Brazil, Russia, India, China, and South Africa. Growth in Nigeria has been relatively strong at an average of 5.6% per annum over the past decade (Akinbiyi, 2017). However, this has been fueled by the oil boom and population expansion, rather than investments.

As depicted in Table 4, in addition, InGDCPS and InNFA both showed positive relationship with LOGGDP. The positive sign of the elasticity parameter attached to InGDCPS shows that domestic credit to private sector by banks in Nigeria positively contributes to the growth of domestic product of Nigeria. When InGDCPS rises by 1%, it leads to GDP rising by 8.71%, on average, ceteris paribus. According to Adegbesan (2022), banks' credit to the private sector of the economy rose Year-on-Year (YoY) by 33.7 percent to N35.3 trillion in November 2021 from N26.4 trillion in the corresponding period of 2020. The Vanguard findings from the Money Statistics Data of the Central Bank of Nigeria, CBN, show that net domestic credit also rose YoY by 36 per cent to N48.3 trillion in November 2021 from N35.5 trillion in 2020, signifying an uptick in economic activities. The CBN drive towards expanding bank credit to the economy sector resulted in its policy of increasing the loan to deposit ratio (LDR) to force banks to lend more to the private sector. Total credit to the private sector since it began this policy in March 2020 has increased tremendously (Adegbesan, 2022).

Finally, the elasticity value attached to InNFA reveal that, a 1% increase in net foreign assets (InNFA) increases GDP by 0.74%, on average, ceteris paribus. In addition, this result is statistically significant at 1% level. As reported by the International Monetary Fund, as of December 2020, Nigeria's foreign assets amounted to $102.15bn while its foreign liabilities stood at $187.36bn (Adenubi, 2021).

The obtained R-squared value of 0.626039 indicates that 62.6% variation in the dependent variable (lnGDPG) is explained by the considered explanatory variables: lnGDS, lnGCF, InDCPS, and InNFA. However, the R-squared value has not been able to explain more than 25% variation present in dependent variable. To further, confirm the robustness of the regression model, the Wald coefficient diagnostic test was conducted and results reported in Table 5. The Wald test null hypothesis is that the coefficients of interest are simultaneously equal to zero. The results in Table 4 shows a low probability values indicating that the null hypothesis that C(1)=0, C(2)=0, C(3)=0, C(4)=0, are strongly rejected. Since the test rejects the null hypothesis, this suggests that all the cointegrating regressor coefficient values are significant to the model fit.

Similarly, the residue diagnostic test is reported in Table 6. The correlogram shows the autocorrelation and partial autocorrelation functions of the residuals, together with the Ljung-Box Q-statistics for high-order serial correlation. If there is no serial correlation in the residuals, the autocorrelations and partial autocorrelations at all lags should be nearly zero, and all Q-statistics should be insignificant with large p-values. Nonetheless, the correlogram in Table 6 has spikes at lags up to one, three, four, five and at lag nine. The Q-statistics are significant at these lags, indicating significant serial correlation in the residuals.

Also, normality test was deployed for the diagnostic test of the residual distribution. The necessary information are shown on the histogram in Figure 2. The interest is in the value of the Jarque-Bera probability value in the figure. As a rule of thumb, if the p-value of JB is greater than five percent, we reject the null hypothesis and accept the alternative hypothesis. In this case, the probability value is 0.817457 which is greater than 0.05. The result indicates that the residual distributions are normally distributed.

Table 4: Dynamic Least Squares (DOLS) Estimates (Long Run)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnGDS	8.034547	2.031201	3.955565	0.0011
lnGCF	3.423410	2.282314	1.499973	0.1531
lnDCPS	8.713062	3.419977	2.547696	0.0215
lnNFA	0.737246	0.167642	4.397754	0.0004
C	-77.18245	19.27753	-4.003752	0.0010
R-squared	0.626039	Mean dependent var		1.003391
Adjusted R-squared	0.252078	S.D. dependent var		1.303867
S.E. of regression	1.127616	Sum squared resid		20.34430
Long-run variance	0.611615			

Source: Computation by the author

Table 5: Wald Test

Test Statistic	Value	Df	Probability
F-statistic	9.288130	(4, 16)	0.0004
Chi-square	37.15252	4	0.0000

Source: Computation bythe author

Table 6: Correlogram- Q-statistics

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.**| . |	.**| . |	1	-0.320	-0.320	3.7033	0.054
. |*. |	. | . |	2	0.111	0.010	4.1638	0.125
.**| . |	.**| . |	3	-0.299	-0.291	7.6143	0.055
. |** |	. | . |	4	0.223	0.055	9.6007	0.048
. *| . |	. *| . |	5	-0.170	-0.096	10.787	0.056
. | . |	. *| . |	6	-0.015	-0.196	10.797	0.095
. *| . |	. *| . |	7	-0.076	-0.085	11.053	0.136
. | . |	. *| . |	8	0.012	-0.152	11.059	0.198
. | . |	. *| . |	9	-0.026	-0.133	11.092	0.269
. | . |	. *| . |	10	0.016	-0.082	11.105	0.349
. | . |	. | . |	11	0.039	-0.059	11.185	0.428
. | . |	. | . |	12	0.065	0.014	11.419	0.493
. | . |	. | . |	13	0.003	-0.008	11.420	0.576
. | . |	. | . |	14	-0.026	-0.056	11.462	0.649
. | . |	. *| . |	15	-0.062	-0.110	11.712	0.701
. | . |	. | . |	16	0.042	-0.039	11.834	0.755

Source: Computation by the author

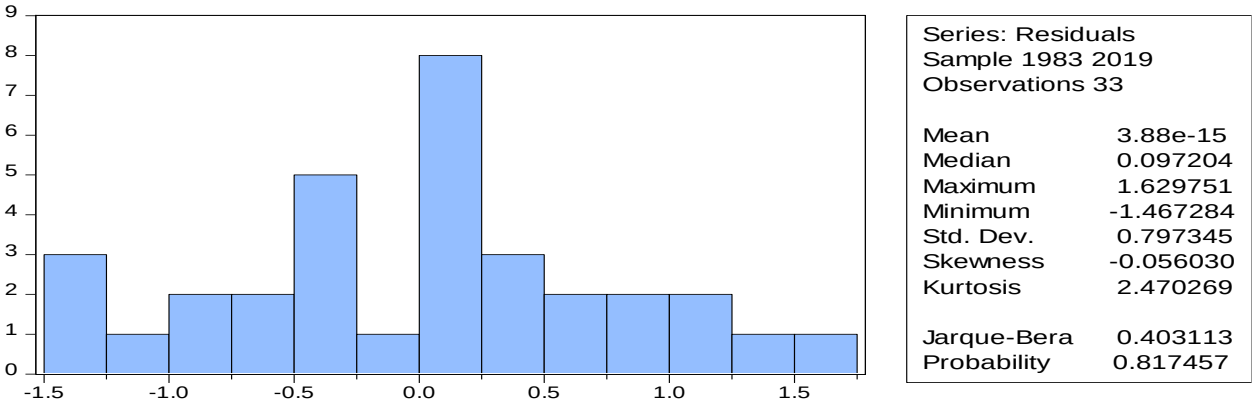


Figure 2: Normality Test
Source: The author

Finally, to explore the causal relationships among the considered variables in the context of Nigeria, Pair Granger causality analysis was conducted. It must be emphasized that Pairwise Granger causality does not mean causation; rather, it indicates that there is correlation between the past values of one variable the present values of another. The null hypothesis for the test is that lagged x-values do not explain the variation in y. In other words, it assumes that x(t) doesn't Granger-cause y(t). The findings from the causality analysis are summarized in Table 6. No causality was found between InGDS and InGDP; no causality was found between InDCPS and InGDP; no causality was found between InGCF and InGDP; no causality was found between InNFA and InGDP; and no causality was found between InDCPS and InGDS. However, the statistical significance of the F-statistics confirms unidirectional causalities stemming from InGCF to InGDS; the F-statistics also reveals a unidirectional casual nexus between InNFA and InGDS. Similarly, it runs from InNFA to InGDS. Lastly, unidirectional causality also runs from InNFA towards InGCF.

Table 6: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
lnGDS does not Granger Cause lnGDP	38	0.47055	0.6288
lnGDP does not Granger Cause lnGDS		0.55895	0.5771
lnDCPS does not Granger Cause lnGDP	38	0.32156	0.7273
lnGDP does not Granger Cause lnDCPS		0.33076	0.7207
lnGCF does not Granger Cause lnGDP	38	0.21419	0.8083
lnGDP does not Granger Cause lnGCF		0.94455	0.3991
lnNFA does not Granger Cause lnGDP	35	1.04774	0.3632
lnGDP does not Granger Cause lnNFA		0.03939	0.9614
lnDCPS does not Granger Cause lnGDS	38	1.38935	0.2634
lnGDS does not Granger Cause lnDCPS		0.54362	0.5858
lnGCF does not Granger Cause lnGDS	38	3.15940	0.0555**
lnGDS does not Granger Cause lnGCF		0.75183	0.4794
lnNFA does not Granger Cause lnGDS	35	2.71497	0.0825***
lnGDS does not Granger Cause lnNFA		0.91744	0.4105
lnGCF does not Granger Cause lnDCPS	38	3.21112	0.0532**
lnDCPS does not Granger Cause lnGCF		2.45938	0.1010
lnNFA does not Granger Cause lnDCPS	35	4.41162	0.0209**
lnDCPS does not Granger Cause lnNFA		1.00559	0.3778
lnNFA does not Granger Cause lnGCF	35	5.51049	0.0092*
lnGCF does not Granger Cause lnNFA		1.25388	0.2999

Note: ***** ,**and *** denote the statistical significance of the estimated F-statistic at 1%, 5% and 10% levels of significance, respectively.
Source: Compiled by bthe author

Summary, Conclusion and Suggestions

Saving is important to the economic progress of a country because of its relation to investment. In the traditional literature, savings increases lead to economic growth. Although, this relationship has been analyzed in many studies, but this study focused on Nigeria which is one of the fastest growing economies in West Africa. The aim is to find out whether the impressive economic growth recorded in Nigeria is partly a result of increase in savings or not. In the course of this study, causality test was performed to ascertain if there is any causality between savings and economic development in Nigeria. The study used annual time series data during the period 1981-2020 and deployed dynamic ordinary least squares (DOLS) to provide estimates for the relationship as well as Granger causality to ascertain the direction of causality.

The results of the DOLS estimation techniques for cointegrating regression show a positive relationship between gross domestic savings (InGDS) and gross domestic product

growth (InGDP). That means gross domestic savings is effective in enhancing the growth of gross domestic product in Nigeria. The results supported the neoclassical viewpoint that saving rate is positively or directly related to the GDP. However, the Pairwise Granger Causality Tests showed no causality between them (InGDS and InGDP). Similarly, no causality was found between InDCPS and InGDP; no causality was found between InGCF and InGDP; no causality was found between InNFA and InGDP; and no causality was found between InDCPS and InGDS. On the contrary, However, unidirectional causalities were shown to stem from InGCF to InGDS, from InNFA to InGDS, and from InNFA to InGCF.

Furthermore, the DOLS estimates showed a positive and insignificant relationship between gross domestic investment (InGCF) and GDP growth. On the other hand, domestic credit to private sector by banks in Nigeria (InGDCPS) and net foreign assets (InNFA) both showed positive significant relationship with InGDP.

The bottom line in this study is that savings positively influences economic growth in Nigeria as such policy makers in the country need to stimulate savings in order to further increase economic growth. However, since saving includes both private and public savings, and public savings largely depend on oil revenues, conditions should be improved to encourage the private sector to increase savings. The demands for public sector spending are very large in Nigeria, so public savings are minimal. Private savings is the only feasible means for providing investment funds. In that regard, policy makers and the government should encourage the integration of the formal and informal sectors as this would have a strong positive impact on domestic savings. Deposit money banks and the monetary authority should evolve policies aimed at reaching the unbanked informal sector agents, especially the rural households and the urban informal production units. This will deepen the financial sector and assist in mobilizing the much needed savings that will engender investment and growth in Nigeria.

In addition, more encouragement should be made by the relevant authorities to increase access to domestic credit to private sector by banks in Nigeria in the long run. Such policies should include development of modern banking sector, efficient financial market, infrastructure so as to increase private sector credit and public sector credit. In the same vein, policies should be pursued to reduce real interest rate so as to increase private sector investment.

Lastly, it is pertinent to note that even though this study has concentrated on Nigeria, its results can be applied to other African countries not previously studied. They contain some valuable lessons for informing policy measures in the current thrust towards greater mobilization of investment and encouraging savings in the African continent.

References

Abu, N. (2010). Saving–Economic Growth Nexus in Nigeria, 1970–2007: Granger Causality and Co-integration Analyses. Review of Economic and Business Studies, 3(1), 93–104.

AbuAl-Foul, B. (2010). The Causal Relation between Savings and Economic Growth: Some Evidence from MENA Countries. Paper Presented at the 30th Annual Meeting of the MEEA, Atlanta, GA, January, 2010.

Adegbesan, E. (2022). Banks' Credit to Private Sector Rises 33% to N35trn. https://www.vanguardngr.com/2022/01/banks-credit-to-private-sector-rises-33-to-n35trn/

Adeleke, A. M. (2014). Saving–Growth Nexus in an Oil-Rich Exporting Country: A Case of Nigeria. Management Science and Engineering, 8(3), 72–78.

Adenubi, D. (2021). Nigeria Recorded $85.21bn Net Foreign Liabilities – IMF. https://punchng.com/nigeria-recorded-85-21bn-net-foreign-liabilities-imf/

African Development Bank (ADB). (2014). African Statistical Yearbook, African Development Bank Group. Retrieved 7 April 2016, from www.afdb.org

Agrawal, P. (2000). Savings, Investment and Growth in South Asia, Mimeo. Indira Gandhi Institute of Development Research, Mumbai.

Ajisafe, R.A., and Okunade, S.O. (2020). International Capital Inflow and Sub-Saharan African economy: Does Capital Inflow Lead Growth? Growth, 7(1), 26-34.

Akinbiyi, A. (2017). Boosting Investments: Nigeria's Path to Growth. https://www.proshareng.com/news/Nigeria%20Economy/Boosting-Investments--Nigeria-s-path-to-growth/35574

Anoruo, E., and Ahmad, Y. (2001). Causal Relationship between Domestic Savings and Economic Growth: Evidence from Seven African Countries, African Development Bank, Blackwell publisher, Oxford.

Bacha, E. L. (1990). A Three-Gap Model of Foreign Transfers and the GDP Growth Rate in Developing Countries, Journal of Development Economics, 32(1), 279-296.

Barro, R. J., and X., Sala-i-Martin (1995).Economic Growth. New York: McGraw-Hill.

Dickey, D.A., and Fuller, W.A. (1979) Distribution of the Estimators for Autoregressive Time Series with a Unit Root. Journal of the American Statistical Association, 47, 427-431.

Domar, E. D. (1946). Capital Expansion, Rate of Growth, and Employment. Econometrica, 14(1), 137–147.

Harrod, R. F. (1939). Toward a Dynamic Economic Growth. London: Macmillan and Co.Ltd.

House, R. (2006). "Random House Unabridged Dictionary." Random House, 2006 Encyclopedia Britannica (2022). Saving (economics). https://www.britannica.com/topic/saving

Hundie, S. K. (2014). Saving, Investment and Economic Growth in Ethiopia: Evidence from ARDL Approach to Cointegration and TYDL Granger Causality Test. Journal of Economics and International Finance, 6(10), 232–248.

IMF (2012). Statistics on the Growth of the Global Gross Domestic Product (GDP) from 2003 to 2013. https://www.statista.com/statistics/273951/growth-of-the-global-gross-domestic-product-gdp/

Jagadeesh, D. (2015). The Impact of Savings in Economic Growth: An Empirical Study Based on Botswana. International Journal of Research in Business Studies and Management, 2(9), 10-21.

Jangili, R., (2011). Causal Relationship between Saving, Investment and Economic Growth for India? What does the Relation Imply? MPRA Paper 40002, University Library of Munich, Germany.

Joseph, K. E., Olayiwola, A. S., and Yinusa, D. O (2019). Capital Inflow, Manufacturing Export and Economic Growth: A Threshold Regression Analysis. Journal of Economics and International Finance. 11(5), 52-59. https://doi.org/10.5897/JEIF2019.0982

Johansen, S. (1991). "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models". Econometrica, 59 (6),1551–1580.

King, R. G., and Levine, R. (1994). Capital Fundamentalism, Economic Development, and Economic Growth. Carnegie-Rochester Conference Series on Public Policy, 40(1), 259–292.

Lewis, W. A. (1955). Theory of Economic Growth. London: Allen and Unwin, Ltd.

Masih, L., and Peters, M. (2010). A Revisitation of the Savings–Growth Nexus in Mexico.

Economics Letters, 107(2010), 318–320.

Misztal, P. (2011). The Relationship between Savings and Economic Growth in Countries with Different Level of Economic Development. eFinance Financial Internet Quartely, 7(2), 17-29.

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.

Nigeria High Commission (2022). Economy Overview. https://www.nigeriahc.org.uk/economy

Nwonye, N. G., Ihegboro, I. M., Onah, V.C., and Ijeoma, O. (2022).Growth Impact of Savings on the Nigerian Economy. European Journal of Economic and Financial Research, 6 (1), 1-19

Odhiambo, N. M. (2014). Electricity Consumption, Exports and Economic Growth in the Democratic Republic of Congo: An ARDL–Bounds Testing Approach. Journal of Developing Areas, 48(4), 189–207.

Olayiwola, A. S., Okunade, S. O. , and Fatai, M. O. (2021).Savings-Growth Nexus Revisited: An Empirical Analysis from Nigeria. African Journal of Economic Review, 9(4), 223-237.

Patra, S.K., Murthy, D.S., Kuruva, M.B., and Mohanty, A. (2017). Revisiting the Causal Nexus between Savings and Economic Growth in India: An Empirical Analysis. Economia, 18, 380–391.

Ribaj, A., and Mexhuani, F. (2021). The Impact of Savings on Economic Growth in a Developing Country (the Case of Kosovo). J Innov Entrep 10(1), 22-38. https://doi.org/10.1186/s13731-020-00140-6

Romer, P. M. (1986). Increasing Returns and Long-Run Growth. Journal of Political Economics, 94(5), 1002–1037.

Romer, D. (2006).Advanced Macroeconomics (3rd ed.). New York: McGraw-Hill.

Saikkonen, P. (1991). 'Asymptotically Efficient Estimation of Cointegration Regressions.' Econometric Theory, 7(1), 1–21.

Siaw, A., Enning, K.D., and Pickson, R.B. (2017). Revisiting Domestic Savings and Economic Growth Analysis in Ghana. Theoretical Economics Letters, 7(1), 1382-1397. https://doi.org/10.4236/tel.2017.75093

Singh, T. (2010). "Does Domestic Saving Cause Economic Growth? Time-Series Evidence from India,"Journal of Policy Modeling , 32(1) , 231–253.

Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. Quarterly Journal of Economics, 70(1), 65–94.

Stock, J. H., and Watson, M. W. (1993). A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems. Econometrica, 61(1), 783–820.

Tang, C. F., and Chau, S. Y. (2009). The Savings-Growth Nexus in Malaysia: Evidence from Non-parametric Analysis. The IUP Journal of Financial Economics, 7(3&4), 83–94. http://dx.doi.org/10.1080/00036846.2011.587784

Tradingeconomics.com (2022a). Nigeria GDP Annual Growth Rate. https://tradingeconomics.com/nigeria/gdp-growth-annual

Tradingeconomics.com (2022b). Nigeria - Gross Domestic Savings (% of GDP). https://tradingeconomics.com/nigeria/gross-domestic-savings-percent-of-gdp-wb-data.html

Turan, G., and Olesia, G. (2014). What is the Impact of Savings on Economic Growth? The Case of Small Open Economy in Albania. Mediterranean Journal of Social Sciences, 5(13),360-368.

Udousoro, L.E., Eko, S.A., and Ubong, U. (2013). “Dynamic Analysis of Savings and Economic Growth in Nigeria.” Journal of Agriculture and Social Research, 13 (2), 1–15.

United Nation (2015). MDG Task Force Group Report, 2015: Taking Stock of the Global Partnership for Development, United Nations Department of Economics and Social Affair, United Nations, New York.

Verma, R. (2017). Savings, Investment and Growth in India: An Application of the ARDL Bounds Testing Approach. South Asia Economic Journal, 8(1), 87-98.

Verhoef, G., Greyling, L., and Mwamba, J. (2014). Savings and Economic Growth: A historical Analysis of the Relationship between Savings and Economic Growth in the Cape Colony Economy, 1850–1909. Economic Research Southern Africa (ERSA), Working Paper 408.

World Bank (2013). World Development Indicators. World Bank

World Bank (2015). World Development Indicators. World Bank

World Bank (2016).World Development Indicator. Retrieved 17 March 2016, from www.data. worldbank.org