A Re-Examination Of The Savings-Growth Nexus In Nigeria

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Abstract

This paper empirically re-examines the relationship between savings and economic growth in Nigeria using Engle and Granger (1987) and Granger Causality tests. The study employs annual time series data spanning the period 1960-2010. The empirical results revealed that there is absence of long run relationship between savings and economic growth. In addition, the Pair wise Granger causality test results suggest neutrality hypothesis implying that neither savings nor economic growth granger causes each other in Nigeria thereby disputing Lewis's (1955) theory that higher savings lead to higher investment, which in turn leads to higher economic growth.

KEYWORDS: ***Economic Growth; Savings; Causality; Engle and Granger***

1. INTRODUCTION

The last few years have seen a revival of interest in the relationship between savings and economic growth in many developing countries and emerging economies.The thrust of these interests has been whether higher savings precedes economic growth or the reverse. This may not be unconnected with the postulate of Lewis's (1955) theory that higher savings lead to higher investment, which in turn leads to higher economic growth. The Harrod–Domar model proposed by Harrod (1939) and Domar (1946) postulates that saving as the major determinant of economic growth and suggests that the economic growth depends on the marginal propensity to save and capital-output ratio. The debates pertaining the temporal precedence between savings and economic growth is one of the most important issues that occupy the centre stage in the literature. The determination of causal flow between savings and economic growth is a crucial economic problem as it has important policy implications for developing countries (Alguacil *et al*., 2004).

A number of studies have been conducted on the relationship between savings and economic growth in Nigeria (see Adebiyi, 2005; Olajide, 2009; Abu, 2010; Adelekun, 2011; and Temidayo and Taiwo, 2011). Studies by Adebiyi (2005); Olajide (2009); Abu (2010); and Adelekun (2011) dealt with saving-growth nexus within the framework of Johansen cointegration technique and error correction model (ECM). However, these studies suffer from small sample size bias. As for Temidayo and Taiwo (2011) their tool of analysis is rather weak, just confined to descriptive and correlation analysis between savings and economic growth which does not indicate causation in any way. In its own right, this study is unique for it uses Engle and Granger residual-based test approach to cointegration and a longer period (1960-2010). It is against this backdrop that this study attempts to re-examine

the relationship between savings and economic growth via the application of Engle and Granger (1987) and Pair wise Granger causality test.

The rest of the paper is organized as follows. Section 2 presents a brief review of literature on the subject, section 3 describes the data and the methodology employed, section 4 presents the empirical results and analysis and section 5 reports the concluding remarks.

2. LITERATURE REVIEW

The relationship between savings and economic growth is widely studied in the literature using various statistical and econometric models. Though, the causal relationship between the two variables remains inconclusive, this is especially justified from an empirical stand point. For example, Tang (2009) investigated the causal relationship between savings and economic growth proxied by real GDP for quarterly data from Malaysia for the period 1991:Q1-2006:Q3 via the application of KPSS unit root test, conventional Granger causality test, Modified Sims test, Hsiao test, Multiple rank F-rank test, and Modified Wald (MWALD) test. The results of all the causality tests consistently revealed bidirectional causality between savings and economic growth. This invariably implies that using different causality test techniques for same data set may not produce different results. Similarly, Tang and Lean (2009) investigated the relationship between savings (disaggregated savings data into private savings, public savings, foreign direct investment, official long term capital and private short term capital) and economic growth over the period 19961-2000 and applied Autoregressive Distributed Lag (ARDL) technique and Variance Decomposition Analysis. The results evidenced long run relationship between savings and economic growth. The findings also suggest that economic growth in Malaysia is dominated by domestic savings.

Furthermore, Sinha and Sinha (1998) examined the relationship between savings and economic growth over the period 19960-1996 for Mexico and applied Multivariate Cointegration test and Multivariate Granger causality tests. Their results revealed that there is a long run positive relationship between savings and economic growth. The results of Granger causality test suggest that the growth of GDP Granger causes the growth of both private and public savings but there is not much evidence of reverse causality. However, the bivariate causality tests indicate that there is no causality flows in any direction. Employing same time series data for Mexico from 1970-2000 through the application of Toda and Yamamoto technique for Granger non-causality test to re-examine the causal flow between savings and economic growth, Maite *et al.* (2004) found that higher savings Granger caused higher economic growth. A more recent study by Masih and Peters (2010) also re-examined the savings-growth nexus in Mexico covering 1960-1996 using Johansen cointegration technique, Toda and Yamamoto causality technique and Generalized Variance Decomposition Analysis. The authors found a clear evidence of feedback long run relationship between public savings and economic growth. The results also showed evidence of public savings having leading information for private savings. However, no significant long run causality running from private savings to economic growth was observed.

Moreover, Pravakar *et al.*(2001) examined the causal relationship between savings and economic growth for India from the period 1951-51 to 1998-99. Engle Granger and Error Correction Model (ECM) in the presence of structural break are applied and their results

indicate that there is a long run relationship between savings and economic growth. The results further suggest unidirectional causal flow from economic growth to savings. This implies that increase in economic growth stimulates savings in the case of India. Another study by Singh (2010) further re-examined the relationship between domestic savings and economic growth for India from the period 1950-51 to 2001-02 via application of OLS-based two-step Cointegration estimator of Engle and Granger, Dynamic Least Square (DOLS), Fully Modified OLS (FOLS) and Non-linear Least Square (NNLS). The findings revealed a significant long run effect of savings on income. Causality test results suggest two-way causality relationship which implies that savings and income reinforce each other.

Moreover, Olajide (2009) investigated the direction of causal relationship among domestic income, domestic saving and foreign direct inflow through applying Toda and Yamamoto (1995) and Dolado and Lutkephohl (1996) techniques for the period 1970-2006. The results revealed a stable long run relationship between savings and economic growth. The results further indicate one-way causality running from savings to economic growth as well as foreign direct investment. Justifying the results obtained by Olajide (2009) on the basis of private savings and economic growth nexus for the period 1970-2007 Adelekun (2011) reports a stable long run relationship between private savings and economic growth for Nigeria.

Another recent study by Abu (2010) applied Johansen Cointegration test and Pair wise Granger causality test to investigate the relationship between savings and economic growth for the period 1970-2007. The Cointegration results revealed existence of long run equilibrium between savings and economic growth. Also, causality test suggests one-way causality running from economic growth to savings implying that it is economic growth that Granger caused savings in the Nigerian case. More recent study by Temidayo and Taiwo (2011), though, with just correlation coefficient and conclude a weak correlation between savings and economic growth.
Similarly, on the basis of time series data Morande (1998) conducted a study on the relationship between savings and economic growth over the period 1960-1995 and applying Johansen-Juselius, Engle and Granger Cointegration techniques and Variance Decomposition analysis for Chile, the results suggest that private savings are positively affected by economic growth and a dummy reflecting the effect of pension funds. The Error Correction Coefficient also suggest that most of the adjustment process between short run to long run will be completed within three years, while the variable representing income bears the bulk of such adjustment. Also, Odhiambo (2009) investigated the causal relationship between savings and economic growth over the period 1950-2005 and applied Cointegration-based error correction and trivariate causality test for South Africa. The results indicate bidirectional causality between savings and economic growth in the short run and unidirectional causality running from economic growth to savings in the long run. The results further suggest bidirectional relationship between capital inflow and savings, while causality runs from economic growth to foreign capital inflow.

In addition, Agrawal and Sahoo (2009) empirically examined the long run total private and private savings functions for Bangladesh for the period 1975-2004 via application of Autoregressive Distributed Lag (ARDL) bound test Error Correction Model (ECM) and

Forecast Error Variance Decomposition (FEVD) analysis. The ARDL bounds results revealed a stable and long run equilibrium among saving rate, economic growth, dependency rate, banking density, interest rate and foreign savings. The authors also showed directional causality between these variables. While, the FEVD justified the causality tests results. A recent study by Shahbaz and Khan (2010) was also conducted to investigate the long run equilibrium and direction of causality between savings and economic growth for Pakistan from the period 1971 to 2007 through applying Autoregressive Distributed Lag (ARDL) bounds test procedure, Johansen First Information Maximun Likelihood test to Cointegration and Toda and Yamamoto causality tests. Their results showed a long run relationship between economic growth and savings. The results revealed unidirectional causality running from economic growth to domestic savings using both Innovative Accounting and Toda and Yamamoto techniques.

However, the savings and economic growth nexus has also been justified on panel data For example, Ahmad *et al.*(2003) examined the long run relationship and direction of causality between savings and economic growth spanning from 1960 to 1997 in five Asian countries using Johansen and Juselius Cointegration technique and Granger causality test within the framework of Vector Error Correction Model (VECM). The authors found that foreign savings does not Granger cause gross domestic product (GDP) proxied for economic growth both in the short and long run. Similarly, savings does not Granger cause economic growth in all countries with exception of Singapore, and finally, the effect of interest rate on savings in countries under study is inconclusive. Moreover, Mohan (2006) conducted a study to investigate the savings and economic growth nexus for various countries (classified into Low-income, Low-middle income, Upper-middle income, and High-income groups) for the period 1960-2001. The author employed ADF unit root test, Johansen Cointegration technique and Granger causality tests. The results are varied, the overall findings revealed that the there exists unidirectional causality running from economic growth to savings in 13 countries. The results further indicate reverse causality from savings to economic growth for India and Singapore. The findings however, observed bidirectional causality for Malaysia, South Africa, Brazil, Argentina and Chile. A more recent study by Misztal (2011) using Engle and Granger Cointegration and Granger causality tests to analyze the relation between savings and economic growth in Advanced countries and in Developing and Emerging countries for the period 1980-2009. The results revealed the existence of unidirectional causal flow from gross domestic savings to gross domestic product for Developed countries as well as in Developing and Emerging countries. However, neutrality hypothesis was confirmed between gross domestic product and gross domestic savings for all the countries under study.

3. DATA AND METHODOLOGY

The study used annual data from 1960 to 2010. All data came from Central Bank Statistical Bulletin. Variables used in this study are LGNS (log of Gross National Savings) and LRGDP (log of Gross Domestic Product).

According to Misztal (2011), savings are a determinant of economic growth. In this way, economic growth is the function of savings, A reduced-form bi-variate model for the long-run effects of saving on economic growth can, thus, be specified as:

$$RGDP_t = \delta_0 + \delta_1 GNS_t + \varepsilon_t$$ ----------

where:
RGDP = real GDP proxied for economic growth,
GNS = gross national savings,
δ_0 = constant term in the equation,
δ_1 = slope coefficient,
ε_t = white noise disturbance term

Bivariate causal relationship between gross national savings and economic growth in Granger causality framework is carried out based on the premise that the variables are stationary at level denoted by I(0). If the variables are not stationary at their level value but stationary at their first difference denoted by I(I), the next step is to determine whether they are cointegrated. Should the variables not cointegrated, a practical solution is to examine the Granger causality test in log first differences of the variables as demonstrated by Pravakar *et al.* (2001).

$$RGDP_t = \sum_{i=1}^{a} \delta_1 RGDP_t + \sum_{i=1}^{a} \delta_2 GNS_t + \varepsilon_{1t} \text{ ----------} (3)$$

$$GNS_t = \sum_{i=1}^{a} \lambda_1 GNS_t + \sum_{i=1}^{a} \lambda_2 RGDP_t + \varepsilon_{2t} \text{ ----------} (4)$$

Where:
δ_0 , δ_1 , λ_1 and λ_2 are constant parameters, t stands for time, $\sum$ vector of the parameter, ε_{1t} and ε_{2t} are white noise disturbance terms.

Hence the first stage involves testing the order of integration using Phillips and Perron (1988) unit root test. Depending on the outcome of the tests, the second stage involves examining the cointegration relationship and Granger causality test. For this purpose, the study relied on a simple two-stage Engle and Granger cointegration approach and Pair wise Granger causality test.

4. EMPIRICAL RESULTS AND ANALYSIS

Prior to conducting cointegration and causality testing, it is important to determine the order of integration of the series in order to avoid spurious results. This is done using Phillips and Perron (1988) test and the results are presented in Table 1 below.

Table 1: Phillip-Perron Unit Root Test

Variable	Phillip-Perron (PP) test at Level	Phillip-Perron (PP) test at first Difference

RGDP	-1.041051	-6.406565***
GNS	0.575151	-6.127523***

Source: author's calculation using EVIEWS software, ***indicates level of significance at 1%

The results of the stationarity tests at level revealed that all variables are non-stationary at their level value. Having found that the variables are not stationary at level, the next step is to difference the variables once in order to perform stationary tests on differenced variables. The results of the stationarity tests on differenced variables are presented in Table 1. The results revealed that all the variables are stationary after differencing them once.

Table 2 : Unit Root for STATRESID

Variable	ADF test at Level
STATRESID	-1.213237*

Source: author's calculation using EVIEWS software.* indicates non stationarity at level

The Ordinary Least Square (OLS) is conducted by taken real GDP proxied for economic growth as dependent variable and the residual is generated and saved via equation (1). The unit root test on residual is conducted and Table 2 presents the results of cointegration between economic growth and savings. The results indicate that there exists no cointegration between economic growth and savings in Nigeria between 1960 and 2010.

In addition, the results of the Granger causality tests carried out based on the Pair wise approach to determine the direction of causal flow between savings and economic growth are presented in Table 3.

Table 3: Granger Causality Test

Null Hypothesis	Obs	Number of Lags	F-Statistic	P-value
GNS does not Granger Cause RGDP	49	2	1.03381	0.36412
RGDP does not Granger Cause GNS	49	2	0.30284	0.74024

Source: author's calculation using EVIEWS.

The results of Granger causality test are presented in Table 3. The results revealed that not only economic growth does not Granger cause savings but also that savings has no causal relation with economic growth. These results confirmed the Engle and Granger (1987) results of no cointegration between economic growth and savings in Nigeria.

5. CONCLUSION

The purpose of this study is to revisit the relationship between economic growth and savings in Nigeria spanning the period 1960-2010. For this reason, Engle and Granger (1987) residual based test approach to cointegration and Pair wise Granger causality test were applied. The results suggest that there exists no long run relationship between economic growth and savings in Nigeria. Further, the causality results justified the neutrality hypothesis that neither does economic growth Granger cause savings nor savings Granger

cause economic growth. Therefore, these results contradict the previous studies conducted on Nigeria. This may not be unconnected with the limitation of the bivariate framework that suffers from the variables omission bias.

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