Determinants of Private Saving in Nigeria

Tochukwu Nwachukwu

Abstract

This paper discusses the trend in Nigerian saving behaviour and reviews policy options to increase domestic saving. It also examines the determinants of private saving in Nigeria during the period covering 1970 – 2010. It makes an important contribution to the literature by evaluating the magnitude and direction of the effects of the following key policy and non-policy variables on private saving: Income growth, interest rate, fiscal policy, and financial development. The framework for analysis involves the estimation of a saving rate function derived from the Life Cycle Hypothesis while taking into cognizance the structural characteristics of a developing economy. The study employs the Error-Correction modelling procedure which minimizes the possibility of estimating spurious relations, while at the same time retaining long-run information. The results of the analysis show that the saving rate rises with both the growth rate of disposable income and the real interest rate on bank deposits. Public saving seems not to crowd out private saving; suggesting that government policies aimed at improving the fiscal balance has the potential of bringing about a substantial increase in the national saving rate. Finally, the degree of financial depth has a negative but insignificant impact on saving behaviour in Nigeria.

JEL Classification: E21
Keywords: Life Cycle; Saving; Nigerian Economy.

INTRODUCTION

Development economists have been concerned for decades about the crucial role of domestic saving mobilization in the sustenance and reinforcement of the saving-investment-growth chain in developing economies. For instance, Aghevli et al. (1990) found that the saving rate and investment in human capital are indeed closely linked to economic growth. The relationship among saving, investment and growth has historically been very close; hence, the unsatisfactory growth performance of several developing countries has been attributed to poor saving and investment. This poor growth performance has generally led to a dramatic decline in investment. Saving rates have not fared better, thus worsening the already precarious balance of payments position. In the same vein, attempts to correct external imbalances by reducing aggregate demand have

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led to a further decline in investment expenditure, thus aggravating the problem of sluggish growth and declining saving and investment rates (Khan and Villanueva, 1991).

The strong positive correlation which exists between saving, investment and growth is well established in the literature. The dismal growth record in most African countries, relative to other regions of the world has been of concern to economists. This is because the growth rate registered in most African countries is often not commensurate with the level of investment. In Nigeria for instance, the economy witnessed tremendous growth in the 1970s and early 1980s as a result of the oil boom. Following the oil boom, there was investment boom especially in the public sector. However, with the collapse of the oil market in the 1980s, investment fell, thereby resulting in a fall in economic growth.

Although a vast empirical literature has shed light on various aspects of saving behaviour, several crucial questions remain unanswered with regard to the relevance of policies in raising the saving rate vis-à-vis the non-policy determinants of saving. From the perspective of policies, there is need to know the following: What is the magnitude and direction of these variables on saving? How effective are growth-enhancing policies such as macroeconomic stability and higher income growth in raising the saving rate? What is the effectiveness of financial development in raising private saving? Is there a role for fiscal policy in increasing national saving? What is the impact of interest rate on total saving?

This article has two objectives. First it provides stylized facts about the trend of saving and its key determinants in Nigeria. Second, it evaluates the impact of the main determinants of saving identified in the literature on private saving in Nigeria.

This can only be achieved through a thorough time-series analysis of the determinants of saving through an appropriate interplay of qualitative and quantitative analysis of Nigeria’s policies and performance, with the view to building a strong empirical basis for informing policy debate. Country-specific studies of this sort are however few. Besides, the available ones are mired in controversy with regard to the magnitude and sign of the coefficients of the variables of interest.

To begin with, our question is inherently a time series one: how did saving change when each of its determinants changed? In addition, given that the variables of interest vary significantly over time, their time series provide a considerable wealth of information which is lost in cross-sectional averages. This article takes into cognizance the fact that the use of time series presents some problems for saving regressions. The effects of these variables on saving are likely to exhibit complicated dynamics, which may be obscured by temporal effects arising, for instance from the business cycle. For this reason, it employs the Error-Correction Methodology which has the ability to integrate
short-run dynamic and long-run equilibrium models in a unified system while at the same time ensuring theoretical rigor and data coherence and consistency.

The rest of the article is structured as follows: Section two carries out a detailed analysis of the trend of saving and its key determinants in Nigeria, including GDP growth rate, various interest rates and their spread, inflation rate and fiscal balance. The Life Cycle hypothesis, which is the theoretical underpinning of this paper, is the focus of section three. A brief review of empirical evidence is also carried out in this section. Section four outlines the methodology that was employed in the analysis. The data requirements are also highlighted in this section. Section five presents the results of both the long run and dynamic short run relationships of the saving function, while section six concludes the article.

TREND OF SAVING AND ITS DETERMINANTS IN NIGERIA (1970 - 2010)

Prior to the deregulation of the banking sector in the early 1990s, interest rates were administratively determined by the Central Bank. Both the deposit and lending rates were fixed by the CBN on the basis of policy decisions. At that time, the major goals were socially optimum resource allocation, promotion of orderly growth of the financial market, as well as reduction of both inflation and the internal debt service burden on the government.

During the period 1970 to 1985, the rates were unable to keep pace with prevailing inflation rate, resulting in negative real interest rates. Moreover, the performance of the preferred sectors of the economy was below expectation, thus, leading to the deregulation of interest rates in August 1987. This market-based system enabled banks to determine their deposit and lending rates according to the market conditions through negotiations with their customers.

However, the monetary policy rate (MPR) which is the central bank’s nominal anchor continued to be determined by the CBN. The lack of responsiveness of the structure of deposit and lending rates to market fundamentals makes the interest rate inefficient. The wide divergence between the deposit and lending rates (interest rate spread) is inimical to economic growth and development of the Nigerian economy. Between 1980 and 1984, interest rate differentials averaged 3.9 per cent. Even though this was reasonable within the accepted limit, the spread widened between 1985 and 1989, averaging 4.3 per cent per annum. This impacted negatively on the amount of loanable funds available to the private sector for investment.

The interest differential further widened to an average of 7.9 per cent between 1990 and 1994. Thereafter, the yearly interest rate spread maintained an upward trend, rising from 8.2 per cent in 1995 to 24.6 per cent in 2002, before declining to 20.35 per cent in 2010.
(see Figure 1). The widening gap between the deposit and lending rates reflects the prevailing inefficiencies in the Nigerian banking sector and has deterred potential investors from borrowing, and thus lowered the level of investment in the economy.

![Figure 1: Interest Rate Spread (in percent)](image1)


![Figure 2: Real Interest Rate (in percent)](image2)

Source: Same as under Figure 1

Figure 2 shows the interest rate figures in Nigeria between 1970 and 2010. A cursory look reveals that the prime lending rate was institutionally determined by the monetary authorities throughout the 1970s and the first half of the 1980s. However, with the
advent of the structural adjustment programme in the mid 1980s which brought with it a rash of financial sector reforms, Nigeria abandoned its fixed interest rate regime. This resulted in prime lending rate rising from 9.3 percent in 1985 to reach its peak of 29.8 percent in 1992. The figure has since hovered between 13.5 percent and 24.4 percent. It stood at 15.7 percent in 2010.

The real interest rate figures present an interesting picture. Between 1970 and 2010, the figure was negative 20 times, attaining positive figures on 21 occasions. The fixed interest rate regime of the 1970s and early 1980s no doubt contributed to this negative trend by leaving the interest rate at artificially low levels. For instance, in the first two decades (1970 to 1989) when the fixed regime dominated, real interest rate was negative 14 times and positive only 6 times. However, in the last two decades (1990 to 2010), when market forces took over, the real interest rate was negative on only 6 occasions. The inflation rate also played a very important role in making the real interest rate negative for most of the period. A cursory glance at figure 2 shows that the years when the real interest rate was negative usually coincided with those of double-digit inflation rates.

Figure 3 shows the other macroeconomic variables of interest, i.e. private saving rate, growth and fiscal balance. The Nigerian economy has witnessed several fluctuations in its chequered history, with economic growth fluctuating between 45 percent and -31 percent in the period between 1970 and 2010. In the 27 year period between 1974 and 2001, the economy experienced negative growth 14 times, while making a positive showing only 13 times. However, growth has been positive since 2002. Fiscal balance was even more troubling given that Nigeria experienced a budget surplus only six times
out of the 41 year period between 1970 and 2010. The State governments have been as culpable as the government at the centre, with each level seemingly competing to outspend the other.

Private saving witnessed much less volatility, with the variable recording no negative value in the 41 year period. The saving rate fluctuated between 6.0 percent and 9.9 percent between 1970 and 1979. These figures changed to 11.0 percent and 20.2 percent in the next decade. Between 1990 and 1999, the saving rate hovered between 5.0 percent and 12.4 percent, reaching an impressive range of between 7.0 percent and 23.3 percent in the period 2000 to 2009. The private saving rate stood at 23.3 percent in 2009.

A REVIEW OF THEORY AND EVIDENCE

MODIFIED LIFE CYCLE THEORY

The life-cycle hypothesis was formulated by Modigliani (1970) and is the principal theoretical underpinning that has guided the study of savings behaviour over the years. A critical analysis of this theory however shows that it seems to mirror what happens in developed economies with little or no regard to the peculiarities of developing countries like Nigeria. There are a number of reasons that make it imperative for saving behaviour in developing countries to be modelled separately from that in developed economies. First, at the microeconomic level, developing-country households tend to be large and poor. They have a different demographic structure, more of them are likely to be engaged in agriculture, and their income prospects are much more uncertain. The problem of allocating income over time thus looks rather different in the two contexts, and the same basic models have different implications for behaviour and policy.

Second, at the macroeconomic level, both developing and developed countries are concerned with saving and growth, with the possible distortion of aggregate saving, and with saving as a measure of economic performance. However, few developing countries possess the sort of fiscal system that permits deliberate manipulation of personal disposable income to help stabilize output and employment. Third, much of the literature in the last five decades expresses the belief that saving is too low, and that development and growth are impeded by the shortfall. Sometimes the problem is blamed on the lack of government policy, other times on misguided policy. Lastly, saving is even more difficult to measure in developing than in advanced economies, whether at the household level or as a macroeconomic aggregate. The resulting data inadequacies are pervasive and have seriously hampered progress in answering basic questions.

Given the above, and following Deaton (1989) and Nwachukwu and Odigie (2011), this paper appropriately modifies the life-cycle theory by developing a model of households which cannot borrow but which accumulate assets as a buffer stock to protect consumption when incomes are low. Such households dissave as often as they save, do
not accumulate assets over the long term, and have on average very small asset holdings. However, their consumption is markedly smoother than their income.

Our model diverges from the standard model in four important respects. First, households in developing countries tend to be larger than those in developed ones, and there is a greater tendency for several generations to live together. Such a household has no need for retirement saving because resources are shared between workers and dependents, and ownership is passed from parents to children.

Second, income derived from agriculture is inherently uncertain, an uncertainty that spreads from agriculture to related occupations and affects most of the population in predominantly agricultural economies. The poorer consumers are, the more risk averse they will be, with declining risk aversion having implications for the shape of the consumption function (see Zeldes, 1989, Kimball, 1990, and Skinner, 2007). The standard model in which consumption is equal to permanent income cannot be derived from utility maximization in such a context.

The third divergence from the standard model is the assumption that borrowing is not permitted. This is an extreme simplifying assumption, but more appropriate than it’s opposite, that households are free to borrow and lend at a fixed real interest rate. Borrowing constraints may be serious because in financially repressed economies, there may be no credit available to non-favoured borrowers. Besides, borrowing rates may be so much greater than lending rates that credit is only a last resort in dire emergency. Even where there are financial intermediaries, they may be unwilling to lend for consumption purposes to individuals who have no collateral or to lend across agricultural seasons rather than within them.

The fourth distinction is a consequence of the previous three. In the model developed here, saving provides a buffer between uncertain and unpredictable income and an already low level of consumption. Saving here is intertemporal smoothing saving, not life-cycle intergenerational saving. The analysis is different, and so are the welfare issues, which are focused on the protection of consumption, particularly among those whose consumption levels are not far above subsistence.

One of the most celebrated predictions of the lifecycle model is that there is a relation between aggregate saving and the rate of income growth. If saving is accumulated during the working years to finance retirement, then income growth provides more savers than dissavers, and positive aggregate saving. This is because workers are saving on a larger scale than the retirees are dissaving. However, even at the theoretical level, there are complications. If young consumers anticipate a steady increase in income, and borrow against that growth, their dissaving in the early years of the life cycle may induce a negative relation between saving and growth. The standard positive relation works best if
each worker experiences a stationary income stream over his or her own life cycle, with growth taking place between rather than within generations.

The crucial question is whether households really want to have flat consumption streams. Cautious young people may not want to borrow against future income growth, even if that growth is extremely likely. Old people also, faced with daunting uncertainties about health and death may not run down their assets in the prescribed manner (Deaton, 1989). The empirical evidence supports a positive effect of per capita income growth on saving rates (Gersovitz, 1988). However, the results are rarely well-determined and rely on how simultaneity between saving and growth are handled, and on the sample of selected countries.

The fundamental problem is the direction of causality: from growth to saving (according to the life-cycle theory) or from saving to growth? This problem is addressed by several authors with various instrumental variables. However, these efforts are hardly convincing in the absence of an adequate theory of growth. Summers and Carroll (1989) have authoritatively argued that, whatever produces the positive correlation between saving and growth, it cannot be life-cycle saving. They are of the view that the life-cycle explanation assumes common differences across countries, but that differences in economic growth generate differences in the relative lifetime economic standing of young and old in different countries.

Deaton (1989) provides evidence to the effect that the relative lifetime economic status of different age groups does not directly determine their current consumption levels. Given this, the standard explanation of life-cycle rate of growth, which is that younger cohorts are saving and consuming on a larger scale, simply breaks down. The reason is however, unclear because, even if the life-cycle model is false, there may be strong precautionary motives that prevent young consumers from borrowing against their expected future incomes.

In developed countries, concern about the nature of the consumption function has centred on its implications for government policy, in particular the extent to which short-term fiscal policy, by manipulating household disposable income, can affect consumption and thus the level of economic activity. If most of consumption is determined by permanent income, short-term fluctuations in income will have less effect on consumption than if liquidity is constrained for most consumers. Few developing countries have income tax systems that permit fine-tuning of disposable incomes. Nevertheless, fiscal arrangements have important effects on income fluctuations, the distribution of income, and the level of national saving.

In such a world, the government would have a custodial role both as guardian of future generations and as an insurance company, to protect farmer’s consumption against the
volatility of commodity prices (see Mirrlees, 1988). The custodial role for government was prominent in most of the development literature in the 1960s and 1970s, and is embedded in most of the standard cost-benefit procedures. However, a more sceptical attitude toward the ability of governments to handle these problems better than the private sector now prevails.

Following McKinnon (1973) and Shaw (1973), we argue that for the typical developing country, the net impact of a change in real interest rate on saving is likely to be positive. This is because, in the typical developing economy where there is no robust market for stocks and bonds, cash balances and quasi-monetary assets usually account for a greater proportion of household saving compared to that in developed countries (see Nwachukwu, 2009). In addition, in an environment where self-financing and bank loans constitute the major source of investment funds, accumulation of financial saving is driven mainly by the decision to invest and not by the desire to live on interest income. Given the peculiarities of saving behaviour, in addition to the fact that the bulk of saving comes from small savers, the substitution effect is usually larger than the income effect of an interest rate change.

Analytically, the effect of financial liberalization on private saving rates works through the expansion of the supply of credit to previously credit-constrained private agents. This allows households and small firms to use collateral more widely, and reduces down payments on loans for consumer durables and housing. The theoretical prediction therefore is that the expansion of credit should reduce private saving as individuals are able to finance higher consumption at their current income level (Nwachukwu, 2009).

**Empirical Evidence**

There is an abundance of empirical studies that deal with the impact of the different variables of interest on savings mobilization. Some authors have found a strong positive relationship between real per capita growth and saving rates (see for example, Bosworth, 1993; and Carrol and Weil, 1994; Nwachukwu and Odigie, 2011). However, its structural interpretation is controversial, since it is viewed both as evidence that growth drives saving (Carrol and Weil, 1994; and Kibet et al. 2009) and that saving drives growth through the saving-investment link (Levine and Renelt, 1992; Mankiw, Romer and Weil, 1992; and IMF, 2007).

Given the importance of controlling for the joint endogeneity of saving and income growth, a panel instrumental-variable approach to estimate the effect of income growth on saving was carried out by Loayza, Schmidt-Hebbel, and Serven (2000). They found that a one percentage point rise in growth rate increases the private saving rate by a similar amount, although this effect may be partly transitory. In their study, they utilized the world saving database, whose broad coverage makes it the largest and most systematic collection of annual time series on country saving rates and saving-related
variables, spanning 35 years (1960 – 1994) and 134 countries (112 developing and 12 industrial).

Obadan and Odusola (2001) employed both graphical analysis as well as Granger Causality tests to determine the impact of growth on saving. Their results revealed that growth of income does not Granger-cause saving, suggesting that saving is not income-induced in Nigeria. Evidence on the reverse causation argument also shows that saving does not Granger-cause growth. The findings therefore do not show any direct relationship between saving and income growth.

The seminal work in the early seventies of McKinnon (1973) and Shaw (1973) placed at the heart of the development debate the issue of financial and monetary policy. At the centre of the debate was interest rate policy which often resulted in the imposition of below market rates thereby creating a disincentive to save and retarding the process of financial deepening. The results were a shortage of investible resources and growth retardation. Several studies have been done of the McKinnon-Shaw Model. The empirical results have not provided a consensus on the validity of the model. Fry (1980), Watson (1992) and Sierminska and Takhtamanova (2007) have found some empirical support for the McKinnon-Shaw model.

One of the more innovative and interesting approaches to testing the McKinnon-Shaw hypothesis was that of Roubini and Sala-i-Martin (1992) who expanding on the growth model of Barro (1974), showed that financial repression, proxied by a dummy variable capturing three ranges of the real interest rate, has been a factor in the retarding growth in Latin America during 1960 to 1985. However, Giovanini (1985), Watson (1992) and Kulikov et al. (2007) have not found empirical support for McKinnon-Shaw hypothesis. Ajakaiye and Odusola (1995) utilized quarterly data for Nigeria from 1980 to 1993 to investigate the impact of the real interest rate on savings rate. Their results showed that the coefficient of real deposit rate was statistically insignificant even at 10 percent and was wrongly signed for one of the two interest rate regimes.

Loayza, Schmidt-Hebbel, and Serven (2000), found that a 1 percentage point increase in the ratio of private credit flows to income reduces the long-term private saving rate by 0.75 percentage point. Bandiera et al. (2000), on carrying out a deeper analysis of eight episodes of financial liberalization, failed to find a systematic direct effect on saving rate: it was positive in some cases (Ghana and Turkey), negative in others (Mexico and Korea), and negligible in the rest.

In another study, Loayza and Shankar (2000) found that financial development has induced private agents to change the composition of their assets to favour durable goods. This however, did not affect the total volume of saving once saving is measured to include durable purchases. This conclusion should lead to a reinterpretation of the
negative relationship between financial development and private saving. In addition, the indirect positive effects of financial liberalization on saving should not be overlooked. Liberalizing domestic financial markets improves the efficiency of financial intermediation and hence, investment, thus resulting in higher growth. The conclusion is that it is mainly through increased income growth that financial liberalization will increase private saving rates in the long run.

Essien and Onwioduokit (1998) employed the Error-Correction Methodology to examine the effects of financial development on savings mobilization in Nigeria. Their results reveal that there is no long-run equilibrium relationship between financial depth and domestic resource mobilization. Mwega (1997) conducted a comparative analysis of average private saving rates in 15 African countries for the period 1970-1993 and found a negative and highly significant coefficient on fiscal balance. Concretely, a 1 percent increase in government budget surplus was found to reduce the private saving rate by up to 0.9, implying full Ricardian Equivalence. The implication is that fiscal balance and private saving are perfect substitutes.

These studies however, have a number of shortcomings. To begin with, each of them focuses on only one of the determinants of saving. They therefore do not identify the determinants of saving and analyze their impact on the saving rate. In addition, the conclusion of Essien and Onwioduokit (1998) should be taken with a measure of caution. This is because the time span of their study is relatively short (1987-1993). It is therefore difficult to separate the effect of financial development from the effect of recovery and increased capital inflow to the economy, all of which were taking place concurrently. Our study will try to overcome this problem of simultaneity by using a longer time frame dating from 1970-2010.

In a bid to overcome some of these flaws, Chete (1999) evaluated the determinants of saving in Nigeria, using data from 1973 to 1993. He employed the Error-Correction Methodology and found that financial development and external debt had a negative significant relationship on private saving, while terms of trade changes and level of income had a positive significant impact on saving. On the other hand, real interest rate, inflation, public saving and dependency ratio were all insignificant in the regression. The main problem with his analysis is that there are too many explanatory variables (eight in all). In addition to the equation being over-determined, given the period of study and the methodology he utilized, there is also the problem of degrees of freedom.

A second shortcoming is that his period of analysis does not include the far reaching reforms that have been put in place since the distress in the financial sector in the 1990s and again in 2007 to 2009 which had catastrophic effects on domestic savings. These include the National Savings Certificate (2001), the new Pension Scheme (2004), the reforms in the banking sector (2004-2011), the reforms in the capital market and the
consolidation of the insurance sector. These two problems are taken care of in this study by using only four explanatory variables which were derived from the life-cycle framework. Besides, the period of study runs from 1970 to 2010 thus, adequately capturing the effects of all the above-mentioned reforms.

**METHODOLOGY**

The framework for this analysis is derived from the life-cycle model which is appropriately modified to accommodate the peculiarities of a developing country. It also builds on the existing cross-country literature on saving which quantifies the effects of a variety of policy and non-policy variables on private saving. Its flexibility makes it possible for other relevant theoretical considerations to be incorporated, thus forming an integrated analytical framework, without altering its fundamental structure. This framework makes a new contribution to the literature by employing time series data in evaluating the determinants of private saving in Nigeria between 1970 and 2010. It does this while explicitly addressing some of the econometric problems arising from the use of time-series data.

The Cointegration and Error-Correction Methodology is utilized in the study. This procedure involves first estimating the saving function in an unrestricted form, after which it is progressively simplified by restricting statistically insignificant coefficients to zero, until a parsimonious representation of the data generation process is obtained. The aim is to minimize the possibility of estimating spurious relations, while at the same time retaining long-run information. It achieves this by placing the relationship being investigated within a sufficiently complex dynamic specification. The major advantage of this methodology is that it yields an equation with a stationary dependent variable which also appropriately retains long-run information in the data. In applying this estimation technique, we set the initial lag length on all the variables in the unrestricted equation at one period. This is the maximum we can go given the need to preserve degrees of freedom.

The ECM is made up of models in both levels and differences of variables and is compatible with long-run equilibrium behaviour\(^\text{11}\). The steps that were followed are:

i) We studied the temporal characteristics of the variables in the saving function. This involved testing for unit roots for all time series variables in the model. The presence of a unit root implies that the series under investigation is non-stationary; while the

\(^{11}\text{The notion of an ECM is a very powerful organizing principle in applied econometrics and has been widely applied to such important problems in developing economies as Private Investment (Shafik, 1992 and Watson, 1992), Inflation (Downes et al, 1991) and Money Demand (Craigwell, 1991).}
absence of a unit root shows that the stochastic process is stationary. We employed both the Augmented Dickey-Fuller and the Phillips-Perron tests for this purpose.12

ii) We went on to formulate the static (long-run) theoretical relationship and tested for stationarity among non-stationary series of the same order. We explored the Johansen cointegration procedure, while relying on both the Trace and Maximum-Eigen statistics to determine the cointegration rank.13

iii) We estimated the Error-Correction or Dynamic (short-run) representation of the relationship and tested for the adequacy of the resulting equation. This short-run equation includes the lagged error term as a regressor. This acts to correct any deviations from long-run equilibrium. Specifically, if actual equilibrium value is too high, the error correction term will reduce it, while if it is too low, the error correction term will raise it.

Drawing from the analysis above on the life cycle framework, the following model was specified:

\[ PSR = \beta_0 + \beta_1 \text{GRCY} + \beta_2 \text{RIR} + \beta_3 \text{FB} + \beta_4 \text{DFD} + \epsilon \]

Where: \( \beta_1, \beta_2, \text{and} \beta_4 > 0, \text{while} \beta_3 < 0 \)

PSR = private saving rate
GRCY = growth rate of real per capita GNDI
RIR = real interest rate
FB = fiscal balance
DFD = degree of financial depth

The saving equation was estimated using annual data for the period 1970 - 2010. The estimation period was determined largely by the availability of adequate data on all variables. Below are the sources of each variable and how they were calculated where applicable:

**Private Saving Rate:** From Central Bank of Nigeria Statistical Bulletin 2009, CBN Annual Report and Statement of Accounts 2010 and International Financial Statistics Year book 2011 and 1999 published by the IMF. We defined Private Saving rate as the ratio of Private Saving to Gross National Disposable Income (GNDI), where Private Saving is GNDI less Household Consumption Expenditure, including Non-profit Institutions Serving Households (NPISHs). Household Consumption Expenditure, including NPISHs consists of the expenditure incurred by resident households and resident NPISHs on individual consumption goods and services. Thus, the private saving variable consists of savings by both households and firms.

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12 See Dickey and Fuller, 1981; Phillips and Perron, 1988
13 See Johansen, 1991
**Growth rate of real per capita GNDI:** From Central Bank of Nigeria Statistical Bulletin 2009, CBN Annual Report and Statement of Accounts 2010 and International Financial Statistics Yearbook 2011 and 1999 published by the IMF. Real per capita GNDI was obtained by adding Net Primary Income from Abroad to GDP in order to give GNI. When net Current Transfers from Abroad are added to this, we obtain GNDI. Deflating GNDI by the Consumer Price Index gave us real GNDI. Dividing this by the population gave us real per capita GNDI whose growth rate we then calculate. Note that Net Primary Income from Abroad is the difference between the total values of the Primary Incomes Receivable from and payable to non-residents. Net Current Transfers is the difference between all current transfers received by the Nigerian economy (except those made to the economy to finance its overall balance) and all current transfers paid by the Nigerian economy. Consumer Price Index reflects changes in the cost of acquiring a fixed basket of goods and services by the average consumer. Preference is given to series that have wider geographical coverage and relating to all income groups, provided they are no less current than more narrowly defined series. Data on population are provided by the Population Division of the Department of Economic and Social Affairs of the United Nations. These data represent mid-year estimates and are revised every two years.

**Real Interest Rate:** From Central Bank of Nigeria Statistical Bulletin 2009 and CBN Annual Report and Statement of Accounts 2010. Real Interest Rate is obtained by subtracting the inflation rate from the nominal interest rate on bank deposits. The nominal interest rate on bank deposits refers to rates offered to resident customers for demand, time, or savings deposits. The Real Interest Rate variable serves as the relative price of current consumption with respect to future consumption.

**Fiscal Balance:** From Central Bank of Nigeria Statistical Bulletin 2009 and CBN Annual Report and Statement of Accounts 2010. Fiscal Balance is the overall surplus or deficit of the federation as a percentage of GDP. This enables us to evaluate the Ricardian equivalence.

**Degree of Financial Depth:** This was calculated based on data obtained from the Central Bank of Nigeria Statistical Bulletin 2009, CBN Annual Report and Statement of Accounts 2010 and International Financial Statistics Yearbook 2011 and 1999. Degree of financial depth is proxied by ratio of broad money to GNDI.

**RESULTS AND DISCUSSION**

**DESCRIPTIVE STATISTICS**

The characteristics of the distribution of the variables are presented in Table 1 below. Evidently, the Jarque-Bera statistic rejects the null hypothesis of normal distribution for the real interest rate. On the contrary, the null hypothesis of normal distribution is
accepted for degree of financial depth, fiscal balance, income growth and private saving. The statistic for Kurtosis shows that growth of income is normally distributed. However, fiscal balance, private saving and real interest rate are leptokurtic, since their distributions are peaked relative to the normal. On the other hand, degree of financial depth is platykurtic, suggesting that its distribution is flat relative to the normal.

Lastly, the statistic for skewness shows that fiscal balance, income growth and private saving are positively skewed, implying that these distributions have long right tails. On the other hand, degree of financial depth and real interest rate are negatively skewed, meaning that the distributions have long left tails.

Table 1: Summary of the Descriptive Statistics of the Variables

<table>
<thead>
<tr>
<th></th>
<th>DFD</th>
<th>FB</th>
<th>GRCY</th>
<th>PSR</th>
<th>RIR</th>
</tr>
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<tbody>
<tr>
<td>Mean</td>
<td>24.24</td>
<td>-3.46</td>
<td>2.02</td>
<td>28.69</td>
<td>-5.31</td>
</tr>
<tr>
<td>Median</td>
<td>24.00</td>
<td>-3.50</td>
<td>3.00</td>
<td>26.00</td>
<td>-0.60</td>
</tr>
<tr>
<td>Maximum</td>
<td>35.00</td>
<td>9.80</td>
<td>45.00</td>
<td>65.00</td>
<td>18.00</td>
</tr>
<tr>
<td>Minimum</td>
<td>12.00</td>
<td>-11.10</td>
<td>-31.00</td>
<td>-0.60</td>
<td>-52.60</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>6.39</td>
<td>4.29</td>
<td>17.84</td>
<td>12.79</td>
<td>16.01</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.07</td>
<td>0.52</td>
<td>0.48</td>
<td>0.56</td>
<td>-1.05</td>
</tr>
<tr>
<td>Kurtosis</td>
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<td>4.01</td>
<td>3.33</td>
<td>4.05</td>
<td>3.74</td>
</tr>
<tr>
<td>Jarque-Bera</td>
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<td>3.24</td>
<td>1.61</td>
<td>3.65</td>
<td>7.61</td>
</tr>
<tr>
<td>Probability</td>
<td>0.46</td>
<td>0.20</td>
<td>0.45</td>
<td>0.16</td>
<td>0.02</td>
</tr>
<tr>
<td>Sum</td>
<td>897.00</td>
<td>-127.99</td>
<td>74.70</td>
<td>1061.40</td>
<td>-196.40</td>
</tr>
<tr>
<td>Sum Sq. Dev.</td>
<td>1472.81</td>
<td>661.12</td>
<td>11459.88</td>
<td>5886.52</td>
<td>9229.21</td>
</tr>
<tr>
<td>Observations</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
<td>37</td>
</tr>
</tbody>
</table>

**RESULTS OF STATIONARITY TESTS**

The time series behaviour of each of the series using the Augmented Dickey-Fuller and Phillips-Perron tests are presented in Tables 2 and 3, respectively. The results show that while the private saving rate (PSR), growth rate of real per capita GNDI (GRCY) and fiscal balance (FB) are I(0) variables (stationary before differencing), real interest rate (RIR) and the degree of financial depth (DFD) are I(1) variables (stationary after first differencing). This is deduced from the fact that the absolute values of both the ADF and PP test statistics of RIR, GRCY and FB before differencing are greater than the absolute value of the critical values at the 1 percent significance level. For the other variables, this is the case after differencing once.
Table 2: Results of Augmented Dickey Fuller (ADF) Unit Root Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF Value before Differencing</th>
<th>ADF Value After Differencing</th>
<th>Critical Value</th>
<th>Level of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSR</td>
<td>-3.657*</td>
<td>n.a</td>
<td>3.621</td>
<td>I(0)</td>
</tr>
<tr>
<td>GRCY</td>
<td>-5.068*</td>
<td>n.a</td>
<td>3.627</td>
<td>I(0)</td>
</tr>
<tr>
<td>RIR</td>
<td>-3.204</td>
<td>-6.275*</td>
<td>3.621</td>
<td>I(1)</td>
</tr>
<tr>
<td>FB</td>
<td>-4.450*</td>
<td>n.a</td>
<td>3.621</td>
<td>I(0)</td>
</tr>
<tr>
<td>DFD</td>
<td>-1.979</td>
<td>-5.784*</td>
<td>3.621</td>
<td>I(1)</td>
</tr>
</tbody>
</table>

Notes: * denotes significant at 1 percent; the null hypothesis is that there is a unit root. n.a = not applicable

Table 3: Results of Phillips-Perron (PP) Unit Root Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>PP Value Before Differencing</th>
<th>PP Value After Differencing</th>
<th>Critical Value</th>
<th>Level of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSR</td>
<td>-3.683*</td>
<td>n.a</td>
<td>3.621</td>
<td>I(0)</td>
</tr>
<tr>
<td>GRCY</td>
<td>-5.019*</td>
<td>n.a</td>
<td>3.627</td>
<td>I(0)</td>
</tr>
<tr>
<td>RIR</td>
<td>-3.045</td>
<td>-13.017*</td>
<td>3.621</td>
<td>I(1)</td>
</tr>
<tr>
<td>FB</td>
<td>-4.405*</td>
<td>n.a</td>
<td>3.621</td>
<td>I(0)</td>
</tr>
<tr>
<td>DFD</td>
<td>-2.047</td>
<td>-5.784*</td>
<td>3.621</td>
<td>I(1)</td>
</tr>
</tbody>
</table>

Notes: Same as under Table 2 above

**COINTEGRATED MODELS**

Johansen’s test was carried out to check if the saving equation is cointegrated. Table 4 shows that both the Trace and Maximum Eigen statistics rejected the null of no cointegration at the 5 percent level; while Trace test indicated that there are two cointegrating equations at the 5 percent level; Maximum Eigen test indicated only one cointegrating equation at the 5 percent level. The implication is that a linear combination of all the five series was found to be stationary and thus, are said to be cointegrated. In other words, there is a stable long-run relationship between them and so we can avoid both the spurious and inconsistent regression problems which otherwise would occur with regression of non-stationary data series.
Table 4: Johansen’s Cointegration Test Results

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Alternative Hypothesis</th>
<th>Eigenvalue</th>
<th>Critical Value 95%</th>
<th>Critical Value 99%</th>
<th>Alternative Hypothesis</th>
<th>LR Ratio</th>
<th>Critical Value 95%</th>
<th>Critical Value 99%</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r = 0$</td>
<td>$r = 1$</td>
<td>39.79*</td>
<td>37.52</td>
<td>42.36</td>
<td>$r \geq 1$</td>
<td>108.69**</td>
<td>87.31</td>
<td>96.58</td>
</tr>
<tr>
<td>$r \leq 1$</td>
<td>$r = 2$</td>
<td>31.30</td>
<td>31.46</td>
<td>36.65</td>
<td>$r \geq 2$</td>
<td>68.90*</td>
<td>62.99</td>
<td>70.05</td>
</tr>
<tr>
<td>$r \leq 2$</td>
<td>$r = 3$</td>
<td>18.02</td>
<td>25.54</td>
<td>30.34</td>
<td>$r \geq 3$</td>
<td>37.60</td>
<td>42.44</td>
<td>48.45</td>
</tr>
<tr>
<td>$r \leq 3$</td>
<td>$r = 4$</td>
<td>16.09</td>
<td>18.96</td>
<td>23.65</td>
<td>$r \geq 4$</td>
<td>19.58</td>
<td>25.32</td>
<td>30.45</td>
</tr>
<tr>
<td>$r \leq 4$</td>
<td>$r = 5$</td>
<td>3.49</td>
<td>12.25</td>
<td>16.26</td>
<td>$r \geq 5$</td>
<td>3.49</td>
<td>12.25</td>
<td>16.26</td>
</tr>
</tbody>
</table>

Notes: * denotes significant at the 5% level
** denotes significant at the 1% level

LONG-RUN MODEL

We now present the results for the long run relationship.

PSR = +0.4013 +0.5016GRCY +0.0028RIR -0.0190FB -0.1226DFD
(3.346)** (2.233)* (3.769)** (0.459)

As postulated by our modified version of the lifecycle hypothesis, the income growth variable (GRCY) is an important determinant of the private saving rate. The coefficient of GRCY is both positively signed and statistically significant at the 1 percent level. An increase in the growth rate by one percent leads to a long-run increase in the saving rate by 0.5 percent. These results are in line with those obtained by Modigliani (1970), Maddison (1992), Bosworth (1993) and Carroll and Weil (1994). Thus, as the incomes of private agents grow faster, their saving rate increases. This is consistent with the existence of consumption habits and our modified version of the Lifecycle model. The implication is that any policy that encourages income growth in the long run will have a strong impact on private saving rate. Given the historical close link between saving and investment rate, a rise in growth rate will lead to a virtuous cycle of higher income and saving rates.

The result for the real interest rate variable suggests that the real rate of return on bank deposits has a statistically significant positive effect on saving behaviour in Nigeria. A one percent increase in RIR is associated with a 0.003 percentage point increase in the private saving rate. This finding is consistent with the McKinnon-Shaw proposition which states that, in an economy where the saving behaviour is highly intensive in money and near-money assets, the direct incentive effect of high real interest rates on saving behaviour (i.e. the income effect) generally overwhelms the substitution of other assets for financial assets in response when faced with such interest rate changes (i.e. the substitution effect). The implication is that government should find an effective
mechanism for increasing the abysmally low interest rate on bank deposits if the present crusade to increase the private saving rate is to achieve any measure of success.

The result for fiscal balance points to a significant substitutability between public and private saving in the Nigerian context. However, there is no support for full Ricardian equivalence, which predicts full counterbalancing of public saving by private dis-saving. Specifically, an improvement in the fiscal balance by one percent is associated with 0.019 percentage point reduction in the private saving rate. The rather weak private saving offset to changes in the fiscal balance behaviour may be explained by substantial uncertainty in the economy, widespread liquidity (or wealth) constraints, tax-induced distortions and limits in households’ attempts to smooth consumption over time. Thus in the Nigerian context, policies geared towards improvement in fiscal balance have the potential of bringing about a substantial net increase in total domestic saving. This finding is consistent with cross-country results of Corbo and Schmidt-Hebbel (1991) and those of Athukorala and Sen (2004) for India.

The degree of financial depth failed to attain statistical significance in the saving function. Thus, there is no empirical support for the view that the development of the financial sector has contributed to the growth in private saving. The implication is that financial deepening may not bring about an automatic improvement in the saving rate.

**DYNAMIC ERROR-CORRECTION MODEL**

Having identified the cointegrating vector using Johansen, we proceed to investigate the dynamics of the saving process. Table 5 reports the final parsimonious estimated equation together with a set of diagnostic statistics. The estimated saving function performs well by the relevant diagnostic tests. In terms of the Chow test for parameter stability conducted by splitting the total sample period into 1970-1986 and 1987-2010 there is no evidence of parameter instability.

The results show that the coefficient of the error-correction term for the estimated saving equation is both statistically significant and negative. Thus, it will rightly act to correct any deviations from long-run equilibrium. Specifically, if actual equilibrium value is too high, the error correction term will reduce it, while if it is too low, the error correction term will raise it. The coefficient of -0.4415 denotes that 44 percent of any past deviation will be corrected in the current period. Thus, it will take more than two years for any disequilibrium to be corrected.

Furthermore, it is only the income growth variable that is statistically significant at the 1 percent level, indicating that in the short run, it is only growth in income that has a relationship with the private saving rate. The implication is that short run changes in private saving rate that correct for past deviations emanate principally from changes in
income growth. The coefficient estimate shows that a unit change in income growth will bring about a 0.3 percent change in private saving. The other four explanatory variables (PSR(-1), RIR, FB and DFD) do not have any short run impact on the private saving rate. This result is in keeping with the long run relationship where over 50 percent of changes in private saving are explained by changes in income growth.

Table 5: Estimated Short Run Regression Results for the Private Saving Model
Dependent Variable: DPSR
Included observations: 35 after adjusting endpoints

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>T-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.1137</td>
<td>2.9728</td>
<td>0.0063</td>
</tr>
<tr>
<td>DPSR(-1)</td>
<td>0.0303</td>
<td>0.1952</td>
<td>0.8467</td>
</tr>
<tr>
<td>DGRCY</td>
<td>0.3047</td>
<td>3.5435</td>
<td>0.0015</td>
</tr>
<tr>
<td>DRIR(-1)</td>
<td>-0.0016</td>
<td>1.6013</td>
<td>0.1214</td>
</tr>
<tr>
<td>DFB</td>
<td>-0.0054</td>
<td>1.2194</td>
<td>0.2337</td>
</tr>
<tr>
<td>DDFD</td>
<td>0.8020</td>
<td>1.6733</td>
<td>0.1063</td>
</tr>
<tr>
<td>ECM(-1)</td>
<td>-0.4415</td>
<td>-3.3118</td>
<td>0.0027</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.3356</td>
<td></td>
<td>0.1064</td>
</tr>
<tr>
<td>S.E of regression</td>
<td>0.0867</td>
<td></td>
<td>3.6936</td>
</tr>
<tr>
<td>Durbin-Watson stat</td>
<td>2.2200</td>
<td></td>
<td>0.0087</td>
</tr>
</tbody>
</table>

JBN - $\chi^2 (1) = 0.33$  
Probability (JBN) = 0.85

LM - $\chi^2 (1) = 1.92$  
Probability (LM) = 0.18

ARCH - $\chi^2 (1) = 1.0$  
Probability (ARCH) = 0.32

CHOW - $\chi^2 (1) = 1.6$  
Probability (CHOW) = 0.20

**CONCLUSION AND POLICY IMPLICATIONS**

This paper has investigated the determinants of private saving in Nigeria for the period between 1970 and 2010. The estimation results for the long run model point to the growth in income and the real interest rate as having statistically significant positive influences on domestic saving. There is also a clear role for fiscal policy in increasing total saving in the economy, with the private sector considering public saving as an imperfect substitute for its own saving. The Ricardian equivalence was thus, found not to hold in Nigeria contrary to what obtains in industrialized and semi-industrialized economies. Finally, financial development seems not to have any impact on the saving rate.
We began this study by asking what the relevant policies for raising the Nigerian saving rate are. Our results help to understand the effectiveness of policy variables in raising the saving rate in terms of their magnitude and direction. Some major recommendations for policy can be drawn from the analysis.

First, the focus of development policy in Nigeria should be to increase the productive base of the economy in order to promote real income growth and reduce unemployment. For this to be achieved, a diversification of the country’s resource base is indispensable. This policy thrust should include a return to agriculture; the adoption of a comprehensive energy policy, with stable electricity as a critical factor; the establishment of a viable iron and steel industry; the promotion of small and medium scale enterprises, as well as a serious effort at improving information technology.

Second, a stronger policy framework is imperative in bringing about improved macroeconomic performance. The government should sustain its Vision 20: 2020 programme which is partly responsible for the increasing diversification emerging in the economy. The growing contribution of non-oil sectors in GDP growth in recent years is a positive development and should be encouraged. Agriculture has grown strongly in recent years and had the largest industry contribution to GDP in 2010. With about 70 per cent of the working population employed in the agricultural sector, the strong agricultural contribution to GDP bodes well for employment. More importantly, government’s efforts to diversify the economy appear to be yielding results and should be sustained.

Third, public saving has been shown to be a complement rather than a substitute for private saving in Nigeria. Therefore, the Federal government’s recent establishment of the Sovereign Wealth Fund (SWF) is a step in the right direction. This is because the Fund will safeguard the country’s resources for future generations and build a robust institutional framework for a strong fiscal policy and prudent management of excess crude oil earnings. It will also facilitate a more efficient allocation of resources from commodity surpluses and put a stop to the practice where the government indiscriminately spends the crude oil revenue above the benchmark price. Further, the SWF would help to strengthen domestic policy frameworks by ensuring that the liquidity in the system is manageable.

Lastly, it is pertinent to note that even though this paper 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 private saving in the African continent.
REFERENCES


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