Authors:
Lumengo BONGA-BONGA
University of Johannesburg, South Africa
Nomvuyo GUMA
University of Johannesburg, South Africa

THE RELATIONSHIP BETWEEN SAVINGS AND ECONOMIC GROWTH AT THE DISAGGREGATED LEVEL

ABSTRACT

While the literature, both international and in South Africa, is relatively rich in studies on the determinants of foreign direct investment as well as the determinants of savings, none of the work done on South Africa has made use of disaggregated saving data to understand whether there is an observable difference in the marginal propensity to save of the different economic sectors. Thus, this paper attempts to assess the marginal propensity to save by the household, corporate and government sectors in South Africa. The results of the econometric analysis demonstrate that the greatest responsiveness of savings to GDP growth occurs amongst corporates. These findings should inform the South African government on how to regulate sectoral taxation that intends to encourage savings, given the low level of savings in the country.

Keywords: Savings, Corporates, Households, Government, Cointegration
JEL Classification: C1, E2, O4

RIASSUNTO

Il rapporto tra risparmio e crescita economica a livello disaggregato

Sia la letteratura internazionale che quella relativa al Sud Africa sono relativamente ricche di studi sulle determinanti degli investimenti diretti esteri e del risparmio, ma nessuno degli studi sul Sud Africa ha utilizzato dati disaggregati sul risparmio per comprendere se c'è una differenza rilevante nella propensione marginale al risparmio dei diversi settori economici. Scopo di questo lavoro è valutare la propensione marginale al risparmio del settore privato, del settore corporate e del settore pubblico in Sud Africa. I risultati dell'analisi econometrica mostrano che la maggiore reattività del risparmio alla crescita del PIL si ha nel settore corporate. Queste

evidenze dovrebbero suggerire al governo sudafricano come regolare la tassazione nei vari settori al fine di incentivare il risparmio, considerato il suo basso livello nel paese.

1. Introduction

Currently aggregate savings in South Africa are at a historic low. From an average of above 25% in the 1970s the national saving rate has declined to an average of just 15.2% in the 2000s. Household savings, after decades of decline, turned negative in 2006 as interest rates fell to multi-year lows and strong economic growth created incentives for consumers and the private sector to consume more. As the sharp decline in household savings was not compensated for by a simultaneous increase in either government savings or corporate savings, the national saving ratio dropped steadily from the 1980s onwards. South Africa's historical saving performance (currently gross savings stands at 16.4% of GDP) compares unfavourably with those of fast-growing developing economies. Eyraud (2009) found that gross domestic savings in South Africa averaged just 15% of GDP between 1996 and 2006 compared to an average of 29% for countries at a similar level of development. Malaysia, for example, enjoyed an aggregate saving rate that averaged between 25.6% and 42.9% between 1960 and 1996 (Ang, 2007:2168). These unflattering comparisons have led to suggestions that South Africa's low domestic saving rate poses a constraint on the country's ability to grow faster.

Developing countries, led by tremendous growth in South and East Asia, have made great strides in the past two decades in closing the development gap between developing and developed countries. However, despite being an upper middle income economy endowed with abundant mineral wealth South Africa's growth rate over the last two decades has lagged that of its emerging market peers. With the added advantages of sound macroeconomic policies, a relatively stable political framework and sophisticated financial markets, South Africa should arguably have been growing faster than the average. In fact, almost the opposite has happened: over the last decade the South African economy has grown at just half the rate of other emerging economies. GDP growth between 1996 and 2006 is estimated to have grown by 1.7% per annum against a peer group average of 3.6% (Eyraud, 2009: 3). This trend is not just limited to history: while emerging market and developing countries in general are expected to record growth of 5.0% in 2013, South Africa's growth rate is expected to average a relatively anaemic 2.0% (IMF, 2013).

TABLE 1 - *Gross Saving Ratios and Growth Rates for Selected Emerging Market Economies*

	Year	Brazil	China	India	Malaysia	Singapore	South Africa
Gross saving (% of GDP)	1980-90	19.9	36.1	20.9	24.8	39.0	24.4
	1991-00	16.7	40.7	24.0	34.7	47.6	16.6
	2001-11	16.8	47.4	31.5	35.5	43.2	15.5
Average GDP growth (%)	1980-90	3.0	9.8	5.7	5.9	7.8	2.2
	1991-00	1.7	10.0	5.7	7.2	7.3	1.4
	2001-11	3.4	10.0	6.9	5.1	5.6	3.5

Sources: IMF, author's calculations.

There is an observable correlation, over time, between domestic saving rates and GDP growth rates: countries with relatively high saving rates over time also enjoy comparably high GDP growth rates. For example, Table 1 shows that a decrease in gross saving as a percentage of GDP from the periods 1980-1990 to 1991-2000 translated to the decrease in GDP growth during the same period. A prominent paper by Rodrik (2000) showed that the average saving rate of the 31 fastest-growing countries (measured in terms of *per capita* GDP) in the period 1984-1994 was 24% of GDP. In contrast, the average saving rate of the 59 countries in which *per capita* income grew at less than 1% a year stood at just 16%.

Thus, one of the most common reasons proffered in explaining South Africa's comparatively slow growth rate is the lack of domestic savings (see Eyraud, 2009). Savings can be thought of as income received or generated that is not consumed immediately and is therefore available for future use. In a closed economy, where international trade is non-existent, it is from this pool of funds that investment expenditure would be financed.

A high rate of capital accumulation, funded by high domestic saving rates is at the heart of numerous classical models of economic growth and viewed by many, including the World Bank as one of the major reasons behind the rapid growth of many south-east Asian "tigers". Investment in fixed capital formation is significant as it allows for the increased productivity of both labour and capital. This, in turn, allows for an increase in real wages and real income,

resulting in a higher standard of living. Similarly, a low domestic saving rate has the potential to lock a country into a permanently lower growth path as low saving levels lead to a lack of investment and, eventually, a lack of innovation or technological change, which is necessary for permanently higher growth rates.

After reaching a peak of 30% to GDP in the 1970s, capital formation started to decline quite rapidly. Investment *per capita* dropped by 72% between 1976 and 2002, while aggregate investment declined from 8.1% of GDP to 2.4% of GDP over the same period (Perkins *et al.*, 2005: 213). The gold boom of the late 1970s caused corporate profits and government revenues to soar, temporarily resulting in an investment boom. The sanctions that followed in the 1980s, however, quickly put an end to that. In a closed economy, investment can only equal domestic savings – which had been dwindling slowly as high inflation eroded much of the incentive to save – thus South Africa's growth in capital stock deteriorated.

This lack of investment, especially evident in public goods such as railways, roads, ports and more recently electricity, has limited the rate at which the local economy can grow without creating bottlenecks – as has become starkly evident in the wake of the 2008 electricity blackouts. Partly due to these infrastructural bottlenecks, the South African Reserve Bank estimates that South Africa's potential growth rate is just 4.5% – a far cry from the estimated 6-8% annual growth rate that is needed to tackle South Africa's high unemployment rate, which is estimated as being one of the highest in the world (Botero *et al.*, 2004). This potential growth rate is also well below those of South Africa's fast-growing emerging market peers such as China, which has maintained real economic growth rates in excess of 9% for the past decade (Horioka and Wan, 2007:2078).

Reaching the 6-8% growth target will require substantial increases in South Africa's productive capacity, which will necessitate significant investment in fixed capital. The South African government has recently committed itself to spending over R800bn on infrastructure projects over the next three years, and a targeted amount of over R4tn out to 2030, in an effort to alleviate some of the growth constraints in the hopes of boosting long term economic growth (Gordhan, 2013). However, South Africa's gross domestic saving rate is currently well below that of its emerging market peers and also well below its long term average – levels that are insufficient to sustain a suitably high growth rate.

While a closed economy is entirely reliant on the domestic pool of savings to finance investment, in an open economy such as South Africa, savings and investment need not necessarily be equal.

A country may invest more than it saves by running a current account deficit, effectively plugging the gap by using foreign capital. Recently this has meant that the bulk of South Africa's investment has been financed from external sources, reflected in a deficit on the current account which, at its peak, widened to 9% of GDP.

Whilst there is some evidence to suggest that foreign capital inflows can be highly advantageous for developing countries, reliance on foreign capital is a double-edged sword. Foreign capital investment can facilitate the flow of technological spillovers and knowledge transfers, as such capital typically originates in industrial countries. Thus, a country that encourages foreign investment may actually be able to grow faster than a similar country that does not, due to the positive effects of this technological transfer.

However, reliance on foreign capital also has significant drawbacks. Several studies (see Bresser-Pereira and Gala, 2008 and 2009; Orlik, 2008) have concluded that foreign capital can be detrimental to the recipient country. According to this view, the volatility of foreign capital flows can potentially destabilise the recipient economy, can lead to an overvaluation of the currency thereby reducing the recipient country's competitiveness, crowds out domestic savings, distorts income distribution in the recipient country, promotes the importation of inappropriate technology and encourages corruption in many developing countries (Irandoust and Ericsson, 2004). In addition, reliance on foreign inflows means running a large external imbalance over time – something that has proved unsustainable for a number of countries.

It therefore seems advisable, and indeed it has been suggested[1], that South Africa should focus on stimulating domestic savings in order to boost investment, whilst simultaneously reducing the country's reliance on foreign capital. This raises the question of how best to achieve a higher domestic saving rate. Since gross saving is comprised of three components: government savings, savings by households and corporate savings, boosting the level of aggregate savings will entail measures to stimulate one – or all – of these sub-components.

Raising the domestic saving rate is seen as a key policy goal – to this end the National Treasury has released a number of discussion documents[2] on reforming the saving landscape in South Africa. The Treasury has turned its focus on boosting the level of household savings and is, consequently, undertaking a reform of retirement savings. In particular, the focus is on

[1] The World Bank, South Africa Economic Update: focus on savings, investment and inclusive growth, July 2011. Available at :www.worldbank.org

[2] National Treasury, Strengthening Retirement Savings, May 2012. Available at: www.treasury.gov.za

improving the tax incentives for retirement savings. South Africa currently has tax-free interest income thresholds to incentivize non-retirement savings – at an estimated cost of R3bn to the fiscus. And yet, the returns have not been significant. Household savings remain low – begging the question whether this is the correct avenue for government to pursue. It is not at all clear that measures to boost the levels of household savings can achieve the required increase in the national saving rate – particularly as households are constrained by a number of seemingly intractable challenges such as high rates of unemployment and factors such as HIV/AIDS, putting upward pressure on dependency ratios.

In order to successfully raise the level of savings, much more focus needs to be applied to whether there is a difference in the relationship between growth and the components of aggregate savings i.e. which "source" of savings if any would yield the greatest impact on GDP. From a policy point of view, this is clearly a critical question – one that we seek to partly answer in this paper.

The remainder of the paper is structured as follows: section 2 presents the literature review, section 3 describes the methodology and data used; section 4 discusses the results and section 5 concludes the paper.

2. Literature review

Many classical growth models (Solow, 1956; Romer, 1986) propose that higher saving levels lead to higher growth by increasing the pool of available domestic capital. This facilitates a faster accumulation of physical capital, which is held to be the driving force of economic growth. Domestic savings are thus an important indicator and pre-condition for higher growth levels. Solow's famous growth model which highlights the importance of savings in economic growth implies that a higher saving rate precedes a temporary increase in growth rate as the country transitions to a higher growth level. In this and many other classical growth models, higher savings are held to translate into faster growth in capital stock, thereby increasing economic growth. Thus, the direction of causality is held to run from savings to growth.

On the other hand, there is also support for the alternative: that the direction of association runs from growth to saving. The lifecycle hypothesis (LCH), as forward by Modigliani and Brumberg (1954), and later in Ando and Modigliani (1963), proposes that households seeks to maximize utility derived from their lifetime resources by allocating them optimally between current and

future consumption. In the standard Keynesian model, saving depends entirely on current income, with households savings only a portion of this income (marginal propensity to save). Thus, the national saving ratio would rise as *per capita* income rises. Under the LCH theory, however, the budget constraint becomes lifetime resources, not current income. Modigliani (1970) shows how the household saving ratio is independent of income. Instead, it depends on the long-term income growth rate. The novel implication of this approach to saving theory is that the national saving rate is therefore not driven by changes in *per capita* income, but rather, by changes in the long-term growth rate. Thus, growth leads savings.

The relevance of the LCH hypothesis for developing countries, however, has been questioned. This model of saving behavior may not be applicable for countries with low income levels, as people with low incomes may not be able to save enough when young and productive in order to support consumption in old age as the model implies – certainly not to the same degree as people in wealthier countries or with higher incomes. More seriously, this theory faced serious shortcomings when tested empirically. Carrol and Summers (1991) for instance find that, contrary to the predictions of the LCH, the cross-sectional profile of consumption in many countries appears to be better explained by the cross-section of current income in these countries rather than the cross-section of expected lifetime income.

Recently, however, even the empirical evidence supportive of the saving-led growth theory has appeared less convincing than previously. A high domestic saving rate has been widely viewed as one of the key factors driving the rapid growth in several East Asian economies (see World Bank, 1993; Thanoon and Baharumshah, 2007). However, in the wake of the Asian financial crisis in 1998 it became clear that despite impressive saving rates many East Asian economies collapsed and

"their dependency on foreign capital never abated" (Anoruo and Ahmad, 2001).

Thus, the idea that high domestic saving rates reduce a country's dependency on foreign capital is not entirely borne out by the empirical evidence.

Studies by economists such as Carroll and Weil (1993), Sinha (1999), Salz (1999) and Anoruo and Ahmad (2001) have found that the impact of savings on growth is possibly overstated and support the view that the direction of causality runs from growth to savings, and not the other way around. Carroll and Weil (1993:61) explicitly state that

"we find that growth Granger-causes saving, but that saving does not Granger-cause growth".

These findings are compelling: higher growth rates mean higher income *per capita,* which allows individuals to simultaneously increase both consumption and savings. Thus, higher economic growth rates should translate into higher saving rates.
Rodrik (2000) comes to an even stronger conclusion: that a transition to a higher saving rate will yield only a temporary increase in growth, which will then return to pre-transition levels in less than a decade. This is consistent with the classical Solow (1956) growth theory. Rodrik's study finds that in countries that have undergone saving transitions, the median growth rate of those countries rises from 1.5% (relative to the world growth average) to 3.9% (relative to world growth average). However, the effect is temporary: following the initial spike, the growth rate declines slowly until it reaches its pre-transition level, about a decade after the increase in savings began. Growth transitions on the other hand, defined as sustained increases in the average growth rate of 2.5% per annum or more, are associated with permanent increases in savings rates. This suggests that growth leads savings and not the other way around.

If growth in fact leads savings then devising policies to boost savings in the hopes of achieving a faster growth rate may not yield the expected results. By implication, developing countries would be better off concentrating on policies that boost economic growth and, having a higher saving rate, develop as a result of higher economic growth. This implies a virtuous circle of sorts where growth and savings become mutually reinforcing.
Studies done on the relationship between growth and savings in South Africa seem to support this latter view. Both Romm (2005) and Odhiambo (2009) find that there is a bidirectional relationship, i.e. that savings supports growth whilst growth also supports savings. Using a Johansen VEC model to assess the direction of causality between savings and growth in South Africa Romm (2005:188) finds that

"while the private saving affects steady state per capita output directly... a higher steady state per capita output positively affects the saving rate".

Odhiambo (2009) distinguishing between short run and long run effects finds that bi-directional causality dominates in the short term. In the long term, however, on balance, the dominant force is a unidirectional flow of causality from growth to savings, with the growth of the real sector driving growth in savings.

The other distinction often made in the literature is between private and government savings, where household and corporate savings are aggregated into private savings. The justification for this move comes from the argument[3] that the effect on the wealth of the household sector remains the same irrespective of whether businesses withhold profits, thereby causing an increase in equity values and thus capital gains for equity holders, or whether businesses instead distribute all profits as dividends, which are then reinvested by the recipient households. Government savings, on the other hand, is distinguished by the fact that government saving behaviour is in a sense exogenous, driven by policy decisions and therefore driven as much by political considerations as by economic ones.

Romm's (2005) relies on this argument that households can

"pierce the corporate veil"

to combine household and corporate savings into a private saving rate. The author found that the private saving rate has both a direct and indirect impact on *per capita* GDP. The indirect effect is through the private investment rate. Private savings affects growth directly, but also indirectly through investment. In turn, growth also feeds back into savings which further enhances both investment and thus, growth in a virtuous circle.

Analysis from the IMF (2009) on savings in South Africa also argues in favour of that the compositional changes observed in private savings reflect this piercing of the corporate veil and that, consequently, policies aimed at encouraging corporate savings would be of limited value as they would affect only the composition of private savings but not the level. Further, their analysis found that private savings only partially offset changes in the public saving rate. The decline in public savings that occurred in the 1970s and 1980s is thus likely to have played a major role in the overall decline in savings. Hence, they argue that policies aimed at improving the national saving ratio should focus on boosting the public, rather than private, saving rate.

It is far from clear that in the case of South Africa such action is justified. The idea that households "pierce the corporate veil" in viewing corporate savings as an extension of household savings is problematic on several levels. As highlighted by Sturm (2008), in practice household and business savings are not always perfect substitutes from the household's point of view, due to the differing degree of liquidity and tax treatment of retained earnings, capital gains and

[3] Sturm, 2008.

dividend receipts. In addition, South Africa's unique history of excluding a large section of the population from interacting in the formal economy makes it especially unlikely that the majority of households thus view corporate saving decisions as being taken essentially on their behalf. Disaggregating the data would remove this confusion and allow for a much better analysis of the underlying dynamics. This, in turn, would prove to be a far more useful input for policy decisions. In practice, stimulating aggregate savings would also encourage one or more of its constituent parts. Understanding what the relationship is between these constituent parts and GDP growth is thus essential.

3. Data and methodology

In order to assess the strength of the long-term relationship between GDP growth and the components of aggregate savings, this paper will make use of the Johansen VECM estimation technique as suggested in Johansen (1995).

3.1 The Data

The data used for the following econometric analysis is comprised of the GDP growth rate, the real gross domestic saving (TSAV), corporate saving (RCS), household saving (RHHS) and government saving (GENSAV) rates, total loans, corporate loans, household loans, government debt stock and real interest rates. All of the data in use in this analysis is quarterly, seasonally adjusted data and has been obtained from the South African Reserve Bank. The use of this official data source ensures the integrity and quality of the data. The data set begins in 1980 and extends to the third quarter of 2011.

As "savings" in the national accounts are defined as that portion of total income generated in a specific period but not consumed in that period, all saving rates are hypothesized to be a function of an income variable, *GDP*; the *prime interest rate* (as the yield earned on savings, interest rates can be interpreted as representing the "reward" for delaying consumption and thus influence the marginal propensity to save) and *Loans* which also enter the equations through their impact on the marginal propensity to save as a higher burden would, other things equal, reduce an entity's ability to save or consume.

The point of this analysis is not only to describe the determinants of the individual saving functions, but also to isolate the direct relationship between growth and the various saving variables. Moreover, to keep consistency and comparability, the study only makes use of common explanatory variables that may be considered to affect household, corporate and government saving functions individually. For example, it is a stylised fact that the level of economic activity or GDP, as well as interest rates, should affect all types of savings. Moreover, data are standardized to keep the same scale for comparison reasons.

This analysis estimates the relationship between growth and savings by means of a cointegrating system composed of the first-difference of the logarithm of gross domestic product (*DDLGDP*), expressed as a percentage by multiplying the values obtained by 100, the real domestic prime interest rate (*INT*) and a loan variable specific to the end-user i.e. *HLOAN*, representing total loans to households, *CORPLOAN* representing total loans to the private sector and *LLOAN* representing the stock of loans to government.

While the relationship between income and savings is a stylised fact, typically as income rises the level of savings would rise in tandem according to the marginal propensity to save, interest rates can also impact on saving rates due to their impact on consumption. Higher interest rates should (*ceteris paribus*) have a positive impact on savings as interest is viewed as the reward or compensation for delaying consumption. The loan variables are included due to the potential direct impact on savings. A higher loan burden on the part of corporates, households or government crowds out the room for either higher consumption or higher savings – especially in periods where the debt servicing costs (reflected in *INT*) are high.

In order to capture the significant structural changes that occurred in the economy over the period under review due to changes in legislation and the political environment, we included the *FLIB* variable, an indication of financial liberalisation. The inclusion of the *FLIB* variable is based on the hypotheses of Shaw (1973) and McKinnon (1973) who advocated that financial sector liberalisation facilitates financial development and, thus, economic growth. Financial liberalisation in South Africa gathered pace from 1980 onwards, starting with the removal of interest and credit controls in 1980, followed by the removal of limitations on bank competition (1983), reduction of bank liquidity controls (1983) and partial lifting of exchange controls (1995). Exchange controls were further relaxed in the post-2000 period. Due to the stepwise process of

financial liberalisation this variable is proxied by a linear spline function as suggested by Aron and Muelbauer (2002)[4].

3.2 *Methodology*

The long-term relationship between GDP growth and savings will be analysed using the Johansen cointegration methodology (Johansen, 1995). The Johansen technique allows for the possibility of assessing a long-term relationship between variables when they are all integrated of the same order. In presence of more than two variables, it is possible for more than one equilibrium relationship in the model. This leads to the problem of determining the number of cointegrating relationships between variables and the identification of these within the theoretical model structure.

The Johansen technique offers a solution to this problem as it allows for the testing and estimation of multiple long-run relationships, making it an improvement on the single-equation methodology earlier proposed by Engle and Granger (1987). The Johansen method also offers the advantage of allowing us to incorporate feedback effects between the variables, while also allowing for the separation of long-run equilibrium relationships and short-run dynamics.

The Johansen cointegration methodology entails a number of steps. Firstly, one has to test for the presence of a unit root in the data as the Johansen cointegration technique required data to be integrated of order one, I(1). The next step would be to test, using the maximum eigenvalue and trace statistic tests, whether the variables are cointegrated, i.e. if a long-run relationship exists between them as well as the number of cointegrating vectors or relationships that exist between them. Lastly, cointegrating vectors need to be estimated.

The generalised specification of an unrestricted VAR system is as follows:

$$z_t = A_1 z_{t-1} + \ldots + A_k z_{t-k} + \delta + \mu_t \qquad \mu_t \sim IN(0, \sum) \tag{1}$$

Where z_t is an (nx1) matrix, k is the lag length, δ deterministic trends and μ_t an error term. This type of model, developed by Sims (1980), allows for the estimation of relationships amongst jointly endogenous variables without imposing strong *a priori* restrictions such as particular structural relationships or specifying the exogeneity of certain variables. According to Johansen (1995), the reformulation of Equation 1 yields:

[4] The use of a linear spline function was proposed in Aron and Muelbauer (2002), *Estimating Monetary Policy Rules for South Africa*. The dataset can be accessed at http://www.csae.ox.ac.uk/resprogs/smmsae/datasets.html.

$$\Delta Z_t = \Pi Z_{t-1} + \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \ldots + \Gamma_{k-1} \Delta Z_{t-(k-1)} + \mu_t \quad (2)$$

where $\Pi = \left(\sum_{i=1}^{k} A_i \right) - I$ and $\Gamma_i = \left(\sum_{j=1}^{i} A_i \right) - I$

where Γ_i is the parameter of short-term coefficients and Δ is an expression for first difference series. The rank of Π, r, determines how many linear combinations of X_t are stationary.

If Π has $r = k$ (number of variables) then the variables in z_t are *I*(0), meaning that all the variables are stationary and the appropriate modeling methodology would be to estimate the standard VAR in levels. If the rank of Π is zero there are no cointegrating relationships so no combination of z_t or y_t that are stationary – in which case a VAR model in first differences would be appropriate as there are no long-run relationships between the variables. With the Johansen method of cointegration, the maximum number of linearly independent columns should be equal to $k-1$.

We will employ the use of two tests to ascertain the rank of Π. The first test, known as the ***Max-eigenvalue test***, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis that there are $r+1$ cointegrating vectors. The second test, the ***trace statistic***, tests the null hypothesis that the number of cointegrating vectors is less than or equal to *r*. It is important to note that to obtain unique values of α and β requires that we impose identifying restrictions on Π.

We conduct unit root tests on all of the variables in order to ascertain the level of integration of variables. We will use the DF-GLS test for a unit root as proposed by Elliot *et al.* (1996) and later studies have shown that the DF-GLS test has significantly greater power than the earlier versions of the ADF test. As with the ADF test, the use of the DF-GLS test also allows us to consider the possibility of linear time trends in the data.

The question of lag length selection, *p*, is the next important consideration. Too small a lag and the remaining serial correlation in the errors will bias the test, but if *p* is too large then the power of the test will be reduced. Thus, one needs to select the criteria such that it minimises the loss of degrees of freedom. In this study, we will use the Schwarz information criterion (SIC) for both the VAR specification and the unit root tests in order to maintain uniformity across the tests.

Whilst the AIC and SIC feature the same "goodness of fit" term, the SIC exacts a greater penalty on using up degrees of freedom.

The results of the unit root test reported in Table 2 show that all variables are integrated of order one, I(1).

TABLE 2 - *Unit Root Test: DF-GLS Test Statistic*

Variables	Level	First Difference	Order of Integration
DDLGDP	-2.968066	-15.79162*	*I*(1)
LLOAN	-2.397958	-2.441038**	*I*(1)
CORPLOAN	-2.921575	-3.141355**	*I*(1)
RCS	-1.885967	-4.257818*	*I*(1)
HLOAN	-1.980440	-7.092130 *	*I*(1)
RHHS	-2.148802	-2.444478	*I*(1)
GLOAN	-1.443531	-2.369196**	*I*(1)
TSAV	-1.041931	-3.020500	*I*(1)
INT	-2.279678	-7.250941*	*I*(1)
FLIB	-1.594414	-3.751986 *	*I*(1)

* denotes rejection at the 1% level.
** denotes rejection at the 5% level.

4. ESTIMATION AND EMPIRICAL RESULTS

In this section, the results of the Johansen methodology are presented. First, we conducted a test of cointegration for each of the equation that determines the disaggregated saving equation, namely the household, corporate and government saving equations. Later, cointegrating vectors are estimated for each of the equations. The order of the variables in each of the vectors is such that: $Yt = \left(applicable\ SAVINGS_t\ , DDLGDP_t, applicable\ LOANS_t, INTt, FLIB_t\right)$[5].

[5] $FLIB_t$ is exogenous in the cointegrating vector.

4.1 The Household Saving Equation

The household equation is based on the same variables as in the AS model, but using household savings in this instance instead of aggregate savings. The variables included in the household saving equations are: real GDP growth (DDLGDP), real household savings (RHHS), INT, HLOAN and FLIB. Using the SIC criterion to estimate the appropriate number of lags in the cointegrating vector, we find three lags to be appropriate. The results of the trace and max eigenvalue tests are presented below in Table 3.

TABLE 3 - *Trace Test for Cointegration*

Null hypothesis	**Trace Statistic**	**Critical Value (5%)**	**Prob.**
$r = 0$	49.80824	29.79707	0.0001
$r = 1$	15.46411	15.49471	0.0505

These results reported in Table 3 indicate that there is one cointegrating relationship at the 5% level. This means that only one long-term relationship exists between real household savings, the percentage change in the growth of GDP, interest rates and household loans. As with the preceding model, a dummy is used to capture the effects of the gradual financial liberalisation that occurred over the period.

The estimated long-term relationship between the variables in the household equation, normalised by RHHS as reported in Table 4 below can be expressed as follows:

$$RHHS = 0.03DDLGDP - 0.05HLOAN - 0.02INT$$

TABLE 4 - *Estimation of the Cointegrating Vector*

Variables	Coefficient	t-Statistic
RHHS	1.000000	
DDLGDP	-0.034499	-6.48269
INT	0.001882	1.75121
HLOAN	0.047557	3.41457
C	-0.621820	

The relationship between household savings and GDP is positive, as we had expected. As GDP growth rises, the level of household savings rises in tandem, driven by a rise in income growth.
The coefficient on the INT term is negative, contrary to what economic theory would suggest: higher interest rates should, *ceteris paribus*, induce higher savings. In this instance, however, rising interest rates likely exert a negative reaction from households as higher debt servicing costs (as a result of higher interest rates) eat into consumer incomes, reducing the capacity for higher savings.
The coefficient on the HLOAN term is also negative, this is in line with expectations. Higher debt levels (and thus higher debt servicing costs) reduce the room for household savings, especially as savings at the household level are largely discretionary whereas debt servicing is not.

4.2 The Corporate Saving Equation

As with the previous equation we find that there is one cointegrating relationship at the 5% level, thus one equilibrium relationship between the variables of the corporate saving function: real corporate savings, the percentage change in GDP growth, interest rates and outstanding corporate loans. Again, the effects of financial liberalisation are captured by the dummy variable, FLIB.

TABLE 5 - *Trace Test for Cointegration*

Null hypothesis	Trace Statistic	Critical Value (5%)	Prob.
$r = 0$	85.23493	47.85613	0.0000
$r = 1$	37.90934	29.79707	0.0047

The estimation of the cointegrating vector, normalised by RCS as in Table 6, yields the following equilibrium relationship:

$$RCS = 0.185 DDLGDP + 0.0225 CORPLOAN - 0.001936 INT$$

TABLE 6 - *Estimation of the Cointegrating Vector*

Variables	Coefficient	t-Statistic
RCS	1.000000	
DDLGDP	-0.185247	-7.40971
INT	0.001936	0.41662
CORPLOAN	-0.022591	-0.34179
C	0.254118	

The relationship between corporate savings and real GDP growth is found to be statistically significant and positive: a 100% increase in GDP is consistent with a rise in corporate savings of 18.5%. The relationship between corporate savings and corporate loans or debt is found to be not statistically different to zero. This finding support Modigliani and Miller (1958) theory of "capital structure irrelevance", whereby financial leverage does not affect corporate's market value or profitability, an important element for corporate retained profits or savings. Interest rate is also found to be neutral to corporate savings.

4.3 The Government Saving Equation

The results of the trace statistic test reported in Table 7 reveal that in this instance there are two cointegrating relationships at the 5% level amongst the variables of the government saving equation: real government savings expressed as a percentage of GDP, the percentage change in real GDP growth, interest rates and the stock of total loans extended to government. However, despite the statistical estimation of two cointegrating relationships, economic theory supports the presence of only one equilibrium relationship. Thus, we proceed the analysis assuming one cointegrating relationship.

TABLE 7 - *Trace Test for Cointegration*

Null hypothesis	Trace Statistic	Critical Value (5%)	Prob.
$r = 0$	77.12250	47.85613	0.0000
$r = 1$	38.98736	29.79707	0.0033

The estimated long-term cointegrating relationship of the variables in the government saving equation, normalised by GENSAV as in Table 8 below, can be expressed as follows:

$$GENSAV = 0.02DDLGDP - 0.08LLOAN - 0.0009INT$$

These results confirm the positive relationship between higher GDP growth and levels of government savings. Higher growth rates allow for higher tax revenues and, with less support required from fiscal authorities to boost growth, the greater the room for higher levels of government savings (fiscal surplus).

The relationship between government savings and interest rates, however, is not statistically significant, implying that there is no relationship between government savings and interest rates. A higher debt or loan burden, as expected, also has a negative impact on the levels of government savings, mainly as the consequence of debt servicing by the government. A 100% change in government loans leads to an 8.8% decline in government savings as the higher proportion of government revenue diverted to debt servicing crowds out the room for increased government savings.

TABLE 8 - *Estimation of the Cointegrating Vector*

Variables	Coefficient	t-Statistic
GENSAV	1.000000	
DDLGDP	-0.023692	-5.82089
INT	0.000973	1.27440
LLOAN	0.088738	3.32611
C	-1.553414	

The results of the cointegration analysis reveal that corporate savings is found to have the strongest response to changes in GDP growth, while the responsiveness of households and government is far more muted. A 100% change in GDP growth is found to result in an 18.5% increase in corporate savings, but only a 2% increase in government savings and 3% increase in household savings. Whilst few other studies have set out to compare the difference in saving responses to GDP, the fact that corporates have emerged as the clear heavyweight in this regard is consistent with the findings of Aaron and Muelbauer (2000) and Prinsloo (2000) who have noted that corporate savings has been the backbone of the economy's saving effort over the period 1980-2011 as a combination of factors drove savings by households and government into negative terrain. This finding indicates that enough incentives, such as the decrease in corporate tax, need to be directed to corporates if the South African government intends to turn the corner around the low saving rate observed in the country. While decreasing individual income tax may be important for political reasons, this paper shows that the efficient way to encourage savings in South Africa will be by providing sufficient incentives to the corporate sector, the best contributor of savings when GDP changes.

The weak state of government savings on the other hand, gives much more serious reasons for concern. Government savings were found to be the least responsive to changes in GDP growth over time. This may, in part, be due to a lack of fiscal discipline.

5. CONCLUSION

This paper attempted to assess the impact of GDP growth on savings at a disaggregated level in South Africa. Contrary to studies focusing on the aggregate impact of GDP growth on savings,

this paper contributed to the literature on savings and GDP growth in South Africa by comparing the magnitude the marginal propensity to save between the household, corporate and government sectors in South Africa. The results of the econometric analysis demonstrate that the greatest responsiveness of savings to GDP growth occurs amongst corporates. Given that after-tax profits of corporates can be either retained as retained earnings or distributed as dividends, greater level of savings may be achievable if corporates are encouraged to retain earnings, rather than distribute these as dividends to the household sector which has exhibited a weak propensity to save. This paper suggest that enough incentives, such as the decrease in corporate tax, need to be directed to corporates if the South African government intends to change the trend of savings in South Africa.

REFERENCES

Ando, A. and F. Modigliani (1963), "The Life-Cycle Hypothesis of Saving: Aggregate Implications and Tests", *American Economic Review*, 53(1), 55-84.

Ang, J. (2007), "Are Saving and Investment Cointegrated? The Case of Malaysia (1965-2003)", *Journal of Applied Economics*, 39(17), 2167-2174.

Anoruo, E. and Y. Ahmad (2001), "Causal Relationship between Domestic Savings and Economic Growth: Evidence from Seven African Countries", *African Development Review*, 13(2), 238-249.

Aron, J. and J. Muellbauer (2000), "Personal and Corporate Saving in South Africa", *The World Bank Economic Review*, 14 (3), 509-544.

Aron, J. and J. Muellbauer (2002*), Estimating Monetary Policy Rules for South Africa*, in: N. Loayza, K. Schmidt-Hebbel (Eds), *"*Monetary Policy: Rules and Transmission Mechanisms*"*, Series on Central Banking, Analysis and Economic Policies, Central Bank of Chile.

Botero, J., S. Djankov, R. La Porta , F. Lopez de Silanes and A. Shleifer (2004), "The Regulation of Labour", *Quarterly Journal of Economics*, 119(4), 1339-1382.

Bresser-Pereira, L. and P. Gala (2008), "Foreign Savings, Insufficiency of Demand, and Low Growth", *Journal of Post-Keynesian Economics*, 30(3), 315-334.

Bresser-Pereira, L. and P. Gala (2009), "Why Foreign Savings Fail to Cause Growth", *International Journal of Political Economy*, 38(3), 58-76.

Carroll, C. and D. Weil (1993), "Saving and Growth: A Reinterpretation", NBER Working Paper No. 4470.

Carroll, C.D. and L.H. Summers (1991), *Consumption Growth Parallels Income Growth: Some New Evidence*, in: B. Douglas Bernheim, J.B. Shoven (Eds), "National Saving and Economic Performance", Chicago University Press for NBER: Chicago.

Elliott, G., T.J. Rothenberg and J.H. Stock (1996), "Efficient Tests for an Autoregressive Unit Root", *Econometrica*, 64(4), 813-836.

Engle, R.F. and C.W.J. Granger (1987), "Co-Integration and Error Correction : Representation, Estimation and Testing", *Econometrica,* 55(2), 251-276.

Eyraud, L. (2009), "Why isn't South Africa Growing Faster? A Comparative Approach", IMF Working Paper No. 25.

Gordhan, P. (2013), National Budget Expenditure and Revenue Estimates.[Speech]. Online: <http://www.treasury.gov.za/documents/national%20budget/2013/speech/speech.pdf> (Accessed on 27 February 2013).

Horioka, C. and J. Wan (2007), "The Determinants of Household Saving in China: A Dynamic Panel Analysis of Provincial Data", *Journal of Money, Credit and Banking*, 39(8), 2077-2096.

IMF (2009), World Economic Outlook 2009. International Monetary Fund: Washington, DC.

IMF (2013), World Economic Outlook 2013. International Monetary Fund: Washington, DC.

Irandoust, M. and J. Ericsson (2004), "Are Imports and Exports Cointegrated? An International Comparison", *Metroeconomica,* 55(1), 49-64.

Johansen, S. (1995), "A Statistical Analysis of Cointegration for I(2) Variables", *Econometric Theory*, 11(1), 25-59.

MacKinnon, R. (1973), Money and Capital in Economic Development, The Brookings Institution: Washington, DC.

Modigliani, F. and M. Miller (1958), "The Cost of Capital, Corporation Finance and the Theory of Investment", *The American Economic Review*, 48(3), 261-297.

Modigliani, F. and. R.H. Brumberg (1954), *Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data*, in: K.K. Kurihara (Ed.), "Post Keynesian Economics", Rutgers University Press: New Brunswick, NJ.

Modigliani, F. (1970), *The Life-Cycle Hypothesis of Savings and Intercountry Differences in the Saving Ratio,* in: W.A. Eltis, M.F.G. Scott, J.N. Wolfe (Eds), "Induction, Growth, and Trade: Essays in Honour of Sir Roy Harrod", Oxford University Press: Oxford.

National Treasury (2012), Strengthening Retirement Savings. Available at:
< www.treasury.gov.za> (Accessed on 23 January 2016).

Odhiambo, N. (2009), "Savings and Economic Growth in South Africa: A Multivariate Causality Test", *Journal of Policy Modeling*, 31(5), 708-718.

Orlik, N. (2008), "The Effects of External Capital Flows on Developing Countries: Financial Instability or 'Wrong' Prices?", *International Journal of Political Economy*, 37(4), 80-102.

Perkins, P., J. Fedderke and J. Luiz (2005), "An Analysis of Economic Infrastructure Investment in South Africa", *The South African Journal of Economics*, 73(2), 211-228.

Prinsloo, J.W. (2000), "The Saving Behaviour of the South African Economy", South African Reserve Bank Occasional Paper No. 14.

Rodrik, D. (2000), "Saving Transitions", *The World Bank Economic Review*, 14(3), 481-507.

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

Romm, A. (2005), "The Relationship between Saving and Growth in South Africa: A Time Series Analysis", *The South African Journal of Economics*, 73(2), 171-189.

Salz, I.S. (1999), "An Examination of the Causal Relationship between Savings and Growth in the Third World", *Journal of Economics and Finance*, 23(1), 90-98.

Shaw, E. (1973), Financial Deepening in Economic Development, Oxford University Press: Oxford.

Sims, C. (1980), "Macroeconomic and Reality", *Econometrica*, 48(1), 1-48.

Sinha, D. (1999), "The Role of Saving in Pakistan's Economic Growth", *The Journal of Applied Business Research*, 15(1), 79-85.

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

Sturm, P. (2008), Determinants of Saving: Theory and Evidence. OECD Economic Outlook. [Online]. Available at: <www.oecd.org>.

Thanoon, M. and A. Baharumshah (2007), "What Happened to Savings during the Financial Crisis – A Dynamic Panel Analysis of Asian-5 Countries", *Economic Change and Restructuring*, 38(3), 257-275.

World Bank (1993), World Development Report. [Online]. Available at: <www.worldbank.org>.

World Bank (2011), South Africa Economic Update: Focus on Savings, Investment and Inclusive Growth. [Online]. Available at:< www.worldbank.org>.