

Have Pension funds boosted National Savings in South Africa?

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Abstract:

South Africa has one of the largest pension systems in the world, but low savings continues to constrain growth. The exact nature of the relationship between pension funds and savings remain unsettled in the literature. It is for this reason that this study seeks to interrogate the effects of pension funds on savings using the ARDL methodology. We find evidence suggesting that rising pension assets have a negative impact on the national savings rate. The analysis also shows that for our control variables, unemployment has negatively impacted the savings rate while the level of income affects savings rate positively.

Keywords: Pension funds, savings rate, estimation model, economic growth, pension assets

JEL Classification: G20, G23

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1. Introduction

Several authors have pointed out the role of savings in the linkages between pension assets and economic growth (Holzmann, 1996; Bailliu and Reisin, 1998; Bebczuk and Musalem, 2006; Rezk, Irace and Ricca, 2009). The positive association between savings and growth is couched in their provision of capital for investment or government consumption (Bosworth & Burtless, 1998; Murphy & Musalem, 2004; Prinsloo, 2000; Schmidt-Hebbel, 1999). In the context of a growing pension fund assets, it is important to ascertain whether we have seen consumption patterns alter such that postponed consumption has altered aggregate household savings levels. This paper seeks to establish whether pension assets affect savings and examines the theoretical interactions between the two variables. This is an important question as literature has focused on establishing the channels through which pension assets increase growth, namely through savings, improved corporate governance, reduced labour market distortions and capital market development (Schmidt-hebbel, 1999; Catalan, Impavido and Musalem, 2000; Walker and Lefort, 2002; Catalan, 2004; Davis and Hu, 2005, 2008; Hu, 2005; Davis, 2008; Rezk, Irace and Ricca, 2009; Zandberg and Spierdijk, 2010; Kim, 2010; Meng and Pfau, 2010; Raisa, 2012). In this paper we revisit the relationship between pension assets and savings as this has not been extensively assessed in emerging markets and due to the paucity of work in African economies. The transmission from pension funds to growth can be empirically tested in namely the savings and capital market development channels. It is for this reason the study attempts to examine the relationship between pension assets and savings. There exist a large number of studies measuring the relationship between pension assets and savings, however there exist few such studies in sub-Saharan Africa. This is quite understandable given the paucity of well developed pension funds markets in sub-Sahara Africa. South Africa with its globally competitive pension industry will be a good testing ground on the nexus between pension funds and savings rate.

Personal income plays an important role in the ability of an employee to make contributions to pension plans or savings. The growth or decline of personal income will directly impact their ability to save (Friedman, 1957; Feldstein, 1976). The spending habits of the working population will also impact savings levels, and their ability to contribute towards pensions (Thaler, 1994). Apildo (1972) argues that the problem with contributions to retirement plans is the displacement or substitution effect when employees replace other forms of savings with retirement savings, reducing the overall total savings. On the other hand, Bosworth & Burtless (1998) and Rezk et al., (2009) and Samwick, (2000) opine that the introduction of mandatory savings increases the level of pension fund assets and have been empirically proven to significantly and positively affect savings. Retirement savings may supplement

existing savings with prospective retirement income allocated separately by the employees.

Employee contributions to pension schemes have risen in South Africa. The impact has been a significant growth in the number of South African pension funds from 2771 funds with a total membership of 675 404 in 1958 to 5150 funds in 2014. This comprised of nine state or state owned enterprise controlled funds, 2996 privately administered funds, with the majority 2175 underwritten funds (Financial Services Board, 2014). During this period we have seen a high growth in members from less than a million to 15.9 million between 1959 and 2014. The growth has been concentrated in the last decade (Financial Services Board, 2014). The coverage of private and state controlled pension funds supports more than 75% of the South African ageing population reliant on retirement assistance from state social grants in their old age (Van Der Berg, 2002). Pension assets have grown astronomically from R657 billion in 1959 to R3.67 trillion in 2014, making South Africa's pension fund system the biggest in Africa and currently the 11th biggest in the world (Financial Services Board, 2014; Watson, 2014). The question that must be investigated using our data set is whether this increase in pension assets has resulted in a higher domestic savings rate?

A few studies have focused on the pension system and whether this has translated into higher savings levels. Mixed results show there are no conclusive outcomes. However, country specific effects must be factored in any estimation (Bailliu and Reisin, 1998; Bebczuk and Musalem, 2006). The pension systems debate is centered on Pay as You Go (PAYG) versus Fully Funded System (FFS), with many countries now reforming to FFS due to the premise it is most beneficial to savings. Chile is a developing economy with an advanced pension system and long term pension reform. It is a popular case study due to its degrees of freedom, having occurred in 1981 it is one of the few country studies with a long run time series exceeding 30 years after pension system reform. Some Chilean studies show positive results (Holzmann, 1996; Schmidt-hebbel, 1999; Rezk, Irace and Ricca, 2009) but others (Samwick, 2000; Bosworth and Burtless, 2004) contend with different results. In the past two decades several countries including South Africa have undergone pension reform with the main objective of boosting savings. However empirical evidence suggest that there exist mixed results and the intensity of its effect vary quite considerably. This may suggest that increase of pension assets is not necessarily associated with increased savings levels. Increased deficits and the negative savings effects on national accounts can deplete the buildup of pension reserves indicating that pension reform may simply redistribute assets but not increase savings nor have any positive increase on overall economic growth. The pension system selection ex ante may differ from the actual prediction. Policy makers ought to include investigation of both the household savings behaviour and the corresponding government savings response in an economy ex post. This analysis is a first step to understanding the linkages between pension, savings and growth. We begin by investigating the underlying theories supporting the view that pension savings directly provide impetus to total domestic savings? Is this the South African story?

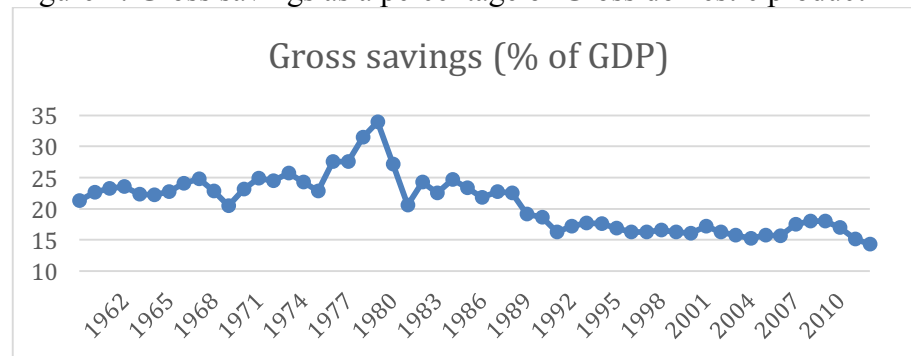
The paper is organized as follows: Theoretical explanations for the relationship between pension assets and savings will be explained in section 3, followed by an empirical literature review of pension funds and savings in section 4. The data,

variables and model specification are shown in section 5. The empirical analysis and results is presented in section 6. Section 7 presents the conclusion.

2. Trends in South African savings

The importance of savings in an economy has received extensive empirical attention, savings not only finances current account deficits, it also plays a mobilization role by contributing towards capital formation in an economy. Investment levels are important as they trigger increase in the gross national income, an important variable in measuring the standard of living in a country. Emerging economies with consistently high and rising growth rates have rising investment rates that are coupled with savings rates exceeding 25%. The World Bank (2011) and Prinsloo (2002) maintain that investment levels exceeding 30% are necessary for growth, but domestic savings boost investment levels and reduce the macroeconomic offsets retained from uncertain international flows of capital. This savings thrust coupled with improvement of technology and innovation improves productivity outcomes. Public expenditure levels also impact domestic savings, in combination with the levels of public expenditure, household and corporate savings. In order to curtail slow growth in the South African economy, the low investment and savings rate that are impediments to transformation of the economy, need to be increased. Despite extraordinary increase in pension asset wealth, the savings rate has steadily declined in the last two decades.

Figure 1: Gross savings as a percentage of Gross domestic product



Source: (World Development Indicators, 2014)

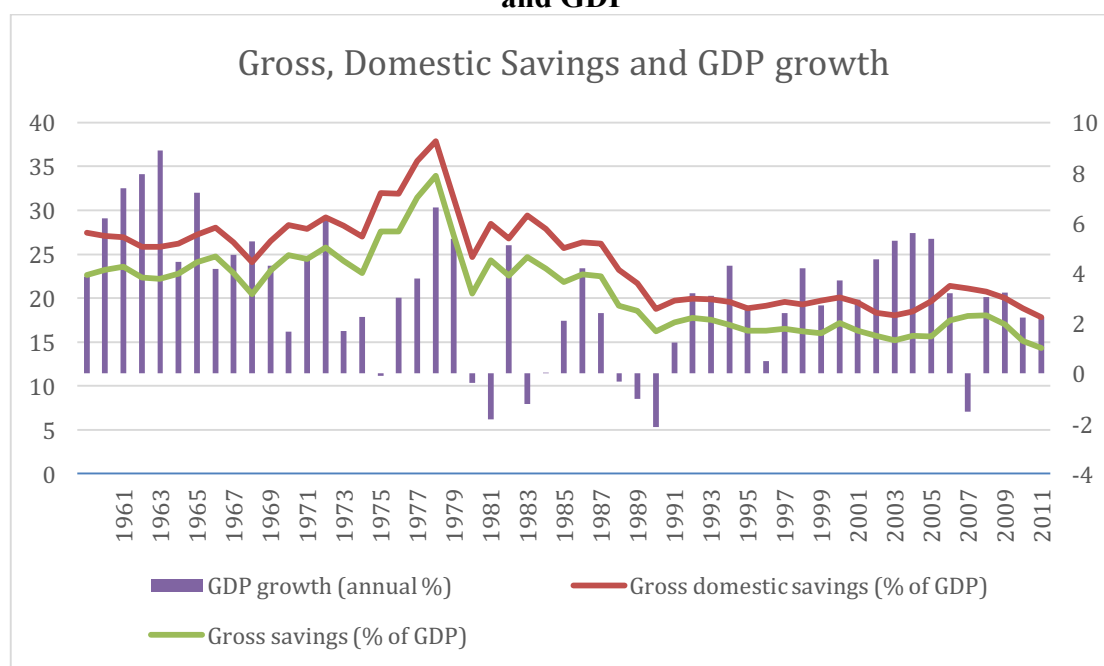
The South African Reserve Bank measures gross savings comprising of corporate, household and government savings levels. An analysis of the trends of gross savings between 1960 and 2014 show that gross savings has declined from 22% to the current 14%. See Figure 1. Total gross savings between 1960s up until the mid 1980s exceeded 25%, and it was only in 1990 when the savings rate dropped below 20%. The gross savings rate as a percentage of GDP dropped substantially with a parallel decline in both household savings and general government savings. The South African Reserve Bank measured household sector savings at 6.9% in 1960, this in 1999 was a low 2.9% of GDP (Prinsloo, 2000). Similarly general government savings declined to deficits from a positive 6.3% in 1960 to a decade in the 1990s of dissavings, the peak in 1996 of -3% level. The deterioration of South African savings rate began in the mid-1980s, from a high average of 26.7% it surpassed several first

world countries. It now has the lowest savings rate even amongst middle income and emerging economies, whose savings rate exceed 20%.

South Africa compared to other emerging market economies (EMEs), Malaysia, and India exhibited the same level of savings at 21% in 1980 but the others have all escalated to above 30%. The weakening of the South African savings rate has continued on a downward trend since the 1990s and it does not appear to have recovered. Conversely savings rate in other EMEs has risen to levels over 30% in China, Botswana, India, Malaysia and Indonesia. Moving higher at a slower rate are Chile and Brazil, both starting at relatively low savings rate levels.

Gross Savings is defined as gross national income less total consumption, with net transfers. Gross domestic savings is GDP less total consumption, it excludes foreign transfers. Gross domestic savings has consistently exceeded gross savings in SA.,. Both series have been steadily declining and current 2014 levels gross domestic savings are at 18% versus a lower gross savings rate of 14%.

Figure 2: Gross and Domestic savings as a percentage of Gross domestic product and GDP



Source: (World Development Indicators, 2016)

The Growth Employment and Redistribution (GEAR) macroeconomic strategy framework embarked on by the government in 1996 targeted a savings rate of 23% which was deemed necessary for a GDP growth rate of 4% per annum (Prinsloo, 2000). In addition this would support investment rates of 25% or more necessary for high and fast growth in this emerging economy (World Bank, 2011). Figure 2 shows the highest level of GDP growth rate was 5.6% in 2005, which has steadily declined to lower levels of 1.5-3% growth per annum post-recession period.

3. Theoretical Background: Pensions and Savings

Friedman's (1957) permanent income hypothesis (PIH) and Modigliani's (1986) life cycle hypothesis form the basis for our theoretical analysis in this section. The PIH is underpinned by establishing the long-term expectations of an individual's future income affecting the consumption and savings patterns. The theory emphasized consumers' expectations of permanent income alter their consumption patterns, more importantly their behaviour towards savings. Several scholars argue that interest rates have an ambiguous effect on savings depending on the opposing effects of the income and substitution effect, the net effect of these determine whether effect is positive or negative (Prinsloo, 2000; Simleit, Keeton and Botha, 2011). The expectations of long-term wealth determine the consumption plans of individuals. Other factors affecting the permanent income include ones training, personality, ability, economic activity location and the occupation held. An employee whose income fluctuates regularly within the same period, (holding all biographical factors age, race, occupation and location constant) versus an employee whose income is stable both have different average expectations of their permanent income. In the former the employee's income cannot be used as a good predictor of future earnings. In contrast to the latter, with a more stable income offers an improved idea of what their permanent income measure will be altering consumption patterns. The theory outlines that consumers are rational and seek to maximize utility thus smoothening consumption over their lifetime, thereby fluctuating savings level are observed at different ages (Friedman, 1957; Bebczuk and Musalem, 2006; Simleit, Keeton and Botha, 2011). Higher savings are associated with young working adults, with retired workers as consumers who dissave. One of the tenets of the hypothesis is that consumption is underpinned by diminishing marginal utility over time, thus young adults starting a family consume more than a young working adult (Simleit, Keeton and Botha, 2011). This introduces the heterogeneity of households whose propensity to save is not identical (Bailliu and Reisin, 1998). Bebczuk and Musalem (2006) also argue that individuals are not homogenous and are not fully rational and altruistic. Therefore pension savings do not always correspond with contributions and benefits. Free riding may occur as workers merely consume disposable income without saving for old age retirement and rely on state support. These are workers who hold the ability to save but choose consumption, possibly burdening future generations with higher taxes from social security assistance. Governments must therefore implement policy tools that enforce savings and fully funded pension systems that ensure alignment between ones savings and benefits derived.

The second theory supporting the direct linkage between pension assets and savings is the life cycle theory. The life-cycle model emphasizes two phases in one's life, the first is the working years and the second is the retirement phase. The assumption is that you save when young and working, and dissavings occurs during retirement (Feldstein, 1976, 2016; Bailliu and Reisin, 1998; Murphy and Musalem, 2004). The accumulated savings generate sufficient capital from households to improving aggregate savings. In the absence of a working younger population aggregate savings would therefore surely decline.

The framework adopted by Bailliu and Reisen (1998) provides the theoretical foundations for how the accumulation of pension asset increases aggregate saving. Firstly, the economy is divided into those who work (who will eventually retire), and others who are retired (who produced the capital stock in the economy for the younger

generation). The younger generation utilize this capital stock productively in the economy to generate output.

The younger generation savings s_t plus consumption a_{1t} is the total wage received during the working years. a_{1t} shows consumption when young.

$$a_{1t} + s_t = m_t \quad (1)$$

The savings of the younger generation produce the capital stock required for the next generation. Interest paid on these savings in the next period $t+1$ are shown below

$$a_{2t+1} = (1 + i_{t+1})s_t \quad (2)$$

The worker chooses what level to allocate for consumption and savings in the first period. In the second period consumption a_{2t+1} takes place when retirement occurs. Savings would have borne gains from interest during the period from when savings are held t to period $(t+1)$. Both $a_{2t+1}, a_{1t} \geq 0$

The utility function after first order conditioning derived from Bailliu and Reisen(1998) draws us to the implicit savings function:

$$s_t = s(m_t, i_{t+1}) \quad (3)$$

The total savings in a household can be mandatory (s_t^M) or voluntary (s_t^V) thus substitution between the two can occur depending on national policy frameworks, but total household savings s_t remains unchanged.

$$s_t = s_t^M + s_t^V \quad (4)$$

K_{t+1} capital stock in time $t+1$ is the sum of aggregate savings in time t and $t+1$. The model incorporates a growing population of $P_t = P_0 (1 + n)^t$.

$$K_{t+1} = P_t s(m_t(K_t), r_{t+1}(K_{t+1})) \quad (5)$$

Aggregate savings is represented by savings at time $K_t = P_t s(m_t, r_{t+1})$. Thus total capital stock at time K_{t+1} includes returns to capital stock in one's retirement, combined with total wages saved of the entire population.

In addition to this a further motive Modigliani (1988) added included foregoing current consumption for the future towards retirement through contributions. The theory reflected the allocation of resources and consumption over a lifetime. The rising and declining income levels during one's life span would lead to the increase or decrease of accumulated wealth. The model assumes that income levels do not remain constant and during retirement, income levels drop and dissavings occur. At this point the accumulated wealth would be used to finance consumption due to loss of income. This model assumes that growth rates exhibit ability to change savings rate and not per capita income. Modigliani (1980) outlines the vast amounts of literature quoted prior to the 1980s motivation for savings was primarily wealth transfers to the next generation. However other factors such as children's needs and

retirement planning were a motivation for savings in several surveys. Another assumption is that wealth after retirement declines, and this continues until consumption reduces all accumulated wealth to zero.

Theoretically pension funds lead to savings through contribution to total capital formation as shown in (5). The accumulation of pension savings in capital formation during ones lifetime of the entire population is a function of levels of income and wages that are not consumed in that period and retained for the next period. Contractual savings to pension savings are included in this estimation, whether they are made within a mandatory or voluntary policy framework.

The theoretical reason for pension savings non-effectiveness on gross domestic savings is what is referred to as transition costs. A pension regime change from PAYG to FFS only has a positive impact on savings if the cost of doing so does not reduce overall savings (Schmidt-Hebbel, 1999; Samwick, 2000; Zandberg and Spierdijk, 2010; Cuevas *et al*; 2008). This transition cost is referred to as implicit debt and it comprises those retirees who have to be paid pensions premiums whilst existing worker contributions no longer directly reach retirees but are deposited in a private fund (Schmidt-hebbel, 1999). Cuevas *et al* (2008) attests that the privatization of pension funds still require ongoing payments be made to current retirees, despite the diversion of contributions to a fund. This indicates financial contributions to existing retirees that continue are due from the public revenue, no loner current workers. Hendriks (2008) argues the implication of this cost is paid by the current generation in foregone expenditure substituted to finance pension debt. He in fact argues that the government incurred substantial liabilities in order to finance pensioners and the additional burden of higher financial debt in the context of grossly high levels of inequality and low levels of income unwarranted. Without the demographic prerequisites of a shrinking youth and growing retired population, the reform is argued to perhaps have been untimely. Especially in South Africa where life expectancies are declining. Furthermore the expectations of improved savings premature if countries incur debt accompanied by high servicing costs, eroding government fiscus at the expense of prioritizing national expenditure targeted at improving social welfare. Fiscal measures taken in financing the transition such as increased taxation, scaling up on borrowing raising national debt, reduced government expenditure or tax incentives promoting retirement savings will determine the net gains made to gross savings from pension reform undertaken, are not correspondingly eroded.

4. Empirical Literature Review

The pioneering investigations on the effects of pension and savings are provided by the works of (Richard and Paul, 1998) and Thomas & Spataro, (2016) who give an overview extending beyond pension effect on savings and capital market development. These papers also considered labour force participation, household income and consumption and job mobility in the extensive surveys of pension fund effects. In this paper our focus is on pension funds and savings. The early works on this topic in the 1970s and 1980s focus only on OECD countries mainly investigating the Social Security Wealth (gross and net) effect on household or personal savings (Munnell, 1974; Feldstein, 1978; Feldstein, 1979; Boyle and Murray, 1979; Makowski and Palmer, 1979; Geletkin and Logue, 1980; Kopits and Gotur, 1981; Kune, 1981). During the same period more studies focused on the effects of social security wealth

with respect to consumptions and household income behaviour. In the 1990s culminating with the increased pension savings wealth, studies incorporating the effect of pension wealth on personal savings and households were produced (Lee and Chao, 1988; Geletkin and Logue, 1980; Kune, 1981; Bailliu and Reisen, 1998; Schmidt-Hebbel, 1999; Morande, 1998; Coronado, 1998).

In the last two decades the empirical testing of pension savings and domestic savings has undergone significant research. One of the early papers investigating emerging market pension reform effects on the labour market, investment and growth also measured impact on savings. Schmidt Hebbel (1999) argued that Chilean pension reform increased both national and private savings. Similarly (Samwick, 2000) reported that Chile increased savings level after pension reform. However, out of 150 countries, it was the only study between 1970-1994 to report increased savings. Furthermore the savings rate of countries with PAYG was lower than those with fully funded systems. This provided evidence that the savings rate was influenced by the pension system adopted.

New evidence introduced by Lopez-Murphy and Musalem (2004) outlined that the impact of pension savings being on national savings depends on whether pension savings are voluntary or mandatory. The econometric analysis included a component of clustering countries where the pension schemes were voluntary or mandatory. Using OLS, the 43 countries tested between 1960 and 2002 introduced an important strand of literature. In other studies several authors have affirmed this view with empirical work (Rezk, Irace and Ricca, 2009) testing Latin American countries Argentina, Chile, Columbia, Mexico, Peru and Uruguay between 1995-2006 showing mandatory pension fund regimes have a positive impact on the aggregate private savings. The relevance of national budgets is introduced into the equation by a study on fifty states in America between 1970-1999 (Bosworth and Burtless, 2004). The primary goal is to estimate the impact of increased pension funding on both national savings and public budgets. The fixed effects model shows that pension savings substitute other forms of private savings and thus have no effect on national savings. Upon the advent of pension reform new bands of literature evolved testing the significance of funded pensions on savings. One of the first research outcomes from Balliu and Reisen (1998) concluded that funded pension increase aggregate savings. The effect was eight times higher in developing economies. The study has a short sample period between 1982-1993 using only 10 countries. Using improved methodologies and 48 countries Bebczuck and Musalem (2006) also focused on the nature of the pension system between PAYG and fully funded expanding on their previous works. The literature argued that there appears to be little evidence that increased pension savings necessarily leads to increased national savings, especially with the policy shifts of pension fund reform. The intensity of an increase in pension savings on national savings varied between 0-20c for every \$1 increase of pension savings showing instances where pension savings impacted national savings. The effect was more pronounced with more mature pension systems showing more significant responses with higher national savings. The sample of 48 countries included 19 OECD countries with 29 developing economies. Many countries having moved to fully funded schemes needed to ascertain whether moving had influenced the national savings rate.

Some of the reasons for decline or no effect in savings from increased pension wealth or savings is explained significantly by Anton et al (2014) and Schmidt-Hebbel (1999). The financing of the pension fund transition is assessed by measuring the pension transition deficit as a percentage of GDP and implicit public debt. Cuevas et al (2008) explores the transition effects of pension liabilities outlining how the newly incurred explicit public debt through transition, may even adversely influence the nations credit worthiness due to the significant fiscal burden incurred. In the South African instance although the work wasn't empirical the debt incurred is a likely reason for pension fund contributions having no effect on national savings (Hendricks, 2008). The effect of depleted national savings and increased tax reliefs for the wealthy crowd out any positive savings effects. This require empirical analysis to determine if this is indeed the case.

The results from various studies show that differences arise in the conclusions of the empirical literature. The various studies in the last two decades, show the relationship between pension fund assets and savings is ambiguous. None of these studies have investigated the accumulation of pension funds assets in South Africa and their impact on gross domestic savings. This gap in literature requires a country specific study. Secondly, the pension fund reform may show different results for the pre and post FFS pension reform systemic change. The results provided by this analysis will offer some explanations for the declining savings rate, in the context of increased pension fund assets.

In summary we find that the literature is inconclusive as studies show that the direction of causality differs and taken into consideration must be the country specific effects. An increase in savings is shown by Balliu and Reisen (1998), Schmidt-Hebbel (1999), Bebczuk and Musalem (2006). In addition positive relationship is exhibited in studies with mandatory savings as a requirement. with Lopez-Murphy Musalem (2004), Rezk et al (2008), Bonasia and Orese (2010). The second strand of literature shows pension funds have no effect or even a negative effect due to their substitution effect in Holzmann (1996), Anton et al (2014), Bosworth and Burtless (2004), Samwick (2000). It is important to establish the empirical linkage in South Africa with Odhiambo (2009) establishing the direction of causality runs from growth to savings, and if this is predominant in South Africa pension assets the long run impact on growth will not be significant. Odhiambo (2004) using the VECM and Johansen cointegration estimation technique also shows that economic growth leads financial development. However the study does not test the specific financial sector it is limited to the aggregate levels of financial development. This study will decompose the sectors and focus on pension assets transmission to savings, these are important as it has consequences on growth. The study will restrict its scope to pension assets and improve the effects of pension funds within financial markets. An additional contribution in one of the models we measure the relationship over 48 years and it is likely one of the longest annual time series surveys conducted in a developing country.

5. Data and Variables

5.1 The Data

The analysis spans a period of 33 years between 1980 and 2013 to measure the impact of pension savings during both the periods of rising and falling savings rates. The dependant variable is gross savings and the independent variables include several determinants of household savings in the model. The model controls for fiscal policy, macroeconomic conditions, labour markets and levels of financial sector development. Data is sourced from the World Development Indicators (WDI), Financial Services Board (FSB) and the Organisation for Economic Co-operation & Development (OECD) Economic Indicators. Total Pension Assets is derived from the FSB, with the Gross National Disposable Income from OECD, and the remaining indicators are derived from the WDI.

Gross Savings is defined as the difference between gross national income and public and private consumption, plus net current transfers. Gross savings which comprises of household, corporate and general government savings as a percentage of GDP is used. The natural log of this measure is used as dependent variable.

Domestic Credit to the Private sector(% of GDP) is used as a proxy for financial sector development. It is measured as a percentage of GDP and the natural logarithm is used. A higher level of financial sector development is associated with the enhanced capability of financial intermediaries to mobilize savings for investments. We expect an increase in private sector domestic credit to increase savings. Data was from the WDI database.

Gross National Disposable Income(GNDI) is the sum of the gross disposable income of all resident institutional units in the economy. GNDI is computed as gross national income and transfers receivable by resident units less current transfers payable by resident units. Disposable Income is the amount of money remaining in a household budget after income taxes have been deducted. The natural logarithm of gross national disposable income was used and data was from the OECD statistics database. We expect an increase in disposable income to increase savings.

Real Interest Rate is the lending interest rate adjusted for inflation as measured by the GDP deflator, the natural logarithm could not be used due to the period of negative real interest rates in the economy. The real interest rate has an ambiguous effect on savings as an increased rate raises the opportunity cost of current consumption (causing savings to increase) yet it simultaneously increases future returns thus it could lead to higher consumption (causing a decline in savings). Data was from the WDI database.

Pension Assets are measured using annual aggregate assets of retirement funds in South Africa. This comprises all Privately administered funds, Underwritten funds, Government Employee Pension Fund, Transnet funds, Telkom Pension fund, Post Office Retirement Fund and Foreign funds. We expect an increase in pension assets to move in either a positive or negative direction with gross savings. The natural logarithm was used and data was from the Financial Services Board.

Unemployment Rate is the measure of the total number of unemployed people as a percentage of the total number of individuals in the labour force. The natural logarithm was used and the data was from WDI.

General Government Consumption Expenditure is the sum of all government current expenditures for the purchase of goods and services. The natural logarithm is used and we expect that an increase in debt service will have a negative effect on savings and the data was from WDI.

The computation of savings as measured by the South African Reserve Bank (SARB) comprises both private and public savings. The measurement of retained income from postponed consumption comprises private (both households and corporates) savings and the public sector savings. South African national accounts according to Prinsloo (2000) show household savings include the income of pension funds and both employee and employer contributions to pension funds. It is important to establish that the measurement of total savings in fact incorporates pension assets.

5.2 Model Specification

The Autoregressive Distributed Lag (ARDL) bounds testing econometric approach will be used to determine the relationship posited in this study. ARDL allows for analysis regardless of the levels of the stationarity of variables in a model, provided that none of the variables are I(2). Pesaran (2001) states that ARDL offers a new approach in testing relationships where regressors stationarity levels are a combination of purely I(0) or I(1). The results of the stationarity tests in this study show that most of our variables are I(1), with only one variable I(0). Chowdhury (2012) further states that ARDL is useful for small sized samples, as the model has the ability to robustly model against autocorrelation and simultaneous equation bias. Another advantageous reason for this estimation technique of the model is in the ability to take an adequate level of lags. Pesaran (2001) makes use of Schwarz Bayesian Criterion and the Akaike Information Criterion for appropriate lag selection per variable. Ozturk and Acaravci (2010) state that ARDL procedure enables a model to have a variety of optimal lags which is not possible with other cointegration procedures. The dependant and the independent variables are permitted to have different lags for different variables. This benefit is described as enabling the past values having the ability to impact the present value (Ajilore and Ikhide, 2013). Lastly, ARDL estimation is able to produce t-statistics that are valid and unbiased in the long run differentiating it from the other more commonly used co-integration estimation techniques (Odhiambo, 2010). It is argued that the ARDL enables the separation of explanatory and dependant variables, this disables the problem of endogeneity (Jalil et al, 2013). Perhaps this is the most advantageous reason for this estimation technique of the model is its ability of the framework not adversely affected by residual correlation further reducing the problem of endogeneity (Sakyl, 2010, Muhammad et al, 2010). It is for this reason this model is advantageous as we measure gross savings which includes pension savings, one of the main explanatory variables.

The control variables that will be used for estimating the contribution of pension assets to savings will include *Private Domestic Credit, Disposable Income, Real Interest Rates, Pension Assets, Inflation, Unemployment Rate*. For Model 1 the model to be estimated is specified as follows:

$$\begin{aligned} \ln(SAV)_t = & \alpha_0 + \beta_1(INC)_t + \beta_2 \ln(PENSION)_t + \beta_3 \ln(INT)_t \\ & + \beta_4 \ln(PSC)_t + \beta_5 \ln(INFL)_t \varepsilon_t \end{aligned}$$

(1)

For Model 2 the model to be estimated is specified as follows:

$$\begin{aligned} \ln(SAV)_t = & \alpha_0 + \beta_1(INC)_t + \beta_2 \ln(PENSION)_t + \beta_3 \ln(GOV)_t \\ & + \beta_4 \ln(UNEMPL)_t + \varepsilon_t \end{aligned} \quad (2)$$

$\ln PFA$ represents the log of total pension assets, which is used to measure pension savings. $\ln INC$ is log of disposable income. $\ln PSC$ represents the log of private sector credit, which is a proxy for the level of financial development. $\ln INT$ represents the level of interest rates, which is used to measure monetary policy. $\ln INFL$ represents the log of inflation as a proxy for uncertainty and macroeconomic stability. $\ln GOV$ represents the log of government expenditure. $\ln UNEMP$ represents the log of unemployment rate which is used to measure the labour market. Subscript t represents the time index and ε_t represents the residuals.

The use of age dependency ratio is an important consideration due to the life cycle theory, however the variable was I(2) and thus could not be incorporated in the ARDL model. Similarly life expectancy is also I(2) and the only variable that will give insights with respect to labour market specific effects is the unemployment rate.

We estimate two models which can be separated into categories making use of the ARDL methodology. The approach used by Loayza et al (2000) gives insights to the broad approaches that can be taken in measuring the reasons for different savings rates in countries. One of the research focuses in that study of savings across the world are country specific savings experiences and policy determinants of these, closely followed in this paper. We separate the models into categories by taking into account indicators identified in literature as explaining the behaviour of pension assets impact on savings rates. The summary of determinants outlined by Loayza et al (2000) is followed in this paper developing economies study focus on specific determinants in various studies. These determinants are traced from more than 7 studies³ and include income, rates of return, financial depth, fiscal policy, demographics, pension systems, uncertainty, distribution of income and wealth and domestic borrowing constraints followed closely by this study. Simeit et al (2011) provides South African specific determinants that form part of this study in the separate models which further emphasis the use of our control variables.

When the explanatory variables are included into one model the results show no long run cointegration and various violations of residual diagnostics. It is important to estimate the cointegration thus the control variables of significant interest can only be estimated using the separate models. The models were constructed using existing literature affording us the ability to measure the labour market impact, levels of financial development and per capita income or per capita GDP effects (Bailliu and Reisin, 1998; Odhiambo, 2004; Ajilore, 2013). The different models are able to reveal the different interactions of each variable on the savings rate. Model 1 we are able to see the effect of levels of financial development, monetary policy, uncertainty, pension assets and income on gross savings. Model 2 includes the labour market effect and a proxy for fiscal policy on the same independent variable.

6. Results and Empirical Analysis

6.1 Stationarity test

The Augmented Dickey Fuller and the Phillip Perron tests were employed to determine the order of integration of the variables. It must be noted that with the ARDL the variables can be I(0) or I(1), however they cannot be I(2). The stationarity test helped to eliminate any variables that do not satisfy this condition. Interest rates and Government expenditure show that they do not have a unit root at levels at the 5 and 1% significance levels, we can reject the null hypothesis that there is a unit root at levels. All the other control variables are I(1) we are able to proceed with the cointegration analysis.

Table 1: Unit Root tests

T stat	ADF	PP	Order	ADF	PP	Order
	Level	Level		Differenced	Differenced	
Gross savings	-1,053933	-0,689357	I(1)	-6,862452*	-7,266662*	I(1)
Income	-1,819868	-1,464601	I(1)	-4,132902*	-4,06806*	I(1)
Private Domestic Credit	0,354821	0,60097	I(1)	-8,735705*	-9,277317*	I(1)
Government Expenditure	-3.880622 *	-4.333168*	I[0]	-5.387661*	-5.383192*	I[1]
Inflation	-0.813102	-2.638151	I[1]	-10.65812*	-12.761*	I[1]
Real interest rate	-3,533991**	-3,501382**	I(0)	-8,1283*	-10,18494*	I(1)
Pension Assets	-2,075593	-2,865243	I(1)	-6,64163*	-6,64163*	I(1)
Unemployment rate	-2,116991	-2,278553	I(1)	-3,978624*	-4,002924*	I(1)

Note: Null hypothesis is that series contains a unit root, alternative is that the series is stationary. ** and * indicate statistical significance at 5 and 1 percent levels respectively.

6.2 Cointegration Test

The bound testing procedure is used to determine whether there is a long run cointegrating relationship between gross savings or gross domestic savings and the independent variables.

Table 2: ARDL Bounds Test for cointegration

Model	The combination of explanatory variables	F statistic
Model I	F(INC, PFA, INT, PSC, INFL)	F stat 3.314992*** LB 2.08 UB 3.0
Model II	F(INC, PFA, GOV, UNEMPL)	F stat 3.492132** LB 2.56 UB 3.49

Asterisks indicate significance level: 10%***, 5%** , 1%*levels

In Table 2 we report the results of the ARDL bounds cointegration test. The results show Model 1 is significant at the 10% level and Model 2 is significant at the 5% significance level. A very strong cointegrating relationship has been established between gross savings and the explanatory variables. The computed F statistic of

3.31>3.00 and F statistic of 3.49>3.49, the hypothesis of no long run relationship existing can be rejected at the 10% and 5% level. There is also evidence of a strong relationship between gross savings rate and all the independent variables when fiscal expenditure and labour market related proxy (using unemployment) are taken into account.

The residual diagnostics for both models show that there is no evidence of heteroscedasticity, as we cannot reject the null hypothesis at the 5% significance level. Similarly the same holds for autocorrelation, we cannot reject the null hypothesis that there is no autocorrelation at the 5% significance level. The histogram shows that the models are normal and the CUSUM of squares and CUSUM tests show that the models are stable.

6.3 Causality Analysis based on Long Run Model

The cointegration analysis shows that there exists a long run relationship between gross savings rate for the models.

The block exogeneity results show that in the short run *INC* causes gross savings. Thus the model exhibits unidirectional relationship between pension and savings and we do not find evidence of savings causing pension fund assets.

The results of the short run dynamic coefficients are not shown causality is tested using the Wald test for each independent variable. In Model 1 we see that in the short run the Wald test shows that the variables *PFA* causes gross savings. In Model 2 the short run representation shows that the variables *INC*, *GOV*, *UNEMP* has a positive effect on savings in the short run.

Table 4: The Long run Estimation

Variable	Regressors	Coefficients	(t-stat)
F (INC, PFA, INT, PSC, INFL)	LNINC	0.350113	1.263414
	LNPFA	-0.486256**	-2.145695
	LNINT	0.006127	0.773622
	LN PSC	-0.489895***	1.973882
	LNINFL	0.371143***	2.004030
F(INC, PFA, GOV, UNEMPL)	LNINC	0.389041***	1.848002
	LNPFA	-0.343143***	-1.861146
	LNGOV	0.163443	0.514061
	LNUNEMP	-0.335011	-2.504080

*1 % significance level, **5% significance level, *** 10% significance level

The estimated coefficients show that in the long run a 1% increase in income (*INC*) has a positive result. In Model 2 the results show a 0.38% impact on gross savings rate, from a rise in income. This is expected with various other studies showing positive linkages between an increase in income with increased savings levels (Samwick, 2000; Simleit, Keeton and Botha, 2011).

When testing the impact of levels of financial development we find that the variable has a negative relationship and it is significant at the 10% significance level. This finding confirms our a priori expectations that an improvement in savings can be expected with higher levels of financial development, as financial intermediaries are able to mobilize savings for investment and manage risk. The coefficient for government (*GOV*) consumption is has a positive relationship but it is not statistically significant. The results are ambiguous as public consumption in other studies shows a negative effect on savings (Loayza, Schmidt-Hebbel and Servén, 2000). Simleit (2011) argues that the prudent fiscal position of the South African government is inadequate to improve savings levels. The predicted theoretical expectation that higher levels of uncertainty result in higher savings levels holds true as we see a 0.37% increase in savings from a 1% increase in uncertainty (Loayza, Schmidt-Hebbel and Servén, 2000).

The coefficient for the interest rate (*INT*) consumption is has a positive relationship but it is not statistically significant. Literature shows relationship with interest rates is ambiguous due to various other studies showing mixed results (Samwick, 2000; Simleit, Keeton and Botha, 2011). Prinsloo (2000) argues in the event that the substitution effect prevails, interest rates will have a positive effect on savings rate.

Pension assets (*PFA*) is the main variable of interest and it has a negative relationship with gross savings in both models. A 1% increase in pension assets resulting in a (-0.48%), (-0.34%) decrease in savings in Model 1, 2 respectively. This is significant at the 5 and 10% significance levels. Other studies confirm that pension savings can be a substitute for other forms of saving thus exhibiting no positive effect on total savings (Bosworth and Burtless, 2004; Anton et al, 2014). Holzmann (1996) outlines the negative coefficient of pension assets is likely the impact of fiscal performance and public dissavings. Prinsloo (2000) and Simleit et al (2011) outline public dissavings were prevalent particularly in the 1990s and 2000s in the South African context. The financing of pension reform through public expenditure and higher taxes may have reversed the effects of an increase in pension assets on savings rate. The required increase in corporate savings has been inadequate to offset both a declining household and government savings.

7. Conclusion

The evidence suggests that despite rapid accumulation in pension assets, this has not led to a positive impact on savings. Despite a more developed capital market and highly developed banking sector, the financing of pension fund reform may limit the savings impact of pension funds. An increase in income has a positive effect in savings levels. Policies that will increase household income growth and disposable income levels amongst the low-income households, will positively impact savings. It is imperative to increase the number of employed to reduce the dependency ratio in low-income households, this may show positive results for pension savings.

Although the effect of South Africa's well developed social security system on savings was not measured it could promote the deferment of savings in old age and reliance on state assistance.

Policies that will increase the level of household savings and reduce government dissavings should be adopted, in order to boost the savings rate of South Africa. The government having adopted the privatization of pension funds has not measured the effect of government decline in savings due to continued deficits, financing the transition may have depleted the intended effect of an increased savings. This requires further research but both South Africa's high unemployment rate requires a response that reduces the low levels of household incomes. The government must boost economic growth that is coupled with labour intensive economic growth in order to boost higher household savings required for the high levels of investment required for higher growth. Dependency on volatile foreign capital inflows remain inadequate for South Africa to boost its investment levels and growth without the required accumulated domestic capital acquired from postponed consumption. The study recommends policy makers should boost higher household savings through increased income levels and encouraging labour intensive growth.

8. References

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