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The Case of Pension Funds Evolution and Reforms in South Africa: A Shift from PAYG to FF

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THE CASE OF PENSION FUNDS EVOLUTION AND REFORMS IN SOUTH AFRICA: SHIFT FROM PAYG TO FF

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The paper examines the cointegration between pension assets and economic growth in the presence of structural breaks in 1995 and 1999. The structural breaks are endogenously determined. This paper gives an extensive literature review of the theoretical and empirical framework of pension fund reform in relation to growth. The literature shows pension fund reform has been encouraged with some emerging market economies including South Africa shifting from Pay As You Go (PAYG) to Fully Funded Schemes (FFS). The Zivot Andrews and modified ADF unit root test are used, and empirical evidence suggests no evidence of a unit root. This paper examines the cointegration between pension assets and economic growth in the presence of structural breaks. We find that pension assets have a positive but minimal impact on growth in the presence of structural breaks. The direction of the results is similar for the model with or without structural breaks. The results show that pension reform in South Africa has not contributed to a redistributive growth agenda despite the financial sector sophistication coupled with the strong institutional and regulatory framework.

Keywords: Pension Funds Reform, South Africa, structural breaks, PAYG to FFS, ARDL, Zivot Andrews

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1. INTRODUCTION: WHY REFORMS?

Pension policy reform is a worldwide trend with several countries undertaking major and minor adjustments substituting and replacing the PAYG system with the FFS. The World Bank is a key proponent in restructuring and offering reform technical inputs to several economies undergoing pension reform. Countries undergoing pension reform from PAYG to FFS outline the objectives of diversifying risk whilst maintaining economic growth and social protection. Holzmann (1999) outlines four crucial drivers for reform determined by the World Bank for financial viability both in the short and long term. Demographic trends show that high old age dependency ratios affect long-term fiscal viability, whilst short-term debt obligations to pension schemes in some countries create fiscal problems. Pension policy may affect growth if it is found to have a savings effect, this is heightened when strong linkages between labour markets and benefits are found. The third driver towards pension reform is to ensure all workers receive benefits related to earnings, protecting them from low rates of return and potential misuse which erodes workers' benefits.

Pension fund reform requires long-term fiscal views due to the considerable impact, transition burden and complexities associated with it. The conventional means of addressing PAYG shortfalls are inadequate for the long-term sustainability required for pension funds (Holzmann, 1997, 1999). The main concerns outlined by the World Bank driving nations towards reform are short-term concerns where pensions crowd out government revenue or cause high government debt, impacting long-term growth prospects. Secondly, the long-run fiscal viability is put under pressure due to the old age dependency ratios prevalent in most developed countries. This is not necessarily the case in developing economies, as is the South African situation. In addition, the negative economic effects on savings rates and unclear linkages between contributions and benefits distort labour market outcomes, which must be resolved (Holzmann, 1999).

Barr (2000) disagrees that a change in pension scheme need be the only solution to resolve long-term financial viability. Parametric measures such as raising the retirement age and reduction of benefits to pensioners are insufficient means alone for addressing the shortfalls of the existing PAYG system. Alternative measures to prevent fiscal imbalances are a necessity as the reduction of public expenditure proposed may not always be feasible given the social and developmental needs, particularly in developing countries. He argues that it is possible to increase the savings rate, implement policies that will increase the number of workers, or improve output such that the average nominal wage rises. Other solutions include reducing public expenditure or paying off future debt in advance, a function dependent largely on fiscal discipline. These recommendations will all contribute to the increase in total contributions so that there are adequate reserves to pay pensioners. Vittas (1999) agrees that

parametric measures do not have such a long-term impact on savings and capital accumulation as would pension system reform.

This paper seeks to highlight the impact of the shift from PAYG to FFS and the issues resulting from the structural shift. It is important to ascertain whether the reform had positive effects on the levels of growth. This paper seeks to capture the impact of the structural break and make a comparison with the pre- and post-reform scenarios.

2. PENSION REFORM IN SOUTH AFRICA: THE SWITCH FROM PAYG TO FFS

The newly formed democratic government of 1994 produced several social security reform discussion papers and reports contributing to policy changes and legislative amendments in the sector. Over the last two decades there were no less than nine such outputs and commissions: the Mouton Commission (1992), Katz Commission (1995), Smith Committee (1995), Lund Report (1996), National Retirement Consultative Forum (1997), Report of the Committee of Inquiry into a Comprehensive System of Social Security of South Africa (2002), Taylor Report (2002), National Treasury Discussion Paper on Retirement Reform (2004) and the National Treasury Social Security and Retirement Reform (2007) (Nevondwe, 2010; National Treasury, 2004; van der Berg, 2002; Standish & Boting, 2006). These reforms focused on improving conditions of access and preservation regardless of race. Recommendations also improved the tools and mechanisms to improve the execution of the provision of social security, resulting in the formation of institutions such as the South African Social Security Agency (SASSA). The Mouton and Katz Commissions, and National Treasury (2004), focused on strengthening member protection and benefits.

The Commission's recommendations included revisions of the tax structure to improve and encourage savings for retirement. Although such reforms are argued to increase savings, a criticism is that they have enhanced tax benefits for a minority. South Africa has adopted a tax relief structure argued by Van den Heever (2007) and Nevondwe (2010) to be disproportionately beneficial to high-income earners. For instance only pension fund contributors are beneficiaries of favourable tax treatment, as opposed to provident fund holders where a large proportion are union members (Nevondwe, 2010). Retirement annuity funds receive restricted benefits, showing selective treatment of tax benefits. Despite the reform measures taken, the tools have been inadequate to sufficiently improve access to retirement provision for the large majority of those who are in the informal labour market or those employed at irregular intervals. The majority of the South African participation rates remains dismally low, leaving more than three-quarters of the elderly reliant solely on state assistance for income during retirement.

Pension reform is effected through a variety of processes, these are mainly legislative and regulatory changes, tax changes, contribution levels, liabilities and debt management levels. Moleko and Ikhide (2016) categorised South Africa's pension evolution into four stages: infancy (1911–1958), a period of separation (1959–1984), continued separation (1984–1994), and corporatisation and amalgamation (1995–2015). Harmonisation of tax treatment in order to simplify taxable benefits and to encourage savings incentives were designed. National Treasury (2013) introduced harmonisation of tax treatment of pension funds, provident and retirement annuities. Tax free savings of up to 27% of individual earnings to encouraging long term retirement savings and to discourage early withdrawals these are taxable on a sliding scale between 18 – 24%. Upon retirement up to a third can be retrieved in lump sum payment with the remaining portion annuitized. The intention was to ensure equity and more progressive tax system that reduces benefits concentrated in mainly high-income earners. This chapter takes a specific focus on the switch from PAYG to FFS and thus it is necessary to understand the preconditions necessary, the likely gains and the South African context. There are three predominant pension reform methods referred to in literature, commonly known as systemic, parametric measures or notional defined contribution (Holzmann, 1999; Vittas, 1999; Schmidt-Hebbel, 1995, 1999; Poirson, 2007; Walker & Lefort, 2002; Hauner, 2008). These measures can be implemented as reforms within the specific type of pension system. According to Rhodes and Natali (2003) reform paths within occupational plus purer occupational pensions schemes constitute non-parametric changes that converge benefits and improve labour market conditions. This tends to increase labour supply reducing the problem of financial instability and intra-generational inequity. Pure universal models suffer financial viability problems, especially where the labour market is not producing new jobs. This is not the context of the South African dilemma.

2.1 Preconditions for reform

A strong regulatory environment and effective institutions are requirements for any pension reform to have an impact on capital market development. Secondly there are economic system preconditions for a country to make optimal gains from pension reforms: they are termed feasibility and impact preconditions (Vittas, 1999; Meng & Pfau, 2010, Walker & Lefort, 2002). A nation's macroeconomic stability determines whether inflationary effects erode gains made. A sound regulatory framework must consist of institutions that regulate and monitor the development and application of laws in the local securities markets. Financial sector institutions such as banks and insurance companies will accelerate gains made from pension reform, but they must be efficient. The development of new instruments, issuing licences for the operation of pension funds and monitoring compliance requires a strong agency and driver. Without these pre-conditions of macro-economic stability, sound insurance companies

and banks, and effective regulation and supervision, the dynamic interaction between pension funds and capital markets will be limited reducing any gains that a systemic change from PAYG to FFS ought to produce.

A pension regime change only has a positive impact on savings if the cost of doing so does not reduce overall savings. This transition cost is borne when one undergoes a shift from PAYG to FFS. It is referred to as implicit debt and it comprises those retirees who must still be paid future and current pensions whilst existing worker contributions no longer directly reach retirees but are deposited in a private fund. Cuevas et al. (2008) say that the privatisation of pension funds still requires on-going payments to current retirees. This cost can be paid by the current generation or it can be spread across multiple generations. The decision taken on how to finance the transition will determine the net gains made from savings (Schmidt-Hebbel, 1999; Samwick, 2000; Zandberg & Spierdijk, 2013; Cuevas et al., 2008). Should the current retirees have their benefits reduced? Or should taxes of current workers be increased to finance the implicit debt? Another alternative would be to issue government debt, and this raises the question of how the debt is financed in the long run, through an increase in taxes or reduced consumption?

Implementing these options may cause savings to fall, denying the economy the intended benefits of reform. It is argued by Murphy and Musalem (2004) that if current retirees bear the costs, savings would increase because they have a high propensity to consume. Another argument is that the wealth transfer under the two systems is allocated to either high or low income earners who hold differing propensities to save. In an FFS, wealth is transferred to high income earners who have a higher propensity to save, and thus savings increase. When implementing pension reform, to induce individuals to save there are usually complementary tax rebates or exemptions. This holds true particularly in voluntary pension programmes and these exemptions mean that such preferential tax treatment reduces government tax revenue, reducing government saving (Murphy & Musalem, 2004). The simple linkage of one's pensions contributions and benefits may cause savings to arise in the context of reform. Awareness programmes that raise the importance of savings may improve individuals' behaviour to save.

In the event of financial viability the World Bank states that country responses have focused on moving from PAYG to FFS, and in the short term reducing benefit (Holzmann, 1999). Reforms in several countries have been undertaken because of weaknesses in the PAYG system. Some were supported with technical assistance by the World Bank to effect transitions from PAYG to FFS (Zandberg & Spierdijk, 2013; Bailliu & Reisen, 1998; Holzman, 1997, 1999; Holzman & Stiglitz, 2001).

Another argument that is commonly used to propose for pension system reform is the need to strengthen linkages of individual contributions to benefits (Holzmann, 1999; Uthoff, 2006; Holzmann & Stiglitz, 2001). The weak linkages between the two result in the working population equating contributions as an addition form of labour tax.

According to Holzmann (1999) budget deficits are a common feature in countries using the PAYG system, usually short-term budget management is a concern. The inability to treat these transfers as savings (which have the potential to drive investment) lead to dead weight losses and reduce output and growth. Evidence on whether reform leads to savings is mixed and therefore inconclusive, but the stimulation of additional benefits in the overall financial system leads to development (Raisa, 2012; Zandberg and Spierdijk, 2013).

2.2 Gains of reform

In the literature, systemic reform benefits are equivalent to those gained from an increase in pension assets. They include increased savings, capital market development and improved governance. Additional improvements in the case of reform to financial markets include improved competitiveness with institutional investors, development of new instruments, modernisation of infrastructure and a stronger regulatory framework, corporate governance and even market integrity. The intensity of the gains of reform are higher in markets with already high levels of financial development (Meng & Pfau, 2010).

Schmidt-Hebbel (1999) measured the effects of pension reform in five areas: the labour market, investments, factor productivity, growth and savings. It is an example of the multiple effects of pension assets on the economy, showing that growth and savings are but two of these areas. In this study, using empirical evidence we try to establish whether there is conclusive evidence linking reforms and growth.

It is important to point out that countries are at different stages of the demographic transition and although developing countries are at the incipient and moderate stages where the youth is growing, fertility rates are high and the number of elderly people are low relative to the working population. Some countries are reaching consolidation and exhibiting signs of lower fertility rates and an increasing elderly population towards full demographic transition (Uthoff, 2006). This is the case in some Latin American countries such as Brazil, Peru, Venezuela and Colombia, though not to the same extent in European countries already reaching the advanced stages of demographic transition. Rhodes and Natali (2003) argue that financial viability is further worsened by pension schemes that are reaching maturity. When the ratio between the elderly (the beneficiaries) and the working population (contributors) is rising, it is likely to put further pressure on the fiscus. Contributions in PAYG schemes are made by the employed, and in scenarios where nations experience high unemployment rates, the pressure

on contribution levels by the working population is further exacerbated. This is two-pronged, as both the future number of dependants who will require social protection from the state will increase, and the number of contributors in a PAYG system who contribute to existing beneficiaries decreases. Barr's (2000) simplified pension system model is an equation comprising the number of pensioners multiplied by the nominal pensions and this is equivalent to the contribution rate of the existing number of workers multiplied by the wage bill. Barr modified the model by factoring in a reduction in wages. To balance the equation it would require either an increased contribution rate or an increase in the number of workers contributing in order to meet the pension payouts for existing pension holders. Reduced productivity, and heightened dependency ratios and wage levels holds significant risk for continued sustainability where the number of employed is unlikely to rise and contribution levels of the employed are declining (Rhodes & Natali, 2003).

Van den Heever (2007) argues that the heavy reliance on the state is further worsened by the fact that a significant portion of the employed South African population does not save for retirement. The life cycle theory only assumes dissavings in old age or retirement phase, yet in practice the situation is vastly different (Uthoff, 2006). An estimated 5.4 million informal workers are non-contributors and an estimated 47.8% of the working population neither plan nor save for retirement. Uthoff (2006) presents reasons for non-savings after taking into account prevailing labour market conditions such as job insecurity, income instability and part-time work. Single-headed households led by women in the absence of men cause women to playing dual roles, putting greater strain on them and further restraining them from holding stable jobs. These are important considerations when looking at pension system reform options.

2.3 South Africa's context

Literature on South African pension reform is severely limited. The focus on pension reform literature largely covers the non-contributory first pillar (Van den Heever, 2007; van der Berg, 2002; Nevondwe, 2010; Hendricks, 2008). The main purpose of pension systems is to encourage the population to smooth consumption over their lives, thus saving income now to provide for the old aged in their retirement. Where they are unable to save, the state would finance the poor with income through non-contributory schemes (Holzmann, 1999; Rhodes & Natali, 2003; Uthoff, 2006; Van den Heever, 2007; Van der Berg; 2002). There are structural economic, labour and political characteristics in a country that give rise to specific risks and challenges. Pension reform seeks to reduce the demographic, political and macro-economic risks that reduce the ability to provide income for the old aged in their retirement (Holzmann, 1999). The structural characteristics of a country are important in identification of these risks. Issues of inequality and low growth levels lower the ability to absorb a usually growing working

age population into the labour markets. These are predominantly characteristics of African and Latin American countries, affecting the contribution levels of workers and the number of workers who are fully employed. This will determine the design of pension schemes and the extent to which the state bears the burden of reducing poverty. The most common risk in developed and industrialised economies is rising life expectancies presenting the dilemma of an increasingly ageing population. These, matched with lower fertility replacement rates, equate to higher old age dependency ratios. Germany, Italy and France show dependency ratios higher than 40%, which means that the number of elderly people in ratio to the working population is rising significantly (Holzmann, 1999; Rhodes & Natali, 2003; Stiglitz & Holzmann, 2001). The total value of contributions will not be able to meet the rising and current benefits required to pay the nominal pensions of existing pensioners. This simply means in the medium to long term there will simply not be enough people in the working age population (15-64) to pay the required contributions to sustain the retirement income of pensioners. There are indications that this will lead to an increase in taxes or debt to finance pension expenditure, putting significant pressure on country budgets. The debate on the long-term fiscal viability becomes relevant at this point, however in South Africa this has little relevance.

Pension reform takes place in the context of an existing pension system or scheme, and the nature of reform can take various forms. A commodified regime is where there is a strong push towards privatisation and a decommodified pension system is largely tax financed, underpinned by the country's specific political economy. Rhodes and Natali (2003) outline that it is the prevalence of the state versus the private sector in the provision of pension schemes that determines the route to reform. The question arises of who bears the greater responsibility of providing pension benefits and the prevalence of public versus private schemes where multiple pension schemes exist. Private schemes provide benefits through occupational arrangements (second or third pillar) and public schemes or universal systems (first pillar). A mix between the systems arrives at the universal plus occupational scheme (multiple pillar). Barr (2000) proposes an alternative to pillars: these are developed according to country priorities and referred to as tiers. The difference between tiers and pillars is that tiers place far greater emphasis on objectives of a country versus prescribing a shift before aligning any reform to measures. He maintains that the second tier need not be privately managed, against the World Bank view, and proposes that public-managed schemes may face reduced risks.

Political risk is one of the factors driving the privatisation of pension funds, as it removes potential political interference in the use of pension funds as the state will be prohibited from borrowing the funds. In PAYG schemes high degrees of political risk exist with the use of the funds and the level of retirement income paid to pensioners which is subject to change during times of fiscal imbalance. The regulation of pension fund portfolio managers and investment

management companies also poses significant risks, as the institutional capacity of state regulators determines the ability and efficacy to monitor and police the sector in relation to regulatory framework. Barr (2000) argues that private pension schemes face additional risks beyond those that are common to both publicly and privately managed schemes. All schemes face political risks, demographic and macro-economic shocks. However private schemes cannot guarantee a rate of return due to annuities market risk, investment risk that is linked to the stock markets and management risk inherited through the fault of incompetent or fraudulent fund managers. In addition, Van den Heever (2007) outlines the cost structure of privately-managed policies in South Africa that range between 26.7% and 43.2%. He maintains that as calculated in a previous actuarial report, the findings show that there is secrecy, lack of transparency, and lack of competition concerning administration costs. The fee structure is an additional reduction of benefits in a privately managed scheme across countries. These are important considering the beneficiaries whose net income will be reduced by administration fees charged in the industry.

Compliance to pension laws and regulations is left largely to a Pension Fund Regulator, a state-owned enterprise left to police the entire sector. In South Africa the FSB currently oversees, regulates and monitors 6,581 funds, previously there were between 11,000 and 15,000 funds in the last three decades (FSB, 2012). The necessity of a complex set of skills and capabilities must be highlighted as the protection of 15 million pensioner contributions require legislative compliance by every fund. It is a colossal task. It is also noted that the Pension Fund Registrar excludes public pensions such as the GEPF, Transnet and Telkom, which constitute more than half the value of total SA pension assets, from its direct regulation. Without independent institutions and regulations that curb misuse of public funds, political risk remains a problem. The different systems will both still require strong regulatory and institutional mechanisms in their execution.

2.4 Outcomes of the reforms

The era of changing the funding modality lay within the last phase of corporatisation wherein the Public Investment Corporation Act of 2004 was enacted. For the historical pension reform development, it was necessary that pension laws and regulations be amended. The Department of Finance now referred to as National Treasury's reported in its Annual Reports (1998 and 1999) that the GEPF was formed after the amalgamation of several funds. A single homogenous fund with standard benefits, retirement provisions and requirement and management was formed post 1994. As at 1998 the GEPF had 1.1 million contributing members. There is little documented evidence on the purpose, nature and specific areas of reform conducted during the corporatisation period by National Treasury. Hendricks (2008) and National Treasury (1998, 1999) outline minimal debt-related results likely to be attributed

to pension reform with little provided on the purpose, nature and specific areas of reform conducted during this time. The lack of policy guidance on the transition and formation of several new institutions makes it difficult to measure whether the intended economic consequences of the reforms have been fulfilled.

Hendricks (2008) argues that the elimination of political risk was the driving factor behind pension reform, stating that beyond the protection of apartheid era public servants pensions, the downside has been the cost of debt maintenance and opportunity costs of forgoing meeting the social needs that the people of South Africa are in dire need of. The reform propelled by a demographic transition at advanced stages does not hold for South Africa, in fact National Treasury (2004) agrees that there is no problem of an ageing South African population as there is in most developed economies. Therefore the PAYG to FFS shift propelled by the government can be attributed largely to the argument of political risk and savings effect and a reduction of labour distortions leading to economic growth. This is vociferously opposed by Hendricks (2008) in lieu of the additional investment risk from the stock and bonds market, annuity risk and pension fund management risk that pensioners face under such a scheme.

Vittas (1999) says that long-term economic growth exceeding benefits from labour market distortions are possible only with systemic change. That means a move from PAYG to FFS is most likely to lead to capital market development. Enhanced savings and financial market development are not generated by Notional Defined Contributions (NDCs) or parametric type of pension reform.

During pension reform there is a transition period where social security contributions no longer directly offset existing pension payments. They are deposited in a fund: in the case of South Africa this is the GEPF, which is managed by the PIC. The ongoing pension payments to existing pensioners must continue and it is here that public debt is usually raised if the fiscal position is not in surplus. Financing the transition requires selling state assets, incurring liabilities, reducing government expenditure or raising taxes.

According to National Treasury the GEPF reforms resulted in improved levels of unfunded liability levels, which were reduced quite significantly on a yearly basis. The percentage levels of the funded liability increased from 72 percent in the previous year(1998), to 96.5 percent in 1999. The value placed on the unfunded liability was reduced to R5.26 billion. There is scant mention of the cost of the reform and how it was financed. The Annual Report (1999) stated that more than a fifth of the fiscus at 21.4 percent went towards debt repayment in 1998. This cost is due to domestic debt, of which 98 percent was incurred after 1994 or agreed to during the negotiated Convention for a Democratic South Africa talks. This debt is domestic debt both

inherited and acquired, and the holders of 40 percent of the domestic debt were the Public Investment Commissioners, which held the assets of the GEPF.

In South Africa evidence points to issuing of government debt, which is argued by Hendricks (2008) to have had a neutralising and even negative impact on the improvement of aggregate savings. Cuevas et al. (2008) explain broadly that a pension system change affects the debt structure of a country. The pensions owed to pensioners are known as implicit debt and when privatisation occurs this debt becomes explicit debt, changing the composition of liabilities with financial debt replacing the implicit debt which has a direct impact on country credit risk. It is no longer hidden and must be repaid. Empirical results (Cuevas et al., 2008) show that financial debt increases the perception of riskiness as the nature of liabilities is amended. Pensioners are afforded equal status on their claims as creditors, equal to bondholders, a far higher status than those offered to PAYG participants who hold a lesser claim than any creditor with government. It has been argued by many that this part of the transition may erode all benefits of reform, with financing costs are too high. Holzmann (1997) argues in favour of the benefits derived from reducing the implicit debt from unfunded pension liabilities, but outlines that it requires a complex redesigning of fiscal flows and management. Higher old-age dependency ratios and pension system maturity are contributing factors to the higher implicit debt levels that developed countries hold in contrast to developing economies (Schmidt-Hebbel, 1999). The shift in South Africa's pension system from PAYG to FFS has seen significant amounts of debt incurred by the national government. Hendricks (2008) argues that the astronomical growth in debt from R68 billion to a staggering R990 billion between 1989 and 2008 was largely due to government borrowing money from itself to secure pension funds of civil servants. No empirical work on investigating pension fund reform has been done to date. Overall a systemic change can cause increased savings, capital market development and improved governance.

3. EMPIRICAL LITERATURE MEASURING SWITCH FROM PAYG TO FFS

Analysing the measurement of the impact of reform, literature has shown emphasis on Latin American countries (Chile and Columbia) with only single measurement on Russia and India (Holzmann, 1999; Vittas, 1999; Schmidt-Hebbel, 1995, 1999; Poirson, 2007; Walker & Lefort, 2002; Hauner, 2008; Uthoff, 2006). Empirical studies on sub-Saharan Africa are severely limited. There is a focus on Chile due to the historical significance and reform measures taken in 1981. Its reform included the replacement of PAYG to FFS, partly motivated by an ageing population. It remains a popular case study in the literature for reducing political risk, improving fiscal sustainability and reducing labour market distortions (Acuna & Iglesias, 2001; Holzmann, 1996, 1997; Schmidt-Hebbel, 1999; Shelton, 2012; Vial & Melguizo, 2008).

An increase in pension assets in an FFS is argued to have a positive effect on growth. Savings is one of the channels through which pension fund accumulation exhibits growth effects. This accumulation of capital leads to improved resource allocation and investment, which in turn leads to capital market development. This in turn has positive consequences for productivity and output. Empirical studies have largely focused on the impact of funded pensions on savings (Balliu & Reisen, 1997; Bebczuk & Musalem, 2006; Bosworth & Burtless 2004; Murphy & Musalem, 2004; Rezk et al., 2009; Schmidt-Hebbel, 1999; Holzmann, 1997; Samwick, 2000) and more recently on capital market development (Walker & Lefort, 2002; Enache et al., 2015). Other positive pension reform effects include fiscal viability, reduced labour market distortions, tax distribution effects and reduced political risks. These fiscal benefits and impacts on taxes and public debt or fiscal viability though not measured are usually expressed in models or graphically forecast (Holzmann, 1996; Poirson, 2007; Hauner, 2008; Schmidt-Hebbel, 1995; Uthoff, 2006).

One of the first studies measuring pension reform effects focused on its effect on Colombia's macroeconomic and fiscal economy. Schmidt-Hebbel (1995) used simulation techniques to forecast the economic gains of reform and costs of financing deficits incurred from PAYG. There were other parametric reforms such as increasing contribution rates, introduction of the first pillar of voluntary schemes, and regulatory reforms in the sector. The simulation varied and eight scenarios were forecast for Columbia. The main differences in each varied between a) the levels of pension system coverage, b) the nature of pension reform determined by levels of retirement ages and contribution rates, c) the economic state varied between low and high growth, wages and interest rates, and d) the speed of reform and movement to private funds. Each level of reform showed different results, positive output increase and higher savings. Using similar simulation methods based on equilibrium growth models, Chilean pension reform and its impact is measured, and shows positive effects on growth, output and productivity in the labour markets (Schmidt-Hebbel, 1999). Between 12% and 41% of the output or growth in GDP can be attributed to pension reform. Holzmann (1997) reaches the same conclusion: that total factor productivity was significantly improved post pension reform. Stylised facts trends show that in several countries labour force participation of the elderly has reduced. Schmidt-Hebbel (1999) found that PAYG effect reduces informal labour market participation, simply meaning that employment becomes more formalised.

Several papers compare the effects of pension reform in pre and post reform era (Hauner, 2008; Poirson, 2007; Schmidt-Hebbel, 1995, 1999). The studies assess the financial implications using variables such as levels of market capitalisation or levels of pension assets. The micro and macroeconomic effects focus on variables such as GDP levels, consumption levels, investment, and productivity. The focus is not only on the effect that reform exhibits on

savings and growth, but also on other variables. Using a Dynamic Stochastic General Equilibrium model Hauner (2008) estimated the macroeconomic impact of three financing scenarios on GDP, Government Debt Ratio, Current Account, Investment, Consumption and Foreign Assets Ratio. Funding reform is debt, tax or expenditure financed in a nation, exhibiting different outcomes. The models suggest that borrowing and higher taxation should be avoided, and whichever method is applied lower government consumption is advised. Pension fund reform in emerging markets showed positive impacts on capital markets such as improved financial depth, enhanced pension assets as a percentage of GDP, and a rise in total pension fund assets (Hu, 2012). Poirson (2007) used forecasting techniques used to show the impact of pension reform on market capitalisation and debt levels in India and Russia. The level of assets under management in relation to market capitalisation is plotted in a trend graph. This raises the question of whether a model can be developed to determine how much pension assets develop market capitalisation.

Enache et al. (2015) used a single equation Error Correction Model shows that increasing private pensions has a positive effect on the development of capital markets. The effect is stronger in the short term than in the long term, with the vast definitions of capital market development the paper selects market capitalisation of listed companies as a percentage of GDP as a proxy. This is certainly a limitation in the study, as there are various layers to its definition. Factors such as improved legal framework and financial structure, depth, liquidity, innovation, new instruments, specialisation, improved governance, and lower price volatility are but a few of the argued benefits of pension reform on capital markets. In such a measure of capital market development, the true impact may not be captured adequately. Walker and Lefort (2002) approached the empirical analysis by measuring the impact of pension reform on cost of capital, volatility and reduced transaction costs in 33 countries. The pension reform effect was measured on the cost of capital, impact of reduced transaction costs and volatility. The results show that pension funds reduce the cost of capital and lower security price volatility, they also show that markets exhibit higher traded volumes. Perhaps one of the gaps in literature is the construction of a measure for capital market development, so as to measure the true impact of pension fund reform.

Literature has focused largely on the impact on aggregate savings and national savings, and the results are inconclusive. It is well known that increased savings is a principal reason driving pension reform. The results show higher private savings in developing countries (Schmidt-Hebbel, 1999). In Chile, up to 31% rise in savings can be attributed to pension reform. There is a mixed bag of results in the literature of whether savings are increased when a nation moves from partly funded or PAYG to an FFS. Several studies show that pension reform as defined by moving from PAYG to an FFS leads to an increase in aggregate savings (Balliu &

Reisen, 1997; Bebczuk & Musalem, 2006; Rezk et al., 2009; Schmidt-Hebbel, 1999; Holzmann, 1996). Murphy and Musalem (2004) agree it is only in a mandatory pension scheme system that reform exhibits a positive impact on savings. Samwick (2000) proved that indeed savings rates are higher in countries with FFS, however the transition has not necessarily led to a higher savings rate. Two other studies show that pension savings could potentially replace private savings and even decrease savings (Bosworth & Burtless, 2004; Murphy & Musalem, 2004). If in fact pension savings act as a substitute to private savings this means reform has no effect on savings (Bosworth & Burtless, 2004; Samwick, 2000). It is only in Chile that a shift has led to an increase in national savings, but this is disputed depending on the author and technique used. Holzmann (1996) finds that Chilean savings are not positively affected by pension reform. Therefore, shifting the flow of funds from the fiscal to financial system does not guarantee a positive increase in aggregate savings.

4. EMPIRICAL METHODOLOGY AND MODEL SPECIFICATION

The paper employs the restricted VAR model and the eight variable VAR model comprises pension fund assets (PFA) and pension fund assets with structural break (PFA99), stock market capitalisation (STK), population growth (POP), number of listed companies (LST), total pension asset interaction (INTPFA), (DEBT) which is a measure of national debts owed and per capita GDP (GDP).

This paper differs as we do not use the ordinary unit root tests that have that enabled us to establish the presence of a unit root without misspecification bias and size distortions. Using the Zivot-Andrews (ZA) unit root test we account for the presence of one or two structural breaks.

The use of a VAR framework allows us to measure the relationship between pension fund assets (with and without structural break), capital market development, national debt, governance, population and economic growth. It also allows for the multivariate cointegration techniques in modelling long-run behaviour. Using variance decomposition and impulse response functions, we can estimate the variance of the errors for the variables and examine their sensitivity.

The model to be estimated is specified as follows

$V_t = \sum_{i=1}^{k} B_i V_{t-i} + \varepsilon_t$ where

$$V_t = bGDP_t, PFA_t, STK_t, POP_t\ INTPFA_t\ LST_t\ PFA99_t\ DEBTLST_t$$

The VAR consists of eight variables and the long-run equilibrium is tested between all the variables utilising the Johansen cointegration method. The variables were not all stationary at levels, enabling us to move directly to estimating VAR. The multivariate Johansen

cointegration technique makes use of the maximum likelihood procedure amongst non-stationary variables (Johansen, 1992). Using the maximum Eigen and Trace statistics we estimate the rank of the cointegrating matrix. These statistics are able to show whether there is a cointegration vector between per capita GDP and the other variables.

The next stage in the estimation enables us to empirically test whether there is reverse causation? The multivariate Granger causality based on VECM allows us to estimate causation between the variables. This is measured by Granger causality/Block Exogeneity Wald Test in the VECM estimation using the error correction terms. The null hypothesis in this instance is that there is no causality, where this is rejected the model confirms the presence of causality. It is argued that this method is preferred to the VAR due to its ability to reveal temporary causality as it uses the coefficient of lagged error correction term and those of the explanatory differenced variables (Agbetsiafa, 2004). We seek to explore all the economic variables in the presence of a structural break, however our interest is whether the deepening of pension assets has through capital market development been channelled to expand growth with and without reform.

4.1 Variable definition and data

The data used comprises annual data taken from the World Development Indicators (WDI) between 1975-2014. Total pension assets data is derived from the FSB's Annual Report. The South African Registrar of Pension Fund issues the report annually, there are 41 data points in the time series from 1975–-2014 to allow sufficient time trend for capturing the relevant data.

In this study all variables are annual and have been transformed to natural logarithm (LN).

GDP per capita (GDP) at constant 2005 prices is used as the proxy for economic growth, it constitutes the gross value added by resident producers in an economy, divided by the total population. The natural log of per capita GDP becomes the growth rate.

Total pension assets to GDP (PFA) are measured using the FSB annual aggregate assets of retirement funds in South Africa to GDP. This comprises all privately-administered funds, underwritten funds, GEPF, Transnet funds, Telkom Pension fund, Post Office Retirement Fund and foreign funds. We expect an increase in pension assets to move in a positive direction with economic growth as previous studies have shown a relationship between financial development and growth.

Total pension asset interaction (INTPFA) is measured using aggregate assets of retirement funds in South Africa to GDP multiplied by market capitalisation to GDP. This is a variable that shows the interaction between pension asset and capital market development. It is expected

that pension fund assets channelled into the economy through capital markets are likely to increase economic growth.

Stock Market (STK) is a proxy that measures *Market capitalisation (as percentage of GDP) as a ratio to Gross fixed capital formation (GCFC) (as percentage of GDP).* Market capitalisation of listed companies is the market value measured by number of shares times the share price. This is a proxy for capital market development and is also referred to as stock market capitalisation. GFCF formerly gross domestic fixed investment is a measure of gross domestic investment our variable for physical capital accumulate. It is measured as the outlays on additions to assets of the economy and changes to the level of inventories. Stock market is expected to have a positive impact on growth.

Population Growth (POP) is a measure of the annual population growth for the year t-1 to year t. It is a proxy for the labour force, we expect population growth to have a negative effect on long-run growth.

Debt to GDP (DEBT) is a measure of the ratio between national debts owed and the GDP. We expect a higher ratio to have a negative effect on long-run growth, as public fiscus is increasingly used to service debt at the expense of government consumption.

Number of listed companies (LST) is a measure using the number of listed companies in the stock exchange. It is expected that improved corporate governance will encourage listings, and thus have positive impact on growth.

4.2 Modified unit root test for structural break

The PP, Kwiatkowski-Phillips-Schmidt-Shin, and ADF methods are useful in determining the stationarity of variables. If the variable identified does not exhibit a random walk, or exhibits a structural change in the series, this has implications on the data in terms of level, change in the slope's trend or even having a combined effect on both the level and trend of the slope of data (Ranganathan, 2010.). Using the ordinary unit root tests the tendency to accept the null hypothesis on non-stationarity is heightened due to misspecification bias and size distortions. The ZA and modified ADF (also known as the breakpoint) unit root tests were designed to account for the presence of these structural breaks. Harris and Sollis (2003) outline that when structural breaks occur the likelihood of falsely rejecting the null hypothesis of non-stationarity is increased. The power of the unit root test is lowered.

The literature review shows that pension fund system underwent a permanent shift during the period under review and this suggests the normal stationarity unit root test must be adjusted. The breakpoint unit root tests and the ZA approaches consider breaks in the trend, intercept or both. We will test using the ZA unit root test for both the intercept test and the intercept and

trend model instead of the conventional unit root tests that will lead to biased results. Perron considered the breaking using the additive or innovative outlier model, and the preferred approach which is more straightforward is the innovative outlier model which we select as it adjusts for gradual changes in the trend function (Harris & Sollis, 2003).

The ZA method sequentially runs regressions for the break dates (Harvie & Pahlavani, 2006). The model constructed shows that the structural break series hypothesis is such that:

$$H_{0:}\ y_t = \mu + y_{t-1+}\ e_t$$

$$H_{1:}\ \mu + \widehat{\theta DU_t(T_b)}$$

Both the change in trend and intercept are incorporated. The timing of the structural break is known at *TB* where the model endogenises a single break in the series yt. A dummy variable DU_t captures the shift in intercept, and dummy variable DT_t captures shift in trend. The null hypothesis is that the data is non-stationary. The alternative hypothesis is that the series is I(0) with one structural break.

5 EMPIRICAL RESULTS

5.1 Stationarity using Zivot Andrews test

The time series unit root test is conducted using the ZA test and the modified ADF as reported in Tables 1. The break point in the time series is estimated as endogenously determined. The results of the t tests using the ZA unit root tests are stationary with the model of intercept and trend change, or both. The null hypothesis of is each variable has a unit root with a structural break in the trend. The ZA test shows we can reject the null hypothesis for all variables at the 5 percent significance level in the intercept model. The only changes with the trend model we see this is not significant for *STK* and *DEBT*, except when both trend and intercept are considered at the 5 percent significance level. The results are confirmed with the third model (both intercept and trend), where we see all variables are significant at the 5 percent level in the presence of a structural break in the trend.

Table 1: Zivot Andrews unit root test

Variable		TB	t_α	TB	t_α	Corresponding
Description	**Symbol**	**(Intercept)**		**(Trend)**		**break time**
Per capita GDP	*GDP*	2004	-2.89	1998	-3.78	Global financial crisis, 2004?
Population growth	*POP*	2001	-7.25	1994	-3.22	Democracy
Pension assets interaction	*INTPFA*	1985	-3.59	1994	-4.76	Sanctions
Pension assets	*PFA*	1999	-1.91	1996	-5.60	Financial crisis and PAYG to FFS shift
Listed companies	*LST*	1986	-5.61	1991	-3.77	Sanctions
Market capitalisation	*STK*	1997	-5.89	1988	-5.15	Sanctions and democracy
Debt to GDP ratio	*DEBT*	2002	-4.11	1994	-3.12	Democracy and systemic shift

*These variables are non-stationary at the 5% significance level

The empirical results show that the null hypothesis of non-stationarity is rejected, and the alternative hypothesis holds for all the variables under investigation thus far. The results show that the corresponding structural breaks cover the democratisation period, global sanctions and the financial crisis. The structural break for pension assets coincided with the pension fund systemic shift when National Treasury reduced unfunded liabilities of pension assets in 1999, leading up to the formation of the PIC. In addition, *STK* and *DEBT* can be linked to the advent of democracy and the integration of the South African economy with the global economy as sanctions were lifted leading to linkages of capital markets and investments with global markets.

5.2 Cointegration analysis

In order to select the optimal lag we employ the HQ, AIC and FPE. The appropriate lag length is 1 with AIC, LR, SC, HQ and FPE p = 2.

Table 2: Results of lag length criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
1	309.06	NA	1.79e-16*	-13.61	-10.79	-12.63
2	436.11*	141.17*	8.66e-18*	-17.12*	-11.49*	-15.15*

Note: The asterisks (*) denote the lag order selected by the criterion

Next, to determine whether or not cointegration is present we run the Johansen approach to estimate the number of cointegrating relationship among the variables. The maximum

eigenvalue test statistics indicate that there exists at least seven cointegrating equations at the 5% significance level. Whilst the Max-eigen value test indicates five cointegrating equations. We can thus reject the null hypothesis of no cointegration.

Table 3: Results of cointegration test

Null	λtrace	**5% Critical Value**	**Prob****
r = 0*	465.12	159.530	0.0000
r≤1*	306.78	125.615	0.0000
r≤2*	205.85	95.754	0.0000
r≤3*	118.24	69.819	0.0000
r≤4*	74.41	47.856	0.0000
r≤5*	36.42	29.797	0.0075
r≤6*	15.83	15.495	0.0444
Null	λmax	**5% Critical Value**	**Prob****
r = 0*	158.35	52.362	0.0000
r≤1*	100.93	46.231	0.0000
r≤2*	87.51	40.078	0.0000
r≤3*	43.93	33.877	0.0023
r≤4*	37.99	27.584	0.0016
r≤5	20.58	21.131	0.0596

Having established cointegrating relations allows us to estimate the VECM. Using the optimal lag selected the long-run equilibrium state for the variable is shown below. The VECM results show that there is a long-run relationship between the variables in the model and in the long run they move toward long-run equilibrium state. Table 3 shows the error correction term, it measures the speed of adjustment toward long-run equilibrium, showing how quickly the level of disequilibrium between growth and its determinants is corrected within one period. The rate of convergence towards equilibrium is shown as negative and significant at 5 percent critical value. The error correction term at -0.055 confirms cointegration and the coefficient indicates the speed of adjustment of short- to long-term equilibrium, which means that 5,5 percent of any disequilibrium between real output and the explanatory variables is corrected within that period.

The error coefficient of the cointegrating vector must be negative and significant for causality to be established (Wickens, 1996). Three of the models exhibit acceptance of these restrictions, and in the first model, which is our model of interest with respect to the

endogenous variables causing output in the long run. The VECM is useful to determine short-term dynamics between variables, but is restricted in interpreting long-run relationships.

Table 4: VECM estimates

Variables	**LR coefficient on GDP**						
	PFA	INTPFA	STK	LST	POP	PFA99	DEBT
Coefficient	-0.683	0.591	-0.505	-1.361	-2.7406	-0.1475	0.711
t statistic	-8.366	8.47	-5.794	-23.14	-28.69	-36.86	13.48
ECT	-0.056						

After having established cointegration we test causality based on the modified Wald test/Granger causality to establish the direction of causality. The results are reported in Table 5 report on whether pension fund assets, capital market development, governance, debt, population can jointly result in causality for the different models. Secondly as reported in Table 6 we estimate and report the results of granger causality. The multivariate causality test suggests that *DEBT* and *PFA,* cause economic growth at the 5% significant level in the presence of a structural break[3]. In the event of a structural break we still see a positive effect of pension assets on output, as in the course of when no structural break has occurred as shown in the previous chapter. *INTPFA,* and *PFA99* cause economic growth at a weaker 10% significant level. There are no feedback effects from *INTPFA*, *PFA* and *PFA99* to *GDP.* Bidirectional causality with feedback effects show us that *GDP* causes *DEBT* and vice versa. The results show us that *PFA99* caused *DEBT*, this has important policy implications. The variables of interest are significant, with evidence that pension funds cause economic growth through capital markets. Overall in the background of a structural break, the results also suggesting capital investment plays an important role in stimulating economic growth.

Table 5: Weak exogeneity test

	Chi square	**Probability**
GDP	32.03576	0.00
LST	20.53564	0.1141
PFA	31.45930	0.0048
INTPFA	38.91863	0.0004
STK	59.58678	0.0000
POP	279.0626	0.0000
PFA99	29.39105	0.0092

[3] The VAR Granger Causality/Block Exogeneity Wald Tests showing all dependent variables cause the dependent variable GDP has a chi-squared of 314.08, df =18 at 1% significance level.

DEBT	24.89709	0.0356

The results of the weak exogeneity test are able to show the endogenous variables in the model. Table 5 we see that *GDP*, *DEBT*, *PFA99, PFA, INTPFA, POP, STK* are endogenous variables at the 5 percent level of significance.

Table 6: VAR Causality

Multivariate Causality Test			
Null hypothesis	**Decision**	**Chi-sq statistic**	**Probability**
PFA does not Granger Cause GDP	Reject	6.974960	0.0306
GDP does not Granger Cause PFA	Accept	2.549838	0.2795
PFA99 does not Granger Cause GDP	Reject	5.877523	0.0529
GDP does not Granger Cause PFA99	Accept	0.560931	0.7554
INTPFA does not Granger Cause GDP	Reject	5.642750	0.0595
GDP does not Granger Cause INTPFA	Accept	4.328918	0.1148
POP does not Granger Cause GDP	Accept	3.967922	0.1375
GDP does not Granger Cause POP	Reject	8.769979	0.0125
LST does not Granger Cause GDP	Accept	4.059572	0.1314
GDP does not Granger Cause LST	Accept	0.048255	0.9762
STK does not Granger Cause GDP	Accept	2.798713	0.2468
GDP does not Granger Cause STK	Accept	1.318482	0.5172
PFA does not Granger Cause STK	Accept	1.875992	0.3914
STK does not Granger Cause PFA	Accept	2.819379	0.2442
PFA does not Granger Cause LST	Accept	0.282539	0.8683
LST does not Granger Cause PFA	Reject	6.313234	0.0426
PFA does not Granger Cause INTPFA	Reject	9.188752	0.0101
INTPFA does not Granger Cause PFA	Accept	3.101862	0.2121

5.3 Results

According to the findings of the long-run estimates showing the effect of pension assets in South Africa for the period 1975-2014, the study finds evidence that pension assets have a positive effect on economic growth in the long run. The ECM long-run estimates show that a 1% increase in *PFA* causes a 0.68% rise in *GDP*, this is more strongly exhibited by a 1% increase in *PFA99* which results in a 0.14% increase in *GDP*, significant at the 1% level. We also find that a 1% increase in *DEBT* reduces *GDP* by 0.71%. What is also examined in this study is whether the increased debt was due to *PFA99*, and it is found when employing the

Granger causality/Wald tests that pension funds in the presence of a structural break have caused *DEBT*. This is not found in *PFA* and *INTPFA*, thus leaning towards the argument that implicit debt is incurred when pension systems are adjusted.

This study also finds a weak relationship between *STK* and *POP* and economic growth, suggesting that the effects of labour and capital market development in the long run on economic output are weakly related. The pass-through effects when measuring the Granger causality show that the *INTPFA* causes *GDP*. Similarly, *PFA* also causes *STK* through the interaction term, which further contributes to the argument that capital markets are the channel through which pension assets contribute to growth. Thus, similarly to the previous chapter, we can see that *LST*, *INTPFA*, *STK* cause PFA99 and LST causes PFA without feedback effects.

6. CONCLUSION AND POLICY IMPLICATIONS

This estimation is important is it measures the transmission effect of pension assets in the presence of a structural break. Although the results do not show whether before there was a structural break economic growth improved, we measure in the absence of a structural break the impacts in previous chapters. The key message in this study is that the results show the long- and short-run relationship between economic growth and pension fund assets in the context of a pension systemic shift, with specific capital market fundamentals captured in the model. There have been no earlier studies measuring the empirical outcomes of pension reforms in South Africa.

The long-run relationship between debt and pension fund assets confirms the arguments of Hendricks (2008) which confirm that pension reform has in turn led to increased debt levels. Empirical evidence shows that the privatisation process and the financing of liabilities due to reform have led national government to increased debt incurred. This debt has a negative impact on economic growth and does not augur well for economic output.

The study also finds that pension assets consistently have a positive growth effect on economic growth, transmitted through capital markets pre- and post-reforms.

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