Establishing linkages between Pension Funds and Capital Market Development in South Africa

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Abstract

This paper seeks to provide empirical evidence to establish the effect of pension fund assets on overall capital market development. It uses proxies for both stock and bond markets and investigates using the autoregressive distributive lag (ARDL) and the vector error correction model (VECM). The results show a positive relationship between pension savings and stock market development. There is no long run relationship established between pension savings and the bond market development. Using the VECM framework we find only unidirectional relationship between pension fund savings and stock market development. Policies to improve investment in the bond market could enhance its development as evidence shows policies in stock market are conducive for its development.

Keywords: pension funds, bond market, stock market, South Africa, capital market development, methodology

JEL Classification

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1. Introduction

This paper examines one of the channels through which increase from pension assets affects economic development in the South African context. There exist four channels of pension assets increase on growth, namely through savings, improved corporate governance, reduced labour market distorting and capital market development (Catalan, 2004; Catalan, Impavido, & Musalem, 2000; Davis, 2008; Davis & Hu, 2005, 2008; Hu, 2005; Kim, 2010; Meng & Pfau, 2010; Raisa, 2012; Rezk, Irace, & Ricca, 2009; Schmidt-hebbel, 1999; Walker & Lefort, 2002; Zandberg & Spierdijk, 2010). Investigating the strength of the relationship between pension funds and capital market development determines whether it will impact growth. It is important to determine whether there exist spillovers from capital market development, and if they exist do they stimulate growth in an emerging market economy as in the case of South Africa?

This is an important policy question in determining the role of capital markets in triggering growth, outlining whether pension funds are a mechanism through which domestic markets exhibit sensitivity in growth. The prevailing low growth conditions, high unemployment coupled with high levels of inequality require investigation on growth enhancing policy measures. Although studies exist on this issue, we will be using South African data and the data set will include capital markets using both bonds and stock markets in the empirical analysis. This is an important factor, as existing studies have not used South Africa to examine the channel through which pension fund related growth occurs, the focus has been on largely developed countries and in developing countries it has been mainly Latin American countries and Asia. The significance of South African capital markets in developing economies context is that from the early 1900s it has developed a complex and sophisticated system of pension funds. These pension funds over the last several decades have grown

and make a substantial contribution to the financial flows in the capital markets. The number of retirement funds in South Africa is 5150 with an asset value of R3.67 trillion, derived from 15.9 million members and pensioners (FSB, 2014). The size of pension funds in the South African market has increased from R157 billion to R2.7 trillion between 1990 and 2012, the increase in 2 decades significant and the pension assets ratio to GDP is at a current 57% of GDP (OECD, 2016). Davis (2005) and OECD (2016) estimates show that emerging markets average ratios of 12% of GDP depending on the maturity and size of the economy. In comparison to most developing countries the South African pension fund market has more similarities with pension assets in developed economies.

Although we believe that the impact of pension assets on capital markets is positive further empirical motivation is necessary to confirm this relationship. In light of results showing pension assets do not exhibit a positive effect on savings rate, the theoretical assumptions require testing. Section 2 will outline the role of pension funds in capital market development.

2. The role of Pension Fund Assets in Capital Market Development

Pension funds fall within the ambits of institutional capital, which is derived from the changing regulatory framework and institutional environment required when high contributions from pension funds are accumulated in financial markets. Walker and Lefort (2002) outline that the size of these investors is unique and requires specific set of new financial instruments for investing sizeable amounts of wealth. The process requires a parallel development of regulation to be developed for this institutional capital, this includes laws, regulations and financial instruments that are managed by pension regulatory authorities. The growth in pension funds stem from the increased number of pensioners who are referred to as clients now represented on the financial markets by such institutional investors. The scale of investments is usually large with several pension fund managers appointed by pensioners to act on their

behalf through pension funds. This relationship between pension funds and pensioners is governed by rules for investment levels in various asset classes, reporting guidelines, accounting standards and general auditing standards usually overseen by a pension and investment regulatory authority. It is these systems that indirectly lead to a more developed capital market system as both risk management and transparency is promoted. In the literature pension funds have been recognized to play a contributory role in the development of capital markets (Davis, 2006; Hu, 2005; Walker and Lefort, 2005; Davis an Hu, 2004; Irace, Rezk and Ricca, 2009). The importance of institutional investors and pension funds is heightened in the context of developing financial markets in a market-based economy.

With literature showing a country's ability to make large gains from pension funds is dependant on financial market structure. Preconditions must be met for pension assets to have a substantial contribution to the development of capital markets. Meng and Pfau (2010) argue that an important precondition is the level of financial development, the higher the level of financial development, the more significant the impact of pension funds. The indicators for the levels of financial development vary dependent upon market efficiency, the level of transparency and pension fund investment regulations, specific macroeconomic condition and the existing legal and regulatory framework.

In order to trace the effect of pension fund investment on growth, the paper will provide the channels through which this is possible. The theoretical linkages are outlined in detail below.

Pension assets differ from household assets as they have a long-term outlook. They provide long-term supply of funds to capital markets, leading to financial development [Meng and Pfau, 2010; Davis, 2005). Raddatz and Schmukler (2008) outline the contribution of pensioners in the long term as their contribution of funds through the provision of stable source of funding (their pension savings) that acts as a source of capital in financial markets. This differentiates pension funds from other institutional investors such as mutual or

insurance funds. It lies in the behaviour of liabilities, for instance pension investments are usually released upon retirement, thus offering financial markets systems stability from longer investment time horizons which other retail investors do not provide. Kim (2010) outlines pension assets differ from insurance companies due the illiquid nature of liabilities, in contrast to more liquid insurance and mutual fund investors. Secondly pension liabilities are usually invested with shares rather than bonds. According to the Towers Global Pension Asset Study (2014 and 2015) the average global asset allocation of the largest pension markets was distributed largely between equities and bonds with equities 52%, bonds 28% and in the following year equities dropped substantially to 44% and bonds slightly higher at 29%. The FSB (2014) outlines current South African private pension funds asset allocation is largely skewed towards insurance policies (44%), equities (18%) and bonds (8%) and foreign investments (15%)[3]. Pension funds in South Africa are also recognized as critical drivers of the development of the stock or local securities market and improve liquidity and depth of local bond and equities market. Stock market development has a positive and significant correlation with growth (Levine and Zervos, 1998; Caporale, Howells and Soliman, 2005; Beck and Levine, 2004). The development of the bond market, bond exchange and investments in the sector can be directly linked to the emergence and growth of pension funds (Faure, 2007). Investment levels, productivity and growth are significantly correlated with stock and bond markets.

Pension fund portfolios must be able to match the size of pension fund liabilities this would imply matching pension assets with domestic liabilities (Chan Lau, 2004;). Raisa (2012) argues that no other investor is able to match the long term nature and investment scale of pension assets. This requires pension funds to draw on and increase exposure in the private and government bonds on the domestic markets, variants exist such as inflation linked or zero coupon bonds. Inflation linked bonds are sometimes more attractive due their higher rates of returns for investors.

The size of pension assets enables them to hold greater proportions of equities and bonds than households (Davis, 2006). Empirical work by Hu (2005) found that as pension assets increase in size they encourage private bond finance in both the short and long run. Raddatz and Schmukler (2008) argue this is the reason why several scholars agree that pension funds increase the depth of markets due to increased demand for investment instruments. Impavido and Musalem (2000) explain that pension assets cause a rise in the demand for shares, and bonds. The behaviour of pension funds as holders of these equities, bonds or cash changes the demand of the various market based instruments. Granville and Mallick (2002) argue that the growth particularly in pension funds and life insurance products in these assets determines whether or not the savings effect is positive. Secondly and increase in pension funds promotes market liquidity due to its size there is an increase in trading volumes. As the growth of pension funds occurs, it is coupled with a rebalancing of portfolios who now allocate assets into new bonds and equities (and other instruments). Vittas (1999) terms this the attainment of a critical mass, referring to the increased scale of participation and ownership of pension assets on bond, equities, properties and other securities. This effect of depth from significant increase in assets accumulated across bond, equities, properties and alternative investments is supported across literature (Impavido and Musalem, 2002; Vittas, 1999; Walker and Lefort, 2002; Kim, 2010; Meng and Pfau, 2010). Pension funds as institutional investors over time require diversification across portfolios, Chan Lau (2004) refers to the optimal asset allocations which sees diversification of a pension fund across different asset classes. Optimal portfolios are founded upon on the modern portfolio theory encouraging portfolio diversification as it holds benefits such as protecting against inflation, hedging risk and protecting returns. Thereby allowing for investment into equities, bonds, in either foreign or domestic capital markets.

It is however possible that pension asset growth may exceed the development of and growth of securities markets as was the case in Eastern Europe and Latin

America (Chan Lau, 2004). Risk aversion, investment guidelines limiting investments in asset classes and low bond or equity issuance in developing markets result in few listed companies holding assets the size required by pension investors. Leading to significant concentration of assets invested in a few listed entities and government related bonds. However Chan Laun (2004) lists in several emerging markets we see sizeable holdings in fixed income securities ranging between 40 to 90 percent of holdings of pension fund portfolios. The high volume of pension funds enables them to achieve substantial exposure to a variety of asset classes beyond bond and equity asset classes. The PIC is South Africa's largest asset manager, it represents almost half of the total assets of the non banking financial assets (49%) and it shows how pension funds in South Africa has broadened the depth of capital markets(Moleko and Ikhide, 2016). As at March 2015, PIC allocated 34% of its portfolio to bonds, 48.68 to equity, money markets and cash receiving a combined 10% and the remaining assets classes allocated the remaining portion (PIC, 2015). Between 2007 and 2015 we have seen allocation of equity remain steady at 48% and local bonds at 35%, there has been a decline of cash and money market from 10.6% to 4.46% during the period. Offshore bonds and equities allocation have received between 5-6% of PIC assets over the period. Both bond and equity market liquidity would appear to be positively influenced by such trades in both primary and secondary markets of trade turnover ratios (Kapingura and Ikhide, 2015).

Pension assets economies of scale enable them to also contribute indirectly to financial development. Pension assets behaviour enable them to contribute to lowering transaction costs, diversifying risk, and hold superior ability to process information (Davis and Steil, 2001; Raisa, 2012).

Government regulation may curtail the pension fund industry if restrictive regulations with excessive government influence guide investment decisions. These may limit optimal portfolio allocations reducing returns as they are forced by regulations to invest in various asset classes to the detriment of portfolio

performance. Government restrictions on investment are necessary to prevent any single investment receiving more than the maximum listed to limit concentration of risk in a single asset class leading to reduced portfolio returns.

It is also argued that pension funds receive significant commissions and fees and are thus able to hire skilled professionals who not only manage pension funds, but reduce and diversify risk. Increased specialization occurs as a spinoff usually leading to diversified financial instruments and improved systems for valuing and gathering information on current and future investments for best returns (Impavido and Musalem, 2002; Raisa, 2012; Walker and Lefort, 2002; Thom, 2014). Professionals provide innovation in the development of new instruments such as CDO's, zero coupon bonds, asset backed securities, futures, CPI indexed bonds, mortgage backed securities and derivate instruments. The allocation of funds directly affects trading patterns, and the ability to allocate these assets is what affects capital market development.

An illustration in Table 1 shows the distribution of assets between the years 1981-2013, the last three decades have seen considerable changes in the asset portfolios of privately managed pension funds. According to data from the Financial Services Board Pension Funds Registrar the biggest allocation of pension assets now sits with insurance policies almost doubling at the advent of democracy in 1995 at 24.6%, 46% in 2008, to the current. 44.5% in 2013. Krugerrands have also seen increased allocations of up to 6.3% in 2008 to the current 3.5%. This increase is coupled with a decline in deposits and savings accounts. Unit Trusts now also referred to as collective investment schemes receive a quarter of allocation from their higher levels of 25% in the mid 1980s to the current 6% (2008) and a slightly higher 8.2% in 2013.

Table 1 below shows the investment asset allocation of South African pension funds reported annually by the Financial Services Board, trends are shown from 1981-2011. The information provided below reflects the available data sourced from the FSB Annual reports, after 1994 reports incorporate investment

patterns of self administered funds. Privately administered funds contributed R1.1 trillion, at 47% in 2011 of total R2.4 trillion aggregate asset value of South African pension funds. Post democracy we see the pension funds allocated almost half of pension assets onto equities, likely due to financial market liberalization but as markets stabilized the market allocation has stabilized to 20% (2008) and the total allocation to listed and unlisted equities, and other domestic equity index linked instruments totaling 18.1% in 2013. The most significant decline in asset allocation is the reduction of assets to bills and bonds issued by the government through state owned enterprises, provincial administration or local authorities. The reasons for the decline is largely due to legislative changes with the regulatory framework no longer enforcing exposure (through minimum requirements) to government, municipal or state owned enterprise bonds. The effect has been a reduction from 22.4% in 1981 to 7.2% in 2008, down to the current 7.8% in 2013 of total Bills and bonds. The allocation of state owned enterprises and government administration was accounted for separately and it is now likely included in total bills and bonds. This declined from being almost a quarter of pension asset allocation in the early 1980s at 25% to the 7.8% combined in the total bills and bonds. The effect of its inclusion in a already declining total bills and bonds shows the contribution is now insignificant. Other assets which include derivative instruments and unit trust up until 1982 remains small at less than 2% in the last three decades. It is arguable whether increased assets have increased the number of assets in the case of South Africa. Instead it would appear that overall the allocation has done quite the opposite. These trends are quite surprising and require further investigation of the composition of insurance policies.

Table 1: Investment by Asset Classes of SA Pension Funds

	1981	1987	1991	1995	1999	2002	2005	2008	2011
1. Immovable properties	5.8	5.9	4.8	4.3	3.6	1.1	0.6	1.1	0.7
2. Bills and Bonds	22.4	17.9	9.4	12.6	12.0	10.5	8.6	7.2	7.5
2. Bills and Bonds issued by govt or provincial administration	9.1	3.6	0.5						
3. Bills and Bonds issued by local authorities and administration boards	8.2	7.0	3.6						
4. Bills and Bonds issued by Rand Water board or Electricity Supply Commission	7.9	0.3	2.6						
5. Bills and Bonds issued by Land and Agricultural Bank and SARB	4.5	0.7	0.5						
6. Loans	6.3	1.4	0.5	0.3	0.6	0.8	0.1	0.1	-
7. Debentures	8.7	6.6	10.2	0.7	0.2	0.6	0.1	1.1	1.1
8. Deposits and savings accounts	15.6	19.5	24.4						
9. Equities/Shares in companies				47.7	34.3	29.3	23.3	20	18.8
Collective Investment Schemes/Unit Trusts		24.4	33.3	1.5	5.8	6.2	5.5	6.6	7.9
10. Insurance Policies				24.6	28.2	35.0	47.6	46	45.9
11. Deposits and Krugerrands	-			7.5	7.0	6.7	4.3	6.3	5.1
12. Foreign Investments				-	-		7.8	9.9	11.8
13. Other Assets	17.0	12.7	10.2	0.8	8.3	9.8	2.1	1.7	1.2

Source (FSB, 1981-2014)[4]

[4] FSB's Annual reports outline each period what the Investment pattern is for the pension funds. For a certain period it was reflecting only the self administered, state controlled and foreign funds until 1994. The Annual reports show that from 1994 to date Investment patterns remain isolated to self administered funds. The question arises of what constitutes insurance policies, do they also get allocate such to bonds and shares/equities? Without clarity on that the table can be misinterpreted. This definition is not clear in the annual reports.

Pension funds trigger innovation in financial systems. New instruments, the modernization of infrastructure and improved regulations occur as a consequence of the development of pension funds (Davis, 2006). Pension funds contribute to the loan and securities market, improving competitiveness as they compete with the banking sector. It is argued that efficiency and a reduction of transaction costs and market volatility occurs as lending rates, and spreads are lowered reducing firm and household costs for accessing capital (Davis, 2006). Pension fund assets reduce dividend yields and increase price-to-book ratios, thereby indicating a decline in the cost of capital (Walker and Lefort, 2002). This is also enhanced when concurrently increased corporate governance and liquidity is experienced.

Impavido and Musalem (2002) also argue that a benefit of increased pension savings is enhanced competition, efficiency and modernization of the securities market. This occurs as fund managers increase their participation on the bond and stock markets. Subsequently, this is followed by competitive bidding on bond and stock issues, stock exchanges are at times restructured and technology is introduced to manage the increased trading volumes. As pension funds and their scale increase on the market we see settlement systems and professional specialization. Capital markets make gains from improved governance as a result of increased pension funds activism; this is heightened as they represent at times minority interests (Raisa, 2012). Putting a focus on companies being more transparent, improving company disclosures and they boosting the execution of good governance.

Some of the benefits of institutional investors include a reduction of transaction costs and market volatility, coupled with greater transparency and market efficiency (Davis, 1995). A reduction of transaction costs is explained by the effect of pooling large assets in deals, some of which invest in indivisible assets an example being properties. Davis (2006) argues that due to their scale, pension funds investments are concentrated in assets

whose returns are weakly related. As fund managers seek to improve diversification whilst compensating for risk, these asset portfolios also invest in specific assets who show long term yields. The impact on capital markets is on both the volume and prices of specific instruments. The efficiencies gained are price reduction in asset classes such as corporate bonds, equities and other securitized debt instruments. With a simultaneous decrease in prices of the asset classes as the supply gains from economies of scale are realized in securities market.

3. Empirical Background, evidence of linkages between pension fund assets and capital market development

The empirical literature on the contribution of pension fund assets on overall capital markets has been focused largely on developed countries, and developing economies in Eastern Europe and Latin America. The strength of the relationship between pension fund assets and capital markets development differs between countries and the level of financial development is pointed out as the likely cause (Enache *et al*, 2015).

One of the earliest studies showing a strong correlation between pension fund assets and financial market development used a financial market index. These indicators examined total factor productivity and output linkages and capital stock accumulation levels (Holzmann, 1996). The results in Chile showed that pension funds resulted in deeper and more liquid financial markets. Schmidt-Hebbel (1999) pointed out that very little empirical analysis investigating the linkages between pension system funding and economic growth through capital market development. This is one of the reasons for more empirical analysis.

In looking at the impact of pension funds on Asian financial markets Hu (2012) used the panel error correction model for 10 Asian countries over a period between 2002-2008. The results showed a positive relationship between pension fund assets and the development of financial and capital

markets. The study used variables that included the banking sector, bonds and the stock market. In another study the linkages between pension assets and economic growth using datasets of 59 countries split halfway between OECD and non-OECD, contrasting results are measured (Spierdijk and Zandberg, 2010). This points to pension funds may lead to financial development through specifically capital market development, but the relationship needn't automatically translate to having a positive growth impact. Hu (2005) investigates pension reform, growth and financial development in empirical work combining developed (21 OECD) and developing countries (38 EMEs) using Granger causality. He establishes several advantages pension funds hold for capital market development, such as information provision, incentive challenges, risk management, the clearing and settlement of payment, share subdivision and assembling and the transfer of resources in different times and spaces by smoothing consumption through asset accumulation. He found a negative relationship between pension assets and growth in the short run, but it was positive in the long run. Contrasting results by Spierdijk and Zandberg (2010) using OLS estimation found no relation between funding of pensions and economic growth. The paper argued that one capital market returns were controlled for and demographic developments the causality disappeared.

The fact that capital market development may not always lead to growth does not reduce the positive impact institutional investors exhibit on the levels of financial development. Sibanda and Holden (2014) found using vector error correction model and Granger causality that there is no linkage between institutional investors and gross capital formation. The results however showed that there does exist co-integration between institutional investors and financial development in South Africa. The proxies used in this study could be further developed to include both stock and bond markets, which is lacking in the study. It is clear in empirical literature that pension fund growth is strongly associated with capital market development (Meng and Pfau, 2010; Kim, 2010; Raisa, 2012; Walker and Lefort, 2002; Poirson, 2007). Walker and Lefort investigate the hypothesis of pension fund reform and its

impact on capital market development. The results in mostly emerging market economies show pension funds reduce the cost of capital, lower prices of securities, increase trading volumes and reduce volatility. However others argue volatility is not necessarily reduced (Kim, 2010). The same pattern exists in 15 European Union countries using the OLS and EGLS estimation technique between 1994-2011. The results show that growth of pension funds exhibit positive spillovers on stock market development. The contribution made by Kim (2010) and Meng and Pfau (2010) is the measurement on capital markets including both stock and bond markets in the empirical testing. Kim (2010) examines 37 countries are mainly developed with VAR and GMM estimate showing the growth of pension funds does stimulate the economy. A different LSDV technique is used by Meng and Pfau (2010) for a longer time period spanning from 1980-2008 with a combination of developed and emerging countries. This research highlighted that indeed pension funds do impact capital market development but in countries with high levels of financial development. Thereby outlining the variation of intensity across countries and outlining necessary fundamental requirements. Factors such as macro and economic conditions, market efficiency, transparency and the regulatory framework of financial markets were the differentiating factors.

Thom (2014) investigated the impact of pension funds on particularly the stock markets within South Africa. The results overall show a positive linkage between pension funds and the stock market development between 1985-2013 using Johannsen Cointegration and VECM to examine the linkages. Trading volumes also showed positive relationship with increasing levels of pension fund assets. The contrary was experienced with stock market volatility and with increased investment from pension funds reducing volatility.

This paper investigates further the influence of pension funds on the overall financial market system by including bond market impact in the empirical analysis. The allocation of privately administered funds is across various

asset classes mainly bonds, insurance policies, shares and foreign investments. Meng and Pfau (2010) included both stock and bond market proxies as a measure for capital market development and 32 countries were clustered according to the level of financial development. Using LSDVC estimation the regression results show countries with low levels of financial development exhibited no linkages between pension fund assets and capital market development. On the contrary, results in countries with high levels of financial development showed strong linkages between pension fund assets. South Africa was included in the sample countries and was classified as a high financial developed country with the sample period between 1994-2008. The paper uses panel data methodology that makes it difficult to isolate heterogeneity in the results. In this paper we shift away from aggregate results and we further use data set that is more comprehensive to identify the impact of pension assets on a wider array of proxies in South African capital markets. Inclusion of a proxy that measures capital market development that is not focused on only the stock markets will enable us to understand the transmission effect of pension assets on capital markets.

4. Data and Variables

4.1 Data

The dependent variable is a proxy for capital market development which we utilize a to measure the separate impact of stock and bond markets, due to the structure of the financial system in South Africa. Literature uses stock market capitalization as a percentage of GDP and the less commonly used bond market capitalization as a percentage of GDP. Meng and Pfau (2010) exclude public bonds stating since government fiscal stance influences public bond issuance. This paper focuses on the inclusion of government bonds since these are traded in the secondary market and respond to market returns. It is argued they have had a significant impact on the secondary market development (Faure, 2007). Therefore private and public bond market capitalization effects are measured using total assets of direct investments in debts instruments for private bond market and for public

debt. Stock market capitalization as a percentage of GDP is also measured from 1975 - 2012.

The data used comprises annual data taken from the World Development Indicators (WDI) between 1965-2013. The data for stock market capitalization is available from 1975–2015, the World Bank WDI data supplemented with data derived from the global economy World Bank data between 1975-1988. Total pension assets data is derived from the Financial Services Board's Annual Reports. The South African Registrar of Pension Fund issues the report annually, the time series ranging from 1965-2013. The asset level of portfolio investments in debt securities is derived from the International Monetary Fund (IMF) from 1965-2013.

Investments in Debt securities is defined as cross border transactions and positions involving debt securities. These investments allow residents in once economy to have a degree of influence or management on financial instrument in another economy. This is a dependant variable used as a proxy for private and public sector bond market capitalization.

Stock Market Capitalization is defined as the market value of shares as a percentage of GDP, calculated by the share price and the number of shares of listed companies on the market. This is a dependent variable used as a proxy for stock market capitalization.

Inflation rate is measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. CPI is also a measure to estimate the macroeconomic stability and is an indicator for monetary policy. The natural logarithm is used and we expect inflation the to have a negative effect on capital market development.

Private sector credit is defined as all domestic credit provided by the financial sector which is a common indicator measuring the levels of financial sector

development. The natural logarithm is used with a higher level of financial sector development associated with the enhanced capability of financial intermediaries to mobilize savings to capital for investments. We expect higher the levels of financial development as measured by private sector domestic credit to increase the impact on market capitalization.

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 effect of interest rates on particularly the bond market must be controlled for as the change of yields has an impact on the demand for stocks of bonds. We expect that a rise in yields is likely to decrease the demand for stock, the expected sign is negative.

GDP per capita is a measure of the gross value added by all residents divided by the total population. This indicator is used as the proxy for the levels of economic growth, levels of output in the economy influences the level of productivity on both bonds and stock market development. We expect a rise in total output to positively influence capital market development.

Pension Fund assets are 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 fund assets to have a positive effect on the growth of capital markets, thus move in a positive direction with capital market development.

M3 (as % of GDP) is a measure that has broader definition of money and is the sum of M0 plus M1 plus M2, which includes a summation of the central bank currency and deposits, electronic and foreign currency, all deposits, securities agreements commercial paper and shares held by residents. It is used as a proxy to measure the level of financial development or the financial depth in the economy. Financial depth is expected to increase to have a positive impact on capital market development.

The analysis sought to include the levels of financial liberalization, in order to measure the ability to trade and invest on stock and bond markets with minimum regulatory limitations and openness of the markets. The proxy used in several studies is foreign direct investment outlining the level of the markets openness to international trade. It is expected to have a positive effect on the level of capital market development. The results however were unable to show significant cointegration in models including this variable.

4.2 Model Specification

The Autoregressive Distributed Lag (ARDL) bounds testing econometric approach will be used to determine the cointegration in this study. ARDL allows for analysis regardless the levels of the stationarity, 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) at 10%. Chowdhury (2012) further states that ARDL is useful for small sized samples, as the model has the ability and is better than other approaches due its ability to robustly model against autocorrelation and simultaneous equation bias. This cannot be argued to be relevant in this instance where our time series exceed 40 years. Perhaps the most advantageous reason for this estimation technique of the model in capturing growth of the economy using its proxy, is in the ability to take an adequate quantity of lags. Pesaran (2001) makes use of Schwarz Bayesian Criterion and the Akakie 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 despite the problem of endogeneity 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).

The framework that will be used for estimating the contribution of pension assets to both bond and stock market development will include the control variables*, Private Sector Domestic Credit, Inflation, Real Interest Rates* and *Pension Assets.* Different combinations of explanatory variables are used, these are shown in the different estimations.

The dependent variables Debt Investments securities is used in Model I, Model II uses the dependant variable stock market capitalization. These two models are estimated to measure the overall impact of pension fund assets on capital market development. Variables are logarithms (LN) except for real interest rates that has negative variables, this is factored in the interpretation of the results. Our model specification is estimated as follows for the same combination of explanatory variables in these estimations:

$$Ln(DEBT)_t = \alpha_0 + \beta_1(PSC)_t + \beta_2 Ln\,(INFL)_t + \beta_3 Ln\,(INT)_t + \beta_4 Ln\,(PFA)_t + \varepsilon_t \quad (1)$$

$$Ln(STK)_t = \alpha_0 + \beta_1(PSC)_t + \beta_2 Ln\,(INFL)_t + \beta_3 Ln\,(INT)_t + \beta_4 Ln\,(PFA)_t + \varepsilon_t \quad (2)$$

where *LnPENSION* represents the log of total pension assets which is used to measure pension savings. *LnINFL* represents the log of inflation which is used to proxy monetary policy. *LnPSC* represents the log of private sector credit, which is a proxy for the level of financial development and structure. *INT* represents the level of interest rates that is used to measure macroeconomic stability. Subscript t represents the time index and ε_t represents the residuals. We estimate the dependant variable *LnDEBT* which represents the level of investment on the bond market in

the first model. In the second model we run is *LnSTK*, which represents the stock market capitalization as a percentage of GDP. Both *LnDEBT* and *LnSTK* act as proxies for capital market development.

The use of the Vector Error Correction Model (VECM) is used to estimate the robustness of the ARDL results. The VECM measures the impulse responses and the endogenous movements caused by some variables. The estimation occurs after cointegration is amongst the variables exist and the variables are integrated of order I(1). The results in Table 5 show that there exists a long run relationships amongst the variables impacting pension savings and capital market development.

5. Results and Empirical Analysis

5.1 Unit Root test

The ADF and the PP 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 was to eliminate any variables that do not satisfy this condition. The variables are all I(1), therefore we can reject the null hypothesis that there is a unit root. Given the fact that the majority of variables are I(1) we are able to proceed with the cointegration method.

Table 2: Time series unit root test

	LEVELS				FIRST DIFFERENCE			
	ADF	ADF	PP	PP	ADF	ADF	PP	PP
Tstatistic	Intercept	Trend and Intercept	Intercept	Trend and Intercept	Intercept	Trend and Intercept	Intercept	Trend and Intercept

Ln PSC	-0.5391	-2.3357	-0.4819	-2.3357	-5.7634*	-5.6802*	-5.9028 *	-5.8099 *
Ln INFL	-1.0463	-4.1947**	-1.8914	-4.1156*	-9.9926*	-9.9852*	-10.8131*	-11.7556 *
Ln INT	-3.3248**	-3.5455**	-3.3402**	-3.5267***	-7.7142*	-7.6145*	-8.6501*	-9.5178 *
Ln PFA	-3.2234**	-0.3429	-2.9756**	-0.3429	-4.05473 *	-5.0309*	-4.0964 *	-4.9900 *

The asterisks *denotes the level of significance, therefore showing the rejection of the null hypothesis at 10%***, 5%** and 1%* level of significance

The variables are stationary at I(1) and I(0), we see that LnINT is I(0) and that LnPSC is I(1). LnINFL and LnPFA are a combination of I(0) and I(1). This result tells us that the variables will allow the estimation to exhibit valid results. We can reject the null hypothesis of a unit root in the series and we can estimate cointegration. When using the ARDL procedure the variables can be a combination of I(0) and I(1), however variables that are I(2) cannot be included in the estimation. None of our variables are integrated at second difference, we can thus continue in our estimation.

5.2 Cointegration Test

The bound testing procedure is used to determine whether there is a long run relationship between proxies of capital market development and the independent variables. According to the F statistic the null hypothesis of no cointegration can be rejected at the 1% significance level for both models. The computed F statistic of each model is shown below, they must lie above the upper critical bound at the 5% level in each Model if there is a long run relationship between the independent variables and capital market development in stock or public and private bond markets. The F statistic 4.629>4.37 and 5.156>4.37 both lie above the upper critical bound and show that there is evidence of a long run relationship in both models.

Table 3: ARDL Bounds Test for cointegration

Computed F Statistic	Model 1	Model 2
	4.6292	5.1566
Critical bounds (10%)	LCB 2.2	UCB 3.09
Critical bound (5%)	LCB 2.56	UCB 3.49
Critical bound (2.5%)	LCB 2.88	UCB 3.87
Critical bound (1%)	LCB 3.29	UCB 4.37

Both models exhibit no sign of conflicting residual diagnostic assumptions, there exists no serial correlation and heteroscedasticity in measuring the relationship between LnDebt, LnSTK and the independent variables. The models are both stable using the CUSUM and CUSUM of squares test and normal distribution is confirmed, thus fulfilling all residual diagnostic criteria. All tests confirm the appropriateness of the models.

5.3 Error Correction Representation

The Wald test is able to show that pension assets do not cause or influence the debt market in the short run. Although the *LnPSC* shows a significant relationship in both estimations the Wald test does not show causality between this variable and capital market development. The same result is seen in the short run for *INT* when *LnSTK* is the dependant variable. The short run coefficients do not explain the relationship, the relationship will be explained by the long run coefficients. The short run results of are shown below:

Table 4: Short Run Cointegrating Form

Variable	Regressors	Coefficients	(t-stat)
	ΔLNPSC	1.812432**	2.483843

BOND (1,0,0,2,0)	ΔLNINFL	-0.507926	-1.614738
	ΔINT	-0.066920*	-3.836329
	ΔINT(-1)	0.026192**	1.719082
	ΔLNPFA	-0.152640	-0.575270
	ECM(-1)	-0.399213*	-4.683035
STOCK MARKET (1,1,0,0,0)	ΔLNPSC	1.300569*	3.025994
	ΔLNINFL	0.079560	0.497064
	ΔINT	-0.015750	-1.610056
	ΔLNPFA	0.175254	1.081959
	ECM(-1)	-0.908911*	-5.675011

The asterisks *denotes the level of significance, therefore showing the rejection of the null hypothesis at 10%***, 5%** and 1%* level of significance

Using Vector Error correction estimation we are able to show whether there is bidirectional causality from the dependent variable to the independent variables individually. In the instance of *LnSTK* as a dependent variable we find that there is long run causality from the dependent variable to all the variables. There is a uni-directional causality as none of the other variables exhibit significant cointegration equations. In contrast, *LnBOND* as the dependant variable does not show long run causality from the dependent variable to all the variables.

Table 5: Causality results based on VECM

Dependant variable	Lag	Pension led market capitalization		Market capitalization led pension growth	
		T stat (Standard error)	ECT	T stat (Standard error)	ECT
STOCK	1	[-2.57621]* (0.36543)	0.941415	[1.16768] (0.12570)	0.146778
BOND	2	[-1.12414] (0.10769)	-0.121062	[1.66475] (0.01993)	0.033184

The t-statistic reported in parenthesis. The asterisks indicate the significance of the variable.

We are able to conclude that there is pension led market capitalization, however there is no evidence of market capitalization leading to pension asset growth.

5.4 Long Run Estimation

In the long run estimation we find that interest rates are both significant and have a negative effect on overall capital market development. A 1% increase in interest rates results in a 1.73% and 22.69% in *STK* and *BOND* decline respectively. The rapid growth of South African bond markets is attributed to not only prudent fiscal management and economic growth but also moderate interest rates (Hassan, 2013). Despite the moderate interest rates we know high interest rates have a negative effect on output. It is confirmed though that higher cost of financing as measured by higher interest rates tends to negatively affect the liquidity in both these markets (Yartey and Adjasi, 2007; Enisan and Olufisay, 2009; Kapingura and Ikhide, 2015). Interest rates are outlined as a significant determinant in bond market development (Aron and Muellbauer, 2001). Overall both stock and bond markets output levels are affected from the negative effect of asset prices.

Summary of Test Results

Table 6: Long Run ARDL Coefficients

Regressors	BOND (1,0,0,2,0)	STOCK MARKET (1,1,0,0,0)
C	-7.906527	1.038484
	(-1.239481)	(0.823926)
	[0.2248]	[0.4161]
LnPSC	5.124414**	0.205866
	(2.357999)	(0.486086)
	[0.0251]	[0.6302]
LnINFL	-0.849726***	0.086491
	(-1.740646)	(0.714947)
	[0.0920]	[0.4798]

INT	-0.226229*	-0.017309*
	(-4.888761)	(-2.108152)
	[0.0000]	[0.0429]
LnPFA	-0.434551	0.222964*
	(-1.239481)	(2.987930)
	[0.2248]	[0.0054]

The parenthesis show t statistics (….) and P values […] respectively

Inflation has a negative relationship between *BOND* which confirms that inflation if not kept low has a negative effect on capital market development. In the study done by Kapingura and Ikhide (2016) bond liquidity is shown to be negatively affected by inflation and the stock market index. Inflation rates are outlined as a significant determinant in bond market development.

The positive impact of *PSC* is as expected, it is outlined as a precondition in the development of the stock market (Yartey and Adjasi, 2007; Zhou etal, 2015). The increased ability of the South African financial system to mobilize capital and allocate it towards private sector credit enhances its operations. Furthermore, a more developed the banking sector offers greater support for capital market development. Infrastructure such as inter-bank markets offer support services that positively affect the rate of development. Our results show that a 1% increase in *PSC* increases bond market development by 5.12%, and the relationship is positive in stock markets though it is not significant.

South Africa is classified as a developing economy however the financial sector exhibits traits similar to those in developed economies with regards to scale, sophistication and levels of development. The positive impact of financial intermediation is also confirmed in some studies, with the mobilization of savings by the financial sector showing indirect positive effects on per capita GDP (Kuluratne, 2002).

The variable of interest produces mixed results, in the case of the stock market as a dependant variable we find it has positive results. In the context of stock markets a 1% increase *LnPFA* results in a 0.22% effect on stock market development. This is confirmed as expected by Yartey and Adjasi (2007) when savings are identified as an important determinant in stock market development. These results are similar to Thom (2014), Impavido et al (2003), Raisa (2012), Catalan et al(2000) using a different methodology. One of the reasons for the insignificant effect on *BOND* Faure (2007) argues that equities historically have received the bulk of institutional investment and has been heavily relied on for sources of finance on financial markets in South Africa. Although this has changed in recent years with the development of bond market combined with financial markets ratings of the SA bond market. The increased participation on the bonds market by institutional investors (both foreign and domestic) has not yet shown significant positive results due to lagged effects. The results show that the best channel for pension assets to affect capital market development is through the influence of stock versus bond markets.

The ARDL cointegration results are confirmed by the VECM estimation results which reveal that in the long run equilibrium that *STK* has a positive relationship with all the independent variables, the speed of adjustment shown by the error correction term is significant. The independent variables and their lags suggest that all the variables including pension fund assets cause stock market development. The results also show that when the other independent variables are regressed, there is no positive relationship in the long run. In the case of *BOND* as the dependant variable, the results show that the variables do not jointly cause bond market development. *INFL* and *PSC* show a positive long run relationship between the other dependant variables. This is consistent with the ARDL estimation results. Inclusion of the openness and levels of financial liberalization using either a proxy for foreign direct investment, should be further investigated. In this instance the variable in the computations didn't show any significant cointegration results when included as a control variable.

6. Conclusion

In this paper the impact of pension fund savings on bond and stock market development is investigated using South African time series data. Stock and bond market development proxies measure the impact using ARDL and VECM estimation technique for robustness. It can be concluded that indeed pension funds have positively affected the growth of stock market development, but this cannot be confirmed in the case of bond market development due to insignificant result findings. It can be confirmed that a higher level of financial sector development causes a higher impact of pension funds on overall capital market development.

Secondly the Block Exogeneity tests within the VECM framework show a unidirectional relationship between pension funds and only stock market development. Neither show bidirectional causality, meaning that stock market and bond market development do not cause greater pension fund savings. The policy implication is therefore one that requires development of the bond market such that pension fund savings can stimulate its growth. The mobility of pension funds to bond market investments and their ability to integrate with in a strong correlation requires further investigation. The high degree of financial development shows despite the high levels of capital stock the ability to mobilize these savings for investments in the bond market is limited. Thus the results imply that the efficiency of pension funds to stimulate bond markets requires further measures to enhance the long run relationship in this instance.

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