

Defined-contribution retirement fund investment strategies: An appropriate default?

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ABSTRACT

In South Africa, defined-contribution funds dominate the retirement fund landscape. The members of these funds who refrain from exercising investment choice (where available), will automatically be enrolled into a default investment option selected by the trustees of their fund. The majority of these default arrangements result in an investment portfolio that is determined based on the member's age or their time until retirement (so called lifestage investment strategy). Historically, defined-benefit funds were designed and managed to provide members with a guaranteed income for life at retirement. For example, a member of a defined-benefit plan knew she could expect 60% of her final salary at retirement if she worked 30 years at the company. Most defined-benefit funds have now converted to defined-contribution arrangements. Almost all defined-contribution plans are designed and managed with a focus on the fund credit. In this paper, we introduce design criteria for an improved defined-contribution retirement plan. We propose a goals-based default investment strategy whose core objective is to improve the likelihood of achieving an appropriate level of retirement income (much like the previous defined-benefit funds). The current lifestage default is evaluated against these criteria.

KEYWORDS

Defined-contribution; default investment strategy; goals-based investing; lifestyle; target-dated fund

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INTRODUCTION

In South Africa, as in other countries, there has been a significant move from defined-benefit ('DB') funds to defined-contribution ('DC') funds since the 1980s. Prior to 1980, most large South African pension funds were DB. The movement to DC funds was largely driven by a number of South African specific reasons (for example, political issues and pension fund practice in South Africa) (Kerrigan, 1991).

The majority of employees in the South African private sector now belong to DC funds. This move has resulted in a substantial transfer of risk from the employer (who traditionally stood behind the DB scheme promise) to the individual member of the DC scheme. These risks include market risk (change in the value of the member's accumulated fund balance), interest-rate risk (changing value of an annuity that can be purchased at retirement) and longevity risk (an improvement in the average life expectancy of prospective annuitants). They are well documented (for example Daykin (2002)).

The three main factors that determine the ultimate benefit that is received at retirement are the contributions (to retirement provision) made by a member during their working life time, the period over which they contribute and the returns earned on their accumulated savings. Arguably, the trustees and the members of a retirement fund have very little control over these factors and associated risks with the exception of the chosen investment strategy (normal retirement age and contribution rates are often determined by the rules of the fund).

Costs and charges can also have a material impact on the final benefit received and trustees can add much value in ensuring that benefits received are commensurate with the expense of providing for them.

The investment strategy chosen for a fund member is thus crucial in determining the ultimate retirement benefit received, and hence the risks faced, by a member of a DC fund.

INVESTMENT STRATEGY OBJECTIVES – INCOME IS THE GOAL

The vehicle for retirement savings has changed from a DB fund to a DC fund but the actual needs of the members it serves has not changed. The ultimate objective for these funds is to provide a reasonable standard of living in retirement.

The traditional DB fund had a well-conceived and specific promise to provide its members with a guaranteed income at retirement. A member of a DB fund knew that they could expect a certain level of income in retirement based on their length of service with a fund and their final salary. For example, a South African DB fund would typically provide for an accrual rate of 2% p.a. for each year of service. An employee in this fund working for 35 years would expect 70% of their pre-retirement salary payable as their starting annual pension for life.

The language of DC funds in SA is very different. The regulator and actuaries appointed to a DC investment fund refer to the "liability" of the fund as being equal to the fund credit balance in respect of each member i.e. the accumulated savings of

each member is deemed to be their liability. This is because DC funds are operated as investment savings accounts. The liability is no more than an accounting number based on the accumulated savings in respect of the individual.

The needs of an employee who participates in a DC fund have not changed from employees who participated in the previous DB funds. It is only the vehicle for retirement provision that has changed.

DC funds in the United States are most commonly referred to as 401(k) plans. These were among the first DC funds in the world and were never intended to be the core vehicle for retirement savings. They were named after a section of the United States Tax Code (the Internal Revenue Code) and were originally conceived as a retirement benefit supplement for higher earning executives. They replaced Deferred Compensation Plans in 1978 which allowed compensation of high earning executives to be deferred. They were originally used as savings vehicles alongside the executive's DB fund and were thus incidental to the main retirement provision vehicle. As such, very limited attention was initially placed on the structure of these funds as they were only for the higher-earning executives.

Members in a DC fund have the same objective as that which was promised or targeted under alternative retirement systems – a stream of income that maintains a standard of living in retirement.

Almost every retirement system, with the exception of DC funds, express the benefit promise in terms of income. Even the South African state old-age pension is a means-test benefit that provides a monthly income.

Members are used to thinking about their standard of living in terms of income. It is not uncommon for people travelling to new cities to plan their budget by estimating how much money they would need for each day for travel. This would involve making an allowance for the daily cost of food, hotel, transport and leisure. They would not typically start off by asking a travel expert what lump sum amount of money they need for their vacation.

This applies to important decisions too. A foreign visitor to South Africa might be captivated by the beauty of one of our cities and want to move here. A natural starting point would be for the individual to enquire how much money he or she needs to earn each month in order to enjoy a particular lifestyle.

As members are used to thinking about their standard of living in terms of income and the ultimate objective of the retirement fund is to maintain the member's standard of living, we submit that the appropriate objective and goal for a retirement plan is to provide members with a stream of income in retirement.

Treating Our Retirement Account as a Savings Account

Trustees and members of a DC fund focus on the fund credit balances of the membership within the fund. This practice is entrenched by ongoing communication to members which typically takes the form of a statement which highlights the start and end of period fund credit and the investment return earned over the reporting period.

Members are therefore accustomed from a very early stage to treat their DC fund savings like a bank account. The investment returns earned on the funds relative to a market benchmark are also highlighted.

This practice is reinforced by the regulation. For example, in 2007 the Financial Service Board (FSB) issued Circular PF 130 (“PF130”) entitled “Good Governance of Retirement Funds”. Annexure B to PF130 provides guidelines to an Investment Policy Statement (IPS).

The document contains a section entitled “Essential Elements of the IPS” which states that the IPS should “stipulate the expected rate of return of the portfolio” and the “anticipated volatility of the rate, setting parameters”. They provide further guidance on examples of how to set the rate of return expectations.

- A real rate of return of “x” percent over a given period; or
- A nominal rate of return; or
- A rate of return over an agreed benchmark portfolio.

There is no mention of a board of trustees setting a retirement benefit target based on income (direct or otherwise).

Suppose a board of trustees adopted one of these rate of return targets. A member whose investment return exceeds the target would not be in a better position to determine their ultimate likely retirement benefit. Of more concern is that outperformance of these benchmarks does not mean that the individual member is on track for a reasonable retirement benefit. This is even the case where the target appears difficult to achieve (e.g. a real return of 5% p.a. or the outperformance of the equity index).

The investment value or fund credit and returns achieved each year provide no meaningful insight into the member’s ability to meet their true goal which is to secure an appropriate level of retirement income.

This is because you cannot determine the appropriateness of an investment strategy without any regard to the individual member’s targeted income at retirement. DB funds guarantee the targeted income which is thus a liability commitment of the plan sponsor. The risk of not achieving adequate performance to pay this liability is sometimes referred to as Actuarial Risk. It is therefore important that the objective that underpins the investment strategy defines clearly what the true liability, or value of the targeted income at retirement, of the member is.

The Problem with focusing on Fund Credit

The appropriate objective for evaluating the benefit at retirement is what it has always been i.e. the provision of a real or rather inflation-protected level of income that will allow the member to have a reasonable standard of living in retirement. This income should be payable for as long as the member lives. This income should keep pace with the cost of living and hence escalate at least in line with inflation each year.

An inflation-linked annuity issued by an insurer is the only financial product that mitigates the three key risks present after retirement, namely:

- **Investment risk** This is because the amount received from the annuity cannot reduce in nominal terms.
- **Inflation risk** Payments received by the annuity increase annually in line with inflation.
- **Longevity risk** This is the risk of outliving one's resources which is mitigated by the promise to make payments for as long as the member (or a specified spouse) is alive.

The inflation-linked annuity thus becomes the “risk-free” default investment option at retirement (ignoring for the time being the credit risk of the counterparty issuing the annuity). A choice of any other available product exposes the member to one or more of the above risks. This does not imply that selecting the risk-free choice is the most appropriate option for the member. There may well be member-specific considerations that inform the most suitable investment options for them. These include affordability, risk appetite, household situation (e.g. dependents and spouse), an ability to earn income in retirement, their health and other resources.

We thus submit that without any further member-specific knowledge, the inflation-linked annuity is an appropriate default option at retirement. The cost of purchasing this annuity will change based on prevailing economic conditions.

For example, a retirement fund member retired at the end of 2009 at the age of 65 and requires R6 500 a month until she dies. Each year, she requires this income to increase in line with inflation. The liability has a market value that can be determined with reference to the cost of an inflation-linked annuity provided by an insurer. Based on prevailing real rates, the cost of securing this income stream was approximately R1 million. A key feature of the South African market is the ability to purchase inflation-linked annuities from an insurer.

A member with a different retirement starting date and an accumulated fund credit of R1 million at retirement will typically receive a different monthly income which depends on the cost of annuities at the time that they retire.

Figure 1 below illustrates the approximate inflation-linked monthly income that could be purchased with the same accumulated savings of R1 million in the five years that follow.

It can be seen that there is a significant difference in the starting monthly income stream that can be purchased with a particular level of fund credit. This volatility is largely driven by the change in prevailing real interest rates.

Put differently, an individual retiring with an accumulated fund credit of R1 million at retirement cannot be certain of what retirement income stream these savings will be able to purchase at retirement in the future.

We have not adjusted the starting monthly pensions to reflect the change in inflation over the period. The figure highlights changes in income only due to interest rates. It serves to illustrate that a member with R1 million in fund credit would be able to purchase a different starting monthly pension based on the prevailing interest rates

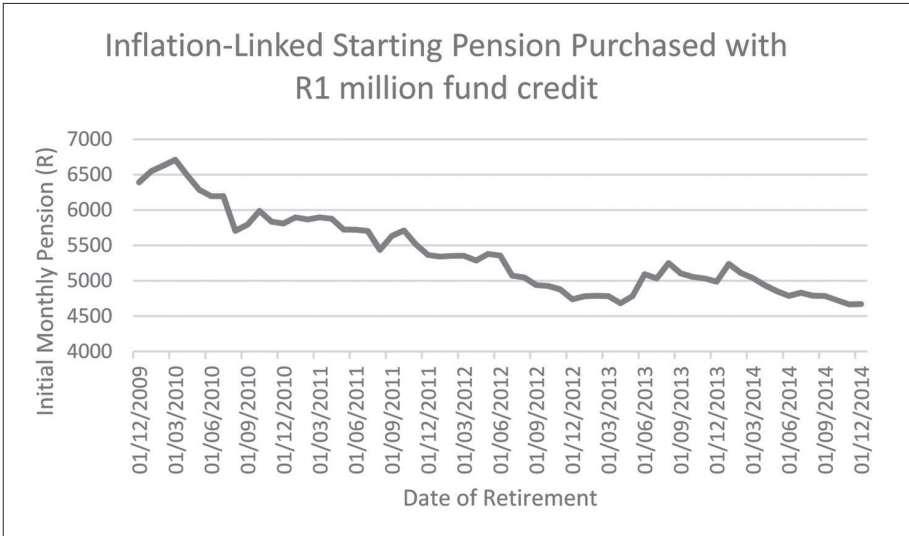


FIGURE 1 Inflation-linked starting pension

at the time of retirement. Depending on the investment strategy prior to retirement, this might be an extremely large market-timing risk for members at the point of their retirement.

As at end of 2014, the inflation-linked monthly pension that could have been purchased with R1 million was approximately R4 650. This is a deterioration of almost 30% over a five-year period in the starting monthly pension that can be purchased with the same level of fund credit. This reduction is further exacerbated if inflation over the same period is taken into account. The retirement objective thus cannot be met by setting a fund credit threshold as an objective or goal.

The example above demonstrates that both accumulated savings and the return achieved in a year provide very little comfort to an individual that they are on track to achieve a particular level of retirement benefit.

Trustees and members should be provided with information that focuses on real income as the goal. In this regard, we distinguish between “important” and “meaningful” information.

Providing Members with Meaningful Information

The format of a typical DC retirement statement provides the accumulated savings of the individual and its change in value over the period. We argue that it is not meaningful. In fact, providing it might actually encourage undesirable member behaviour.

Suppose Lindiwe aged 55 receives her statement and it reveals an accumulated fund balance of R1 million. Lindiwe’s employer has a normal retirement age of 65. Lindiwe is thrilled to have R1 million in her account. She believes she is on track for a

great retirement. This is largely based on her perception that one million rand is a lot of money. The reality is that knowing her account balance provides Lindiwe with no insight into her likely standard of living in retirement. She currently has a potentially false sense of comfort over her retirement provision. Of more concern, Lindiwe is considering leaving her job for another and accessing some of the fund credit.

Suppose Lindiwe instead received a statement from her DC fund that showed the following:

- She has sufficient accumulated savings right now to receive a monthly income of R6 100 a month (in real terms) increasing annually with inflation when she retires for the rest of her life
- Her future contributions towards retirement savings are likely to result in a further R1 100 a month (in real terms) increasingly annually with inflation
- She is therefore on track to receive approximately an inflation-indexed R7 200 a month (in real terms) in retirement

The calculations required for the statement can easily be done by actuaries. They are transparent, objective and market-consistent.

The information that had been used to provide accumulated savings is now used in conjunction with the estimated cost of purchasing the appropriate deferred inflation-linked annuity (based on prevailing real yields). The nature of the statement has dramatically changed from referring to a pot of money to a likely stream of real retirement income.

Only Lindiwe is in a position to decide whether this real income of R7 200 at retirement will be sufficient. But now she has the information necessary to make that decision.

This information did not require a significant education exercise on the part of the trustees, the fund or the employer. As discussed previously, members already think in terms of consumption and they have always budgeted their expenditures in terms of their income throughout their life. The information has been provided in a manner that has more relevance and doesn't require subsequent calculations on the part of a member. It should be noted that the calculation of how much income can be provided by a given fund credit is not something that households do easily or well.

The fund credit has been used in the calculation of these figures. However, it has been standardised by dividing it by a market-consistent annuity factor appropriate for the individual member to express that fund credit in terms of the income that it can provide.

The statement also incorporates another important asset of the individual member – their human capital. This is the future contributions that are expected to be made by the member towards retirement provision. Merton (2003) highlights the importance of explicitly including human capital when developing an investment strategy for an individual member. This is because human capital is the largest single asset most members will have for a significant part of their life before retirement.

The fund credit will still feature at the end of the statement as it is a statutory

requirement. The intention is to provide the meaningful information first and then provide this required but less meaningful information in a less prominent position with the hope that less emphasis is given to it by the member.

Appropriate Income Goal – The Replacement Ratio Objective

It is important for the trustees of a retirement fund to set a default income goal for each member of the fund. This objective will define the liability in our framework. We submit that the trustees should use the Replacement Ratio measure to express the income objective for designing the investment strategy.

The Replacement Ratio is defined as the proportion of a member's salary at retirement that is replaced by the starting pension at retirement. For example, a person earning R1 000 a month just before retirement who receives a starting pension at retirement of R700 a month will have a replacement ratio of 0.70 or 70% (of final salary).

The Replacement Ratio concept has a number of advantages:

- A member's post-retirement income needs will be commensurate with their salary, and thus lifestyle, before retirement;
- During the accumulation phase, members generally pay retirement contributions in proportion to their salary;
- It is analogous to a DB fund construct where the promise was expressed as a proportion of salary; and
- It has been advocated as a target in National Treasury's Discussion Paper on Retirement Fund Reform (South African National Treasury, 2004).

It is essential that an appropriate Replacement Ratio is selected as a target by the trustees of the DC fund as this will be used as our measure of the liability and therefore will be the objective that drives the entire investment strategy.

The target should be customised in a pre-defined way for each individual member. For example, suppose the trustees have decided on a particular Replacement Ratio target for a member who will spend 35 years in the fund and retire at the normal retirement age. To the extent that a member spends less time in the fund, then a lower default Replacement Ratio should be used. This is not different to the previous DB scheme where an accrual rate per year of service in a fund was promised. We submit that there are other factors (other than time in the fund) that need to be incorporated into this target. We will discuss this in the section "Default Investment Strategy for the Unengaged Member".

Determining an Appropriate Replacement Ratio Target

It is understandable that most members might believe that they need to set a Replacement Ratio target equal to 100%, because the objective is to maintain the standard of living experienced prior to retirement.

There are however a number of reasons why a standard of living could be maintained with a Replacement Ratio lower than 100%:

- 1) The member is no longer saving for retirement;
- 2) The taxation in retirement is lower than that prior to retirement; and
- 3) There are lower costs (e.g. lower debt or fewer dependents) of living in retirement (the caveat here being healthcare costs).

Munnell and Soto (2005) state that “the range of studies that have examined this issue consistently find that middle-class people need between 65 and 75 percent of their preretirement earnings to maintain their lifestyle once they stop working.” According to Scholz and Seshadri (2009), the median optimal target Replacement Ratio is 75% for married couples and lower for single people.

Government’s objective in terms of adequacy, as stated in the National Treasury Discussion Paper on Retirement Reform (2004) is a Replacement Ratio of 75% for individuals retiring at age 65 with the possibility of a lower percentage applying at higher income levels. The annuity purchased at retirement is assumed to increase annually in line with inflation, payable for the lifetime of the member. It also assumes a spouses reversion of 50% of the member’s pension.

Under current conditions, we believe that Government’s objective of a Replacement Ratio of 75% is very unlikely to be achieved. We submit that even obtaining a 65% Replacement Ratio for 35 years of service will be very challenging.

We set out our reasoning below.

Key Assumptions:

CONTRIBUTION RATES

The contribution rate is normally set in terms of the rules of a fund. In some circumstances, members may be able to make additional contributions towards retirement or choose between different contribution rates.

National Treasury (2004) state that it is reasonable to assume a 10% of payroll contribution towards retirement funding after expenses.

The Alexander Forbes Benefits Barometer (2014) showed a range of contribution rates in the private sector towards retirement savings depending on industry. This range was between 12.1% and 15.7%.

INVESTMENT RETURN ASSUMPTION

The average real rate of return in South Africa is currently 2% p.a. on long-term government inflation-linked bonds. The real yield of the South African government-issued inflation-linked bond issuances as at end of June 2015 are presented in Table 1.

Assuming an equity risk premium of 3.0% (consistent with Dimson, March and Staunton (2011)) and an inflation-risk premium of 0.5%, the expected return on equities is approximately 5.5% p.a. Regulation 28 of the Pension Funds Act (1956) details prudential investment guidelines for retirement funds. The maximum allocation to equities permissible is 75% of the portfolio. Whilst it is possible to have a 90% exposure to equities if 15% of the portfolio is in listed property, we will assume a maximum equity exposure of 75% at any one time.

TABLE 1 South African government-issued inflation-linked bonds – real yields

Bond name	Maturity	End of month real yield
R211	Jan-17	0.65%
R212	Jan-22	1.64%
R197	Dec-23	1.68%
I2025	Jan-25	1.65%
R210	Mar-28	1.70%
R202	Dec-33	1.81%
I2038	Jan-38	1.91%
I2046	Mar-46	2.05%
I2050	Dec-50	1.99%

Source: Bloomberg

It follows that the maximum expected real return per annum that can be expected over the working lifetime is 4.6% p.a. This assumes a maximum allocation to equities for the entire pre-retirement investment horizon (i.e. no phasing down of equities into more conservative investments). It also implicitly assumes that the investment manager's extra or outperformance will offset their fees.

This maximum real return assumption is lower than what might have been assumed previously. This is because prevailing yields on inflation-linked bonds have fallen. The fall in real yield for the benchmark government-issued R202 inflation-linked bond (maturing in 2033) has fallen from a level of 3.5% to 2% over ten years. It is important that expected return assumptions are reduced by these levels to reflect these new market-consistent levels.

COST OF ANNUITY AT RETIREMENT

We have assumed that the annuity purchased at retirement is an inflation-linked annuity from an insurer that will pay an initial pension that escalates annually in line with inflation for the member's life. We have also provided motivation for this annuity type being the least risk investment for the member at retirement as investment, inflation and longevity risk is mitigated for the member.

Other annuity types or products might have a higher starting pension (and consequently result in a higher Replacement Ratio). Purchasing such a product exposes the member to one or more of investment, inflation or longevity risk. The fact that most members choose a living annuity at retirement is not an argument for using it as part of a default investment strategy at retirement

Importantly, the framework does not require the individual member to purchase a particular annuity type or force the individual member to pursue a particular investment strategy at retirement. The member will still enjoy full flexibility.

For the purpose of these calculations, we have assumed that the cost of the

inflation-linked annuity at retirement is based on real yields of 2%. We consider a member who stays in the fund and contributes for 35 years before retiring at age 65. She contributes at the upper end of the range at a relatively high 15% of salary towards retirement funding and she earns a real return of 5% p.a. each and every year during the accumulation period. Based on our calculation, this hypothetical member is expected to achieve a Replacement Ratio of 65%.

Below in Table 2 we set out Replacement Ratios under various scenarios. In particular, we consider a member who contributes for 25, 30 and 35 years in a retirement fund at contribution rates between 7.50% and 17.50% of payroll towards retirement funding (net of any expenses).

Scenarios of 4% p.a. and 5% p.a. real growth are considered. We provided motivation of a net real return of 4.6% p.a. as an aggressive long-term real return target.

TABLE 2 Expected replacement ratios under various assumptions

Real Return 4% p.a.				
		Contribution Period (years)		
		25	30	35
Contribution Rate	7.50%	17%	22%	27%
	10%	22%	29%	35%
	12.50%	28%	36%	44%
	15%	34%	43%	53%
	17.50%	39%	51%	62%
Real Return 5% p.a.				
		Contribution Period (years)		
		25	30	35
Contribution Rate	7.50%	19%	26%	33%
	10%	26%	34%	43%
	12.50%	32%	43%	54%
	15%	39%	51%	65%
	17.50%	45%	60%	76%

For a given contribution period and real return assumption, the difference in expected Replacement Ratio can be as much as 22% for a 5% change in contribution rate towards retirement funding.

The analysis illustrates that each fund must set a Replacement Ratio target based on the unique features of their own fund.

Trustees should set a Replacement Ratio target that would be reasonable for a member who begins their working life in the fund and retires at the mandatory

retirement age of the fund. The default contribution rate will be unique for each fund and needs to be taken into account.

It is also important for trustees to take into account the manner in which remuneration is structured within the company e.g. some companies utilise a total cost to company approach. In this instance, concepts like pensionable salary—which is the actual salary used for the purpose of determining contribution rates—become important.

It is important for trustees to set a target for individuals who do not engage with their retirement fund provision or are unable to do so.

Trustees should also decide how the target would change for members who do not have the same level of service as the hypothetical member. For example, in a DB fund the member might earn an accrual rate of 2% for each year of service. Thus a member with 35 years of service could expect a Replacement Ratio of 70% whilst a member with 20 years of service could expect a Replacement Ratio of 40%. Similar thinking and principles can be applied for members in the DC fund. The accrual rate concept might be used but other approaches exist. It is important that the target is appropriately adjusted for members with different years of service. These will take into account the reduced contribution period.

Whilst trustees will be unable able to specify a specific rand pension amount on behalf of their members, the framework should ideally allow for individuals to select an explicit pension amount when they are engaged and able to specify it.

Investment Implications for the Risk-free Asset

There are some important implications that arise from the income objective established for the fund. By establishing an inflation-linked income goal as the retirement objective, inflation-linked instruments become the basis for the member's risk-free asset.

The risk-free option at retirement is to purchase an inflation-linked annuity from an insurer that provides a chosen monthly income stream for the remainder of the member's life. This might include a spouse's reversion. These annuities are available in South Africa and therefore there is a readily available market price for the annuity at retirement.

There are currently no widely available deferred inflation-linked annuities available. For example, an individual at age 60 who intends retiring at age 65 cannot buy an annuity today that will provide a known real inflation-linked annuity stream in five years. It is however possible to construct a portfolio of instruments that should track the change in the value of the annuity that the member seeks to ultimately purchase at retirement. This is achieved through creating a replicating portfolio and the technique is widely used by Liability Driven Investment (LDI) managers.

South Africa has more than nine government inflation-linked bonds in issuance with maturities extending up to 2050.¹

1 As at end of September 2015

The risk-free asset prior to retirement involves purchasing an appropriate portfolio of fixed-income securities that will track the change in the value of the inflation-linked annuity at retirement. It therefore mimics the change in cost of the theoretical deferred annuity (had one been available). In this instance, it is preferable to not actually purchase a deferred annuity (assuming one was available) but rather be in a position to purchase one at the point of retirement.

The risk-free asset will consist of government inflation-issued securities where we assume no sovereign risk of default for the local investor.

Importantly, each member has their own risk-free asset. The risk-free asset is actually a portfolio and not a single security or index. The risk-free asset for an individual aged 30 will differ from the risk-free asset for a member one year from retirement. Thus, whilst an investment in a publicly available inflation-linked bond index such as the CILI (Composite Inflation-Linked Index) might be more appropriate than cash, it is inferior to the true risk-free asset which is a tailored inflation-linked bond portfolio that tracks the cost of the annuity that the member might buy at retirement.

This risk-free asset will change through time based on (amongst other things) term to retirement, availability of inflation-linked instruments and changes in real interest rates.

Below we demonstrate why assets traditionally regarded as risk free are in fact not. Cash or money market instruments are often regarded as risk-free whilst asset classes such as government-issued nominal bonds are regarded as low risk.

We present our analysis by making use of the funding level concept traditionally used to describe the financial position of a DB fund. The funding level expresses the assets of a fund as a proportion of the actuarially determined liability. A funding level equal to or greater than 100% implies that the fund has sufficient assets to meet its ongoing and expected future liability obligations. Conversely, funding levels smaller than 100% imply a shortfall.

It is not typical to apply the funded ratio to individual members' accounts. Indeed, actuaries define liabilities equal to a member's fund credit in DC funds and so each member would normally be regarded as 100% funded, by that definition.

If we restrict our analysis of the individual member to their Defined Contribution arrangement, (as opposed to taking into account assets outside of the fund), their assets will comprise their accumulated DC fund credit as well as their human capital (the future contributions towards retirement savings that will be made into the fund). We have defined the liability to be the cost of purchasing a deferred inflation-linked annuity with the targeted real initial pension at retirement.

Suppose a member is one year from retirement and is deemed to be 100% funded. This means that they have the required accumulated value of assets necessary to purchase their required real pension in one year when they retire. One year from retirement this member would be most concerned about the likelihood of the pension they can secure falling below their target.

The analysis below considers the change in solvency that a member would have experienced over a one-year period based on different pre-retirement investment strategies. For ease of analysis, we assume the member has made their retirement contribution into the fund at the beginning of the year and this has been taken into account in determining their fully solvent position.

The change in solvency is calculated for this individual over the course of the year assuming they invested their full fund credit in three different portfolios.

- A dedicated money market fund (where the STEFI Index is used as a measure of return);
- A nominal bond portfolio (where the All-Bond Index (ALBI) is used as measure of return); and
- The risk-free portfolio which is a tailored inflation-linked bond portfolio (constructed using the methodology described previously).

Rolling one-year periods for year ending 31 August 2007 until 30 June 2015 are considered in Figure 2.

Not surprisingly, the STEFI or money market portfolio has positive returns and has relatively low volatility of returns. By contrast, the portfolio termed risk-free has the most volatile return series. For the year ending 31 March 2010, the annual return is almost -11%.

When liabilities are incorporated and we consider the change in the cost of securing the target real-income over the year, the figure shows a different story. The funding level at the time of retirement for each of the investment strategies is

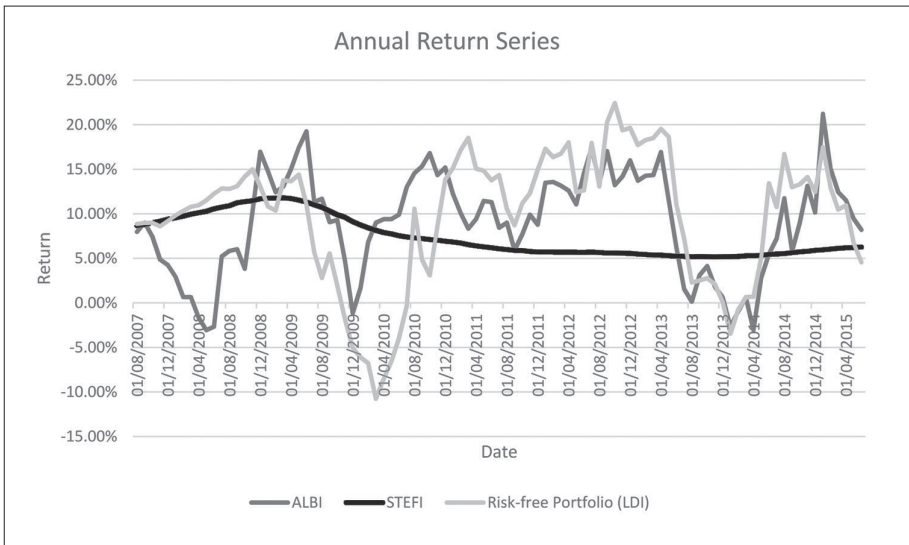


FIGURE 2 Inflation-linked starting pension purchased with R1 million fund credit

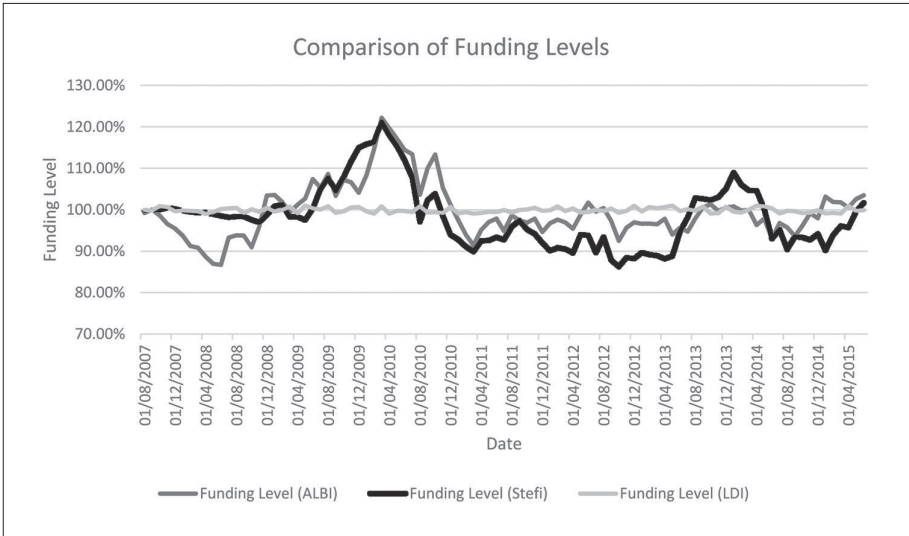


FIGURE 3 Annual return series

presented in Figure 3. The STEFI portfolio now provides the most volatile funding level (as measured by standard deviation). By contrast, the risk-free portfolio largely protects the funding level of the member over the year.

The wide range of year-end solvency demonstrates the risk inherent in a cash or nominal bond pre-retirement investment strategy. These are often not appreciated as the strategies are positioned as low-risk or conservative.

In more than 60% of one-year periods considered, the member would be able to retire with less real income as a result of investing in a cash or nominal bond portfolio. Various statistics are presented in Table 3 which illustrate the sub-optimality of these portfolios when income is the target.

TABLE 3 Select investment statistics for the STEFI and ALBI portfolios

	STEFI portfolio	ALBI portfolio
% of the time where funding level reduced	66%	61%
Minimum funding level	86.3%	86.7%
Average outperformance of liability	-2.3%	-0.70%
Tracking error	7.9%	6.8%
Information ratio	-0.30	-0.10

Another way of illustrating the analysis above is to consider the actual change in income that can be purchased at retirement for our hypothetical member.

Assuming they approached an insurer one year before retirement and were told they could purchase a real income of R10 000 (real terms) in one year when they retire, what level of real income would they actually be in a position to purchase one year later assuming the three strategies above.

The analysis shows that the money market portfolio provides a lower real income two-thirds of the time. In more than 50% of periods considered, the real income reduced over the year when low-risk or conservative strategies were chosen.

Table 4 below does not provide more analysis than the funding level results above. It is simply a reformulation that is arguably a lot more meaningful to an individual member. A member provided with the first table would require some more information and education to interpret the results.

TABLE 4 Select income statistics for the STEFI and ALBI portfolios

	STEFI portfolio	ALBI portfolio
% of the time where income fell below R10 000 real	66%	61%
Minimum real income received	R8 625	R8 669
Median income	R9 815	R9 792

The first table provides statistics like funding level, tracking error and information ratio which are commonly used by investment consultants to evaluate investment strategies and managers.

Whilst the notion of a funding level is not foreign to those advising retirement funds, it is not a natural concept for a member. Even a member comfortable with the concepts might not know what inferences to make from them. It is more meaningful (and arguably appropriate) to be communicating income as they approach retirement. The second table shows measures easily understood by a member requiring minimal financial education.

The risk-free portfolio protected the individual member's solvency and ensured they achieved their targeted real pension over every rolling period considered. It demonstrates why it is the genuine risk-free portfolio for a DC member targeting a real level of income in retirement.

We have proposed that the risk-free asset for a DC member is an appropriately constructed government issued inflation-linked bond portfolio that will vary from member to member and change through time.

Default Investment Strategy

In South Africa, DC funds either have one investment strategy in place for all members or offer member investment choice. Even where member investment choice is provided, trustees often provide a default investment strategy for those members who choose not make their own decisions or are unable to do so. The establishment of a default investment strategy is recommended by the South African government. A discussion

paper on retirement fund reform issued by National Treasury (2004) recommends that “trustees be prohibited from granting investment choice to members unless a default option is granted to members”.

National Treasury (2015) have recently proposed both default investment portfolio and default annuity regulations. These are currently in draft format. We believe that the approach presented meets National Treasury’s core requirement of “substantially improve(ing) the retirement outcomes of members”.

Empirical evidence indicates that when member investment choice is provided, most retirement-fund members take the path of least resistance and are invested in the default investment strategy. Zavone & Gunasingham (2005) refer to this as the ‘participation paradox’ – the fact that many members want investment choice, yet very few make use of it. They state that approximately 90% of Australian fund members are invested in the default option.

A consulting firm in the United Kingdom (Bacon & Woodrow) estimates that 80% of DC scheme members in the UK accept the default investment strategy (Bridgeland, 2002)

Alexander Forbes (a South African employee-benefits firm), in *Personal Finance* (2012) stated that “More than 85 percent of retirement fund members rely on the investment portfolio decisions made by their fund trustees, who create default portfolios into which members’ savings are automatically channelled.”

There is another theory that individuals remain in the default investment strategy because they trust their board of trustees to have made the optimal decisions in respect of the default investment strategy. Arguably members trust their employer and trustees more than external financial institutions such as insurers or banks.

The emphasis placed by government on the default investment strategy, the strong tendency for members to opt for the default investment strategy and the importance of the investment strategy in meeting the income objective for retirement provision means that the default strategy in place for a DC fund is crucial.

Default Investment Strategy for the Unengaged Member

We submit that the default investment strategy should begin by setting a realistic income goal for the members within the fund. As suggested above, this will take the form of the Replacement Ratio. However, rather than setting a Replacement Ratio target for the hypothetical member who spends a certain working lifetime in the fund, a more tailored Replacement Ratio target is calculated for each individual based on their expected number of years within the fund and potentially their gender too.

The investment allocation of the individual member will be made to two broad portfolio types – a member-specific risk-free portfolio described above and a so-called growth portfolio. The growth portfolio is required to provide performance ahead of the risk-free portfolio and will likely have a large equity exposure.

The allocation of each individual to the risk-free and growth portfolios will change through time to optimise the likelihood of achieving the income goal. It will

take into account member-specific information such as the accumulated savings, contribution rate towards retirement provision and the market-consistent cost of securing the inflation-linked income stream at retirement.

To the extent that the individual has sufficient assets to achieve the income goal, the assets will be allocated mainly to the risk-free portfolio.

The change in allocation between the risk-free asset and growth portfolio will not be a mechanical rule based on age. Risk is a tool taken to achieve the goal. To the extent that it is possible to meet the income goal using only an allocation to the risk-free portfolio, then this is where the assets will be deployed. Thus risk is removed (as far as possible) from the member's investment portfolio, once the goal has been achieved. However, if the member is very far away from achieving the income goal, then there will be a much higher allocation to the growth portfolio (since risk is required to reach the income goal).

There are a number of reasons why the allocation between the two portfolio types will change through time.

These include market-related and individual reasons.

Market-related reasons include:

- Change in the value of the accumulated funds; and
- Change in real interest rates and inflation which impact on the change in the deemed value of the liability.

Individual reasons include:

- Change in salary;
- Change in contribution rate towards retirement funding;
- Change in income goal; and
- Change in retirement date.

These measures are neatly captured in a calculation of member's funding level. In this instance, we are calculating the solvency of the individual by expressing their total assets as a proportion of their liabilities. We are considering the balance sheet of the member – in respect of their fund retirement system.

Default Investment Strategy for the Engaged Member

The default investment strategy targets a level of income decided by the board of trustees and the investment strategy in place is tailored to achieve the income goal based on individual member circumstances.

Most members are unengaged with their retirement savings when they join a fund. They are focusing on their careers and retirement seems very distant. It is also not possible to specify what their income needs might be in retirement.

At some point, members will become engaged. For some, this might be at the point of retirement. For others, it might be some time before.

Whilst a DB fund provided no more and no less than the accrual rate for each year of service, an ability for a member to specify their own retirement income need would serve as an advantage over the DB equivalent.

It is possible to provide meaningful choices to individuals to allow them to target more (or less) than the default income assumed by the trustees. This ability to achieve more than what was targeted under the DB equivalent fund is a significant advantage of the framework.

The framework described above does not “put the DB into DC”. Rather it allows for a realistic income goal to be established by the trustees for the unengaged member but allow the actual income needs to be specified when the member becomes interested.

The target in retirement moves from a generic Replacement Ratio objective to an actual level of income. It is important that a member is able to appropriately engage with their retirement provision.

Returning to the example of Lindiwe. Lindiwe’s statement revealed that she was on track for income of R7 200 per month. This may or may not have been the target set for her by the fund. Suppose this was not sufficient for Lindiwe’s retirement and she requires a higher income level.

Lindiwe only has three options to boost her retirement income:

- 1) Contribute more towards retirement provision;
- 2) Retire later; and
- 3) Take more investment risk.

There are no other options available to her. This does not imply that these options are permissible within the fund. Indeed, her employer may not allow for additional contributions in the fund or an extension of the retirement date. However, the implications of saving more and potentially delaying a planned early retirement are invaluable.

Doing so within the fund has a number of advantages.

- From 1 March 2016, South Africans can enjoy tax deductibility of their contributions to 27.5% of their taxable income (capped at R350 000 per annum). This extends to other retirement saving products but arguably is most easily accessed within the current fund set-up.
- Access to much lower fees than an individually administered product. It is very likely that the administration and investment management fees are significantly lower in the DC fund than in competing retirement savings products.

Suppose her statement presented her with the following information:

- Impact on real retirement income (in South African Rand) of alternative contribution rates
- Impact on the real retirement income (in South African Rand) of delaying or bringing forward retirement by a specified period (e.g. 1, 3 and 5 years).

Suppose Lindiwe was 100% funded in the example where R7 200 is the target. This might have resulted in her being fully invested in the risk-free portfolio. This was not an asset allocation decision that she would have made but a consequence of the optimal investment strategy being deployed for the chosen income target.

Each member will always have the option of changing their mind about their target. Suppose Lindiwe now requires an R8 000 real income. She might find herself 90% funded. To the extent that this gap is not addressed, the investment strategy will automatically be changed to incorporate the Growth Portfolio so as to maximise the likelihood of achieving the revised target.

The framework will need to put in place features that limit the required income to something that is achievable (even if this is at a very low probability).

For the engaged member, this approach thus has a number of advantages:

- An ability to understand what their DC fund is likely to produce in actual income;
- The implication of making changes to the contribution rate towards retirement provision;
- The effect of retiring early (or later if allowed); and
- The option of changing the original income target originally specified by the fund.

This framework for reporting does not imply that the engaged member might not make any changes to their retirement provision but would have a meaningful understanding of their situation. To the extent that contribution rates are changed or retirement is deferred, then mechanisms should exist for this to be incorporated as part of the strategy.

Lifestage or Target Dated Fund Approach to Investment

The most common default investment strategy for DC funds internationally is the so-called Lifestage Investment Strategy. Sometimes it is referred to as a lifestyle strategy or a target-dated fund. These strategies all have a common feature of a pre-defined declining equity exposure as the member approaches the normal retirement date.

These strategies provide an intuitive approach to investment. Members are invested in high equity portfolios when they are younger and the portfolio allocation becomes more conservative (lower equity) as the member approaches retirement.

It is often argued that lifestage portfolios become low risk as the member approaches retirement. Risk in this context is defined as the possibility of a negative return and thus large nominal fixed-income portfolios that safeguard the nominal value of the fund credit close to retirement have an appeal to trustees and members alike.

Indeed, the popularity of this type of strategy in the US peaked when the Pension Protection Act of 2006 designated these strategies as a qualified default investment alternative. This means that trustees cannot face legal action from members if investment returns fall short of expectations.

Below we evaluate the lifestage strategy in the context of the framework and approach described above. It is not intended to be a full review of such strategies.

Objective

A lifestage strategy is not consistent with an explicit post-retirement income objective.

There are a significant number of South African DC funds that have an explicit Replacement Ratio objective in their Investment Policy Statement. In some instances these funds establish the real return required to meet the objective for a hypothetical member who spends their entire working lifetime in the fund. The real return then becomes the investment objective or benchmark for the fund. There might be a check that the real return required (at a point in time) to achieve the Replacement Ratio is consistent with the expected return of the default Lifestage strategy.

As yields are changing all the time, so too is the cost of purchasing the assumed annuity at retirement. This is the case even if an annuity other than an inflation-linked annuity is assumed. Even a so-called with-profit annuity will have a different annual increase assumption if yields move (despite a stable conversion factor at retirement). It is thus not possible to specify a real return target (a return specified ahead of inflation) and ensure a post-retirement income goal will be achieved if that return is achieved.

As an example, suppose the Board of Trustees has determined a real return of 5% p.a. is required to meet their Replacement Ratio objective. A member may earn this on their investments each and every year of the assumed working life-time and still fall short at retirement.

Risk-free asset

The risk-free asset in the lifestage portfolio is traditionally comprised of nominal fixed-income components. These might be bond portfolios benchmarked against the ALBI (All-Bond Index) or money-market instruments. Having the nominal-bond portfolio as the risk-free asset implies a level annuity is the appropriate investment choice at retirement. For the majority of members at retirement, this would be a poor choice of investment. Another reason for money-market instruments and nominal bonds is their relatively low volatility of returns which might appear risk-free on this metric but as demonstrated above is a highly risky strategy when income is the goal. A desire of individuals to access the tax-free portion of their assets is also provided as motivation for this.

The framework does not explicitly consider a risk-free asset and the implied risk-free asset is risky for a member's real retirement income needs.

Trigger for change in asset allocation

The lifestage approach to investment changes the underlying asset allocation based only on the number of years from retirement. Thus two members of the same age with completely different financial circumstances, accumulated savings and retirement-income goals will have identical investment strategies.

As individual members join the fund at different points in time, they will have experienced different portfolio returns. The optimal investment strategy at each point in time for each member will thus change based on their own investment experience within the fund. Of course the investment strategy would also change for members who make additional retirement funding contributions.

In our framework described above, a member who is on track to achieving their real income goal close to retirement might be almost fully invested in the risk-free asset whilst his twin brother who was not as fortunate might still have a meaningful exposure to the growth portfolio because this is required to meet the income goal.

By introducing the funding level objective for portfolio allocation for individuals, we incorporate very important individual information and allow an optimal asset allocation for each member to be determined.

The lifestage strategy thus differentiates investment strategies based only on term to retirement which provides no link to whether the member is actually on track to meet their retirement goal.

Consider human capital

The assets in the framework described above considers the assets of the member as comprising both their accumulated fund credit and their human capital (the present value of expected future contributions). This has significant implications for the investment strategy that is ignored in the existing lifestage approach.

A member who has recently joined the fund in their early twenties will have a negligible fund credit but significant human capital. If they were fully invested in equities, a fall in the equity market would not have a material impact on their financial position (as measured by funding level). This is not simply because they have a long time horizon and they can wait for equity markets to recover. This is not the correct reason. It is because they have significant human capital that an individual a few years from retirement does not have, and those future contributions from human capital are relatively low risk with respect to the replacement ratio income goal for retirement. Members close to retirement have the majority of their retirement assets in their fund credit and therefore a fall in the equity market would have a much larger impact on their financial position.

The funding level measure explicitly takes this into account. The existing lifestage incorporates equities on the basis that members have long time horizons.

Provide meaningful information

The current lifestage framework is return and fund credit focused. This is important but not meaningful. The proposed framework provides meaningful information with an ability for members to make changes to their retirement funding. This is valuable when the underlying investment strategy will incorporate these changes (of savings, retirement date or income goal). The current lifestage approach only makes changes based on time to retirement.

We therefore believe that the current lifestage approach does not adequately satisfy the core design criteria put forward and much can be done to evolve these strategies to meet member needs.

ALTERNATIVE ANNUITY TYPES

The framework described above can equally be applied to different default annuity types that might be deemed appropriate in retirement. We submit that the inflation-linked annuity is the risk-free option for an individual member because it removes inflation, investment and longevity risk.

Arguments against the use of an inflation-linked annuity might include a more limited supply of government inflation-linked instruments. There is currently no capacity issues here and we believe that National Treasury might well increase supply to meet greater demand.

Furthermore, these annuity types might be considered expensive relative to alternatives. Expensive in this context does not refer to the relatively low real yields but rather the implied margins charged by insurers for this annuity type. Further research here is required.

Trustees, on the advice of their consultants or actuaries, might elect a different annuity type as a default in retirement. The framework is flexible and can accommodate this change. A different annuity type will have implications for the risk-free asset in the framework.

For example, a retirement fund may choose to target a nominal annuity with annual escalations of 5% p.a. In this instance, the risk-free portfolio will be an optimised combination of nominal bonds (which will be different to the generally used All-Bond Index).

A trustee board may decide that a with-profit annuity is appropriate at retirement as an insurer has a mechanism for smoothing increases during retirement. This annuity choice is largely motivated by an assumption of an equity risk premium.

The use of a with-profit default annuity does not allow for individual member Replacement Ratios to be targeted but the framework can be applied to provide much more certainty to members. Indeed exact targeting of Replacement Ratios are only possible where an exact matching portfolio can be constructed.

Individual targeting needs to be assessed against the criteria of complexity, cost and the composition of the membership profile.

SUMMARY AND CONCLUSION

In this paper, we establish the goal of a DC fund is to provide a good standard of living in retirement. This can be achieved by providing a stream of inflation-linked income in retirement for as long as the member is alive. There is therefore an implicit liability that can be calculated for each member. This contrasts with current practice where the liability is regarded simply as the accumulated funds in respect of each member.

The income target should be expressed as a Replacement Ratio and boards of

trustees should ensure that the target is appropriate and achievable. *Ad hoc* rules of thumb and older targets are likely to no longer be appropriate. The target should also be adjusted at a member level to recognise their expected time in the fund.

By incorporating a member's human capital, it is possible to determine whether the member is on track to meet their income needs in retirement. It is also possible to select a portfolio of assets that maximises the likelihood of achieving a given level of real income in retirement. This does not require member intervention and will be done automatically.

There are a number of implications for the "risk free" asset which is an appropriately structured inflation-linked bond portfolio whose value will track the change in the cost of a notional deferred inflation-linked annuity. "Risk free" in this context is not cash or nominal bond instruments which provide low volatility of returns but are in fact risky when the goal is to achieve a level of real income in retirement.

The paper also considered communication with members and distinguished between providing important information (e.g. accumulated fund credit) and meaningful information. We submit that providing members with an indication of the likely level of real retirement income will result in more appropriate behaviour with respect to saving more, working longer and preserving their savings when changing employer.

We briefly consider the popular default lifestage investment strategy and conclude that it fails to meet the design criteria put forward.

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