Actuaries Institute.

Technical Paper: Innovative Income Streams

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1 STATUS OF TECHNICAL PAPER

This Technical Paper (TP) informs Members about "innovative income streams"[1] and raises some of the issues for Members to consider in the development and management of these products.

This Technical Paper has been prepared by the Retirement Incomes Working Group, which reports to both the Life Insurance Practice Committee (LIPC) and the Superannuation and Investments Practice Committee (SIPC) of the Institute. It may also have relevance to other areas of actuarial practice.

This Technical Paper replaces the previous Technical Paper TP Innovative Income Streams issued in November 2021. This is the third version of this TP and has been prepared based on the legislative framework at the time of issue. It is envisaged that it will be expanded as more issues emerge and/or there are changes in the legislative framework.

This Technical Paper does not constitute legal advice. Any interpretation or commentary within the TP regarding specific legislative or regulatory requirements reflects the expectations of the Institute but does not guarantee compliance under applicable legislation or regulations. Accordingly, Members are encouraged to seek clarification from the relevant regulator and/or seek legal advice in the event they are unsure or require specific guidance regarding their legal or regulatory obligations.

This TP does not override the requirements in any Professional Standards or Practice Guidelines that are relevant to this area of work.

Members should consider the following Professional Practice Documents where relevant:

- Professional Standard 201 - Actuarial Advice to a Life Insurance Company or Friendly Society;
- Professional Standard 202 - Actuarial Valuations for Life Insurance Companies;
- Professional Standard 406 - Unsegregated Superannuation Liabilities;
- Practice Guideline 1 – General Actuarial Practice; and
- Practice Guideline 499.03 Prudential Reporting under the SIS Act.

Feedback from Institute Members is encouraged and can be forwarded to the Retirement Incomes Working Group through ppd@actuaries.asn.au.

[1] This is their regulatory nomenclature, although they go by many other names. See Superannuation Industry (Supervision) Regulations (SIS Regulations) Section 1.06A, paragraph (3) - reproduced in Appendix 1.

2 BACKGROUND

2.1 Legislative changes

Since 1 July 2017, the SIS Regulations have permitted a variety of "innovative superannuation income streams" to be entitled to tax free investment earnings on their backing assets. To qualify for tax free status some income is always payable until death.

They include:

- "Deferred superannuation income streams[2]" (Deferred annuities), which pay an income that does not start immediately on purchase but at a specified later date, e.g. at age 80. The specified later date may be defined at the outset. Alternatively, it may be determined later, or it may vary with investment and mortality experience, as outlined below. Though conventional annuities that are deferred are technically innovative income streams according to the legislation, they are not the subject of this paper.
- "Pooled Investment Pensions or Annuities"[3] depending on whether they are offered by superannuation funds or life companies and where there is a "pool of assets in the fund held for the collective benefit". (In this TP we use the term "annuity" to apply to both pensions and annuities payable for life.)
- Insured, investment-linked, annuities where the mortality rates used for calculating the benefits are guaranteed for life.
- Any other life annuity arrangements where the benefit depends on investments, mortality experience or "any other relevant factors". Products have been introduced that are linked to investment indices and to specific assets chosen by the retiree.

The income they deliver lasts for life but the quantum of the annuity that is provided to the annuitant is not guaranteed and will vary based on investment experience and possible mortality experience where this is not insured. They therefore protect against idiosyncratic risk, but not necessarily systematic longevity or investment risks.

A more detailed description of the products and of the other types of annuities that can now be sold is outlined in Appendix 2. Duncan Rawlinson's paper listed in Appendix 3 gives more details and references.

From 1 July 2019[4], amended Age Pension means testing rules were introduced for all lifetime income streams to assess:

- As income - a fixed 60 per cent of all pooled lifetime income product payments (noting that commutations are not assessed as income); and

[2] Superannuation Industry (Supervision) Regulations 1994 - Reg 1.03
[3] Income Tax Assessment Regulations 1997 – Regulations 307.205.02D and E, respectively.
[4] As published by the DSS in January 2019, https:/www.aph.gov.au/DocumentStore.ashx?id=81e28d83-ce5c-4948-bd02-00f3202f5f0d&subId=665500

- As assets - 60 per cent of the purchase price of the product until the life expectancy of a 65-year-old male at purchase (or 5 years if greater), and then 30 per cent for the rest of the person's life.

In addition, product providers may use a streamlined cross agency process for seeking initial "concept exploration" or "product review" from all four relevant agencies (ATO, APRA, ASIC and DSS).[5]

2.2 Potential advantages of innovative retirement products

The essential benefit of these products, compared to conventional annuity products, is that income stream recipients may obtain a degree of confidence that their idiosyncratic longevity risk is addressed but the provider is not constrained by the investment and reserving limitations associated with traditional annuities, and consequently the income rates can be substantially higher. The annuitant may also benefit from a measure of investment freedom.

This is in contrast with:

- Conventional lifetime annuities which provide guaranteed income for life but no investment freedom; and
- Conventional Account Based Pensions ("ABPs") which provide investment freedom but no protection against investment and longevity risk.

These products include deferred annuities, which then allow that person to choose how to invest the remaining balance of their superannuation account in an ABP, and to manage it to last to the vesting age of the deferred annuity, or perhaps beyond.

These annuities supplement investment returns by redistributing to survivors the amounts retained after the death of members of the pool (referred to as 'survival credits'). They can facilitate investment in growth assets (and therefore investment risk), as does an ABP, but use survival credits to provide some level of income for life. Unlike a conventional lifetime annuity or deferred annuity, the level of income is not guaranteed. Retirees may prefer the products because they do not bear as much cost of capital to back investment or mortality guarantees, and they are prepared to accept some risks. Providers may add some guarantees (of investments, mortality experience or actual payments) where they believe that retirees will be prepared to pay the costs.

One of the Actuaries Institute's major public policy positions is to support "measures that encourage uptake of lifetime income streams, as well as continued innovation and development of lifetime retirement income stream products, including lifetime annuities."[6]. Better retirement products have the potential to help Australia's ageing population to enjoy a comfortable retirement. At this point it is not

[5] https://www.ato.gov.au/Super/APRA-regulated-funds/In-detail/APRA-resources/Cross-agency-process-for-innovative-retirement-income-stream-products/

[6] https://content.actuaries.asn.au/resources/resource-ce6yyqn64sx3-2093352434-60291

clear whether a significant market will develop but government and many in the industry are working on the issues, and actuaries working on retirement products need to be aware of current developments.

2.3 Scope

This Technical Paper focuses on innovative retirement income stream products. It looks at the considerations for Members in pricing and managing these products and the risks which they contain. These include the issues that arise for new products which have intrinsic uncertainty due to possible variations in the actual mortality experience and in the actual investment returns that support the product.

3 BACK TO BASICS ON ANNUITIES

This section briefly describes how annuities work to aid consideration of how much to pay from an innovative income stream and how to change it. The examples are intended to be simplistic, and, in reality, there would be additional allowances for other factors such as inflation and expenses including an allowance for a profit margin for the product provider.

3.1 Level lifetime annuity

A lifetime annuity of \$1 pa is worth $a_x = (1 + a_{x+1}).(1 - q_x).v$ (1)

A survivor to the end of the year will be paid \$1 and will need assets of a_{x+1}. Someone who dies during the year will not receive any benefits.

$$a_{x+1} = \underbrace{a_x.(1+i) - 1}_{\text{Accumulation}} \quad \underbrace{+ a_x.(1+i).{}^{q_x}/_{(1-q_x)}}_{\text{Survival (or mortality) credit}} \qquad (2)$$

The assets needed by a survivor comprise the accumulation of their own start-of-year assets with interest, less their annuity payment of \$1, plus a survival credit. The survival credit is the accumulated amount {a_x. (1 + i)} lost by the deaths {q_x} shared equally amongst the survivors {1 - q_x}.

3.2 Unit-linked annuities

Section 15 of the Life Insurance Act distinguishes between non-participating business where the benefits are determined in accordance with a formula, and participating business where they are determined at the company's discretion, which is covered in the next section. While this does not apply to superannuation funds, the principles for the distribution of deviations from experience are the same.

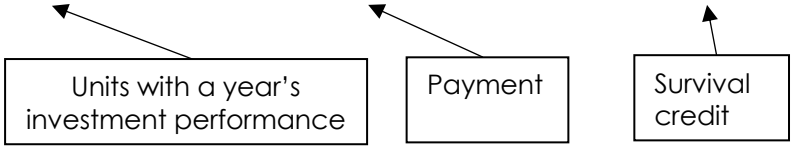
Non-participating business is normally either guaranteed or unit-linked – i.e. where each annuitant is allocated units in a personal account, which is increased or reduced by investment and mortality profits and losses in accordance with a formula. This section applies to such unit-linked contracts.

Now consider an annuity invested in a unitised fund. Assume the annuitant has U_x accumulation units at age x. The units of those who die will be redistributed amongst the survivors.

Annuity of P units = U_x / a_x , paid out at the prevailing unit price, with assumptions about *future* mortality and investment earnings to determine a_x.

A year later the annuitant's unit holding will be:

$$U_{x+1} = U_x - P_x + U_x.\ (q_x/(1-q_x)) \qquad (3)$$



The annuity can be re-determined as P' units = U_{x+1} / a_{x+1}. If mortality and investment earnings have followed the original assumptions and the assumptions have not changed, then the annuity will also not have changed. Deviations from assumed investment performance will translate directly into increases or decreases in the payment.

The underlying investments do not have to be in a pooled unitised fund but can be chosen by the annuitant. What is necessary is that the expected mortality credit is proportional to the expected loss on death, and that the annuitant cannot manipulate the actual loss. (The difference between the expected and actual loss is discussed in Section 4.2.2 below.)

3.3 Participating annuities

There are reasons not to use a unit linked methodology:

- Annuitants might prefer an investment strategy that provides protection against changes in real or nominal interest rates and to include assets with a duration that matches their life expectancy. This means that different assets need to be held for different life expectancies and these assets will require rebalancing if mortality is not as expected.
- It is administratively simpler not to keep unit prices and to spread the survival credits over the pool rather than determine them individually.

There are many ways to determine changes in the annuity payments for members of the pool, depending on investment and mortality profits and losses. Judgement is required to ensure that annuity payments are fair and that annuitants' benefit expectations are maintained.

4 INNOVATIVE INCOME STREAMS

This section refers to income stream recipients, who bear some or all of the investment and longevity risk. A variety of such products are available internationally – some of which are referenced in Appendix 2.

The design of an innovative income stream product would incorporate rules for determining:

- How payments are to be determined
- How mortality and investment experiences are to be shared between members of the pool (distributing deviations from expectations) including across different cohorts of members
- The nature of any investment or mortality guarantees or other means of support to the mortality pool from the product provider
- Charges and rules for changing them
- Whether withdrawal or death benefits are available and how they are determined
- How benefits and risks are to be communicated
- How the product is managed if it ceases to be of a credible size (or fails to reach a credible size)
- Whether there is a need for reserves, and rules for their distribution.

The design may well need to trade off simplicity for administrative and marketing purposes with strict equity and or optimality. Care is needed to ensure that the implications of these trade-offs (particularly the risks that may cause benefits to change) are adequately understood by all stakeholders and in particular that they do not endanger solvency or reasonable benefit expectations.

In addition, in line with the Design and Distribution legislative requirements[7], there will need to be consideration regarding who is best suited for these products to ensure that the products are not marketed to an inappropriate cohort of consumers.

4.1 Setting initial payment amounts

Annuities that are not guaranteed need rules to determine the amounts to be paid each period.

Assumptions are needed for future mortality, investment earnings, and potentially, inflation to set the starting annuity, i.e. to set a_x in the formulae in Section 3 above for the payout in units.

The requirement of SIS Regulation 1.06A that cash flows are not unreasonably deferred may also need consideration. All material circumstances and contingencies that may lead to changes in the real level of total income will need careful communication. In the UK, problems about how the terminal bonus rules were communicated were a key reason why 'the world's oldest mutual life insurer', Equitable Life, collapsed.[8]

4.1.1 Inflationary expectations

Annuitants would generally expect a total cash flow that, more or less, maintains its real value over time. However, some individuals may prefer front- or back-ended income streams to better integrate with other sources of income. The total cash flow will often include an Age Pension, which is currently

[7] https://asic.gov.au/regulatory-resources/find-a-document/regulatory-guides/rg-274-product-design-and-distribution-obligations/
[8] https://en.wikipedia.org/wiki/The_Equitable_Life_Assurance_Society

linked to wage inflation and, for those impacted by means testing, the Age Pension can also increase as assets decline.

The annuitants' non-medical expenditure would be expected to eventually reduce with advancing age[9], but out of pocket medical expenses and domestic support are likely to increase, potentially faster than inflation, unless the annuitant is largely reliant on Medicare or family support.

Inflation risk is often not fully appreciated[10], and indexation methods and modelling ought to be robust to potential changes in the more distant future. Indexation will not be meeting annuitants' needs if it leads to the risk of a significant loss of real purchasing power over time.

Such arrangements might include increases of "70% of the annual CPI", or "CPI with a maximum of 5%". These could make inadequate provision for the negative impact of high rates of inflation on living standards. Three significant periods of high inflation have occurred in the past century and may recur.

Formulae that subject CPI adjustment to a maximum or minimum are also complicated to price and value (requiring inflation derivatives or equivalent) and also harder to manage from a risk point of view.

If some reduction in total income is anticipated, it may be better formulated as a fixed percentage (say 2%) reduction in real terms each year rather than by (say) 30% of the CPI increase.

4.1.2 Investment Returns

The assumed investment return (AIR) used for setting the initial assumptions and thus the initial rate of payment of the annuity ought to be set to provide a realistic expectation that ongoing investment-linked income will meet the annuitants' needs, noting that many will expect relatively constant real income. The AIR could currently vary between 1% and 7% p.a. assuming a real return on government stock currently under 2%, and places a maximum of 6% on the equity risk premium.[11] The actual assumption would depend on the proposed asset mix, allowance for fees and inflation and the degree of conservatism in anticipating future returns. Some companies offer alternative AIR choices for annuitants.

The higher AIR, the more attractive the annuity would look initially but the more likely the income will fall in value over time. Therefore, the consequences of more aggressive assumptions and the potential range of outcomes need to be communicated carefully.

[9] Brancati, C.U., Beach, B., Franklin, B. and Jones, M., 2015. Understanding Retirement Journeys: Expectations vs. Reality. *London: International Longevity Centre UK.* Locally, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2850245

[10] Ranyard, R., Del Missier, F., Bonini, N., Duxbury, D. and Summers, B., 2008. Perceptions and expectations of price changes and inflation: A review and conceptual framework. *Journal of Economic Psychology*, *29*(4), pp.378-400.

[11] For discussion, see Damodaran, Aswath, Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2018 Edition (March 14, 2018). https://ssrn.com/abstract=3140837

4.1.3 Mortality rates

The mortality assumptions need to make a fair allowance for temporary and permanent selection effects – whether related to age, gender, health or occupation and a proxy for socio-economic status. Some (such as gender) may be ruled out based on considerations of law or what is regarded as unfair discrimination, whether direct or indirect.

For new portfolios, the assumptions will necessarily rely heavily on judgement and the cohort that has been determined as suitable for the product. Recognised credibility methods may then be used to update the assumptions based on experience – while also noting deviations from the expected changes to population mortality.

Another mortality risk arises from a common complaint about annuities – and that is that the insurance company or pool takes the money when the annuitant dies. However, to mitigate this complaint, all innovative income streams in Australia currently offer a death benefit that commences at 100% of the initial purchase price and declines over time. Notwithstanding this feature, it is true that the distribution of mortality credits is crucial to the operation of these products. It may also be regarded as unfair to give money to other members of the pool. This increases the need to ensure that potential annuitants understand what they are buying, to mitigate the risk of claims from their heirs.

4.1.4 Mortality uncertainty and projections

The initial level of payment set is informed by expectations of mortality over a lengthy period in the future. Equity between different participants and generations requires balancing competing considerations, and communicating the results:

- If too much is paid early, future payments would be lower than anticipated and may not provide the income anticipated or needed in late retirement.
- If too little is paid at early durations, the product will not appear to be giving value for money.

There are a few sources of mortality uncertainty that need consideration in product design:

- Permanent selection, in that there is little experience in Australia of the mortality of those who will make up any particular group of annuitants. Moreover, for deferred lifetime annuities (DLAs), it could be 15 years until payments are made and mortality rates become better known, unless the continued existence of annuitants is regularly confirmed throughout the deferred period, or a death benefit is paid.
- Temporary initial selection in that healthy life effects could take many years before reaching ultimate rates.
- Population rates of mortality improvement, especially at older ages. These were very rapid from 1970 to 2010, but appear have been slower since then, and may have partly reversed as a consequence of COVID-19. It would be difficult to justify not projecting mortality improvements in an environment where mortality improvement has been the experience over a lengthy period and is reasonably anticipated to continue. Members can consider the Australian Government Actuary's

projections of the Australian Life Table and of considerable professional and academic research into more robust projections – using cohort methods for instance.

- Smaller portfolios will be subject to greater random fluctuations in experience, measured as a percentage. Such fluctuations can be eliminated if a life guarantee is given, or can be smoothed using shorter term insurance,
- Sparse data at very advanced ages creates a greater measure of uncertainty because data is sparse in all countries.

Experience from other countries and from Australian superannuation funds may be useful in making informed judgements as referred to in the Actuaries Institute paper, *"Exploring Retiree Mortality"*.[12] Any mortality guarantees may well require capital backing. A conventional deferred life annuity will have the greatest percentage capital requirement as it is fully guaranteed[13]. The weaker the guarantees, the lower the amount of capital needed.

4.2 Distributing deviations from expectations

4.2.1 Investment profits and losses

The method used ought to be set out in a contract or product disclosure statement.

Where payments are linked to published indices, provision is needed for the possibility of the index no longer being published or changes to tax (franking credit) rules.

Where a unit investment methodology is used for pooled investment linked annuities, there ought to be no specific unit pricing issues relative to other investment linked products on the basis that the principles of unit pricing are well understood. They include that the price of the units should only be dependent on changes in market, and not be affected by cash flows – whether new business, regular payments or surrenders. Some care may be necessary in policy/contract wording to ensure that any overpayments (and related investment profit or losses) from late notification of death are recovered from the annuitant, and not deducted from the pool.

4.2.2 Mortality profits and losses

Section 3.2 showed that each survivor needs a Survival Credit of $S_x = U_x . q_x / (1 - q_x)$ units to maintain their expected payout, in units, not dollars. In practice there will be a shortfall or surplus of the balances forfeited by the deaths as they will not have occurred perfectly as expected.

To maintain equity for uninsured contracts, every survivor has to be credited their expected Survival Credit plus or minus a share of the mortality surplus or shortfall experienced. A decision needs to be made as to whether to share that mortality shortfall or surplus according to:

[12] https://content.actuaries.asn.au/resources/resource-ce6yyqn64sx3-2093352434-54957

[13] For further considerations see Gu, Kerwin (2018) "Coherent Capital Requirements for Longevity Risk" MPhil thesis, UNSW. http://unsworks.unsw.edu.au/fapi/datastream/unsworks:51602/SOURCE02?view=true

- Expected survival credits i.e. in proportion to S_x) or
- Unit balances in the pool (i.e. in proportion to U_x).

If the former, the profits and losses will not be proportional to the balances, so will lead to different rates of change in the payments to be made at different ages.

If the latter, profits/losses will lead to the same percentage increase/reduction in unit balance applying to all annuitants, and thus to the same change in payment rates – if annuity factors remain unchanged.

A variety of other ways of determining the distribution of the survival credits have been suggested in the academic literature. Some of these are listed in Appendix 3.

Ignoring expenses, the method of distribution of mortality surpluses and shortfalls is actuarially "fair" for each person if the probability weighted amount they expect to lose on death is equal to the amount they expect to gain on survival. This is likely to mean that the expected mortality rates used for the annuity factors will be best estimates. If mortality rates are improving, this may mean there is a need for a different mortality table each year.

If annuity factors are not updated and mortality rates continue to improve, there will be increasing losses from mortality and increasing subsidies to newer annuitants. Updating the annuity factors will however differentially affect different ages so not allowing a uniform change in payments.

Expected Survival credits may need to be differentiated on grounds of age, gender, duration, cohort or health and make allowance for temporary initial selection. There needs to be provision in the contract to adapt these or again pools may subsidise or be unattractive to new annuitants.

4.2.3 Participating products

If annuitants do not have separate accounts, there is a need for actuarial judgement to changes in the amounts paid to ensure that the changes are fair. The notional "asset shares" (calculated as if each annuitant had a separate unit balance) would normally provide the basis for evaluating the fairness of the changes.[14]

The objective could be to apply the same percentage change to all payments from the pool, but adjustments could be made that depended on age and duration – and potentially other factors, as discussed above. These adjustments may become complicated if investment conditions or future mortality expectations change significantly. In such cases, it may be desirable to begin a new pool of annuitants.

[14] Needleman, P. D., & Roff, T. A. (1995). Asset shares and their use in the financial management of a with-profits fund. *British Actuarial Journal*, *1*(4), 603-688.

4.2.4 Capitalising changes to assumptions

A decision needs to be made as to whether, and how, changes in the AIR and mortality assumptions will apply to annuities already being paid.

Capitalising changes brings forward any gains or losses that would otherwise be felt more gently in the annuity payments – over a longer period. Regular changes thus may increase the volatility of income, an effect which is exacerbated when the change is soon reversed. The choice of the assumptions is only ever an estimate, so regular changes could give an impression of spurious precision. However, insufficient adjustment over time may lead to more severe consequences for the remaining annuitants and potentially significantly reduced (or increased) payments.

If the new assumptions are less optimistic, then all annuitants could receive a significant reduction in annuities if the results are capitalised, while if the experience is allowed to emerge, the longer lived will experience a reduction at more advanced ages. The opposite occurs when the assumptions are relaxed.

Capitalising the changes allows the same assumptions to be applied to both new and all existing annuitants so may be seen to be simpler administratively. Equity between new annuitants and cohorts of existing annuitants is a primary consideration, although this cannot be exact, and some leeway may be acceptable.

If the annuity payments are matched by cash flows of an equivalent term, then it would be appropriate to adjust the AIR with changes to the valuation rate of the assets in order to avoid spurious volatility.

4.3 Guarantees and smoothing

Although the main benefit of the innovative incomes streams is to avoid the capital and other costs associated with guarantees, the products may well be made more appealing by offering partial guarantees.

4.3.1 Smoothing

If investment returns are smoothed:

- Liabilities will, under either AASB 9 or AASB17, incorporate the fair value of investment guarantees that are implicit investment options.
- Smoothing methods ought to be tested under a variety of investment, interest and inflation scenarios. In particular, they need to be robust to long periods of underperformance, such as experienced in the 1970s or in Japan since 1990.
- Discretions need to be clearly described in contractual wording and in communication with policyholders with the associated boundaries included, so that sufficient equity between cohorts is maintained.

Mortality smoothing introduces similar considerations, noting the mortality uncertainty discussed in Section 4.1.4.

4.3.2 Dynamic hedging

Where dynamic hedging of investments is used for smoothing or guarantees, it is important to consider:

- charges and their variability,
- the possibility that there may be liquidity problems in the reference portfolio, and
- that jumps in market prices will lead to unexpected losses.

4.3.3 Reinsurance

Even where it is planned for the pool of annuitants to take all the systemic mortality risk, it may be desirable to enter into shorter term reinsurance contracts designed to reduce the volatility of Survival credits. This is especially true when pools are new or small and mortality experience is consequently unpredictable or variable.

4.4 Integration with deferred annuities and the Age Pension

There is a risk that annuitants who supplement a deferred annuity with an ABP in order to cover their income needs before vesting age, will run out of money prior to the vesting age. This risk needs to be communicated to annuitants and they need a plausible personal strategy to avoid it happening.

There is also a need to consider integration with the means tests for the Age Pension, but this applies to all superannuation benefits and is not covered by this Technical Paper.

4.5 Policyholder protection

4.5.1 Viable pool sizes

The problems of mortality uncertainty and ways of smoothing have been discussed in Section 4.1.4 above. Actuaries need to understand the pool size needed to meet the annuitants' expectation of stability, and the plans to achieve and maintain that level of membership (or plans to smooth these risks in other ways). There also need to be clear courses of action set out for the equitable treatment of annuitants if that level of membership is not achieved within an acceptable time horizon, or if the membership drops below that level. The equitable treatment of annuitants needs to be paramount, and principles and rules clearly set out in contracts/policy documents.

The problem may be more difficult to resolve if the annuities are offered by superannuation funds without capital reserves as they may lack the funds to subsidise non-economic pools.

4.5.2 Communicating greater uncertainty if not guaranteed

To the extent that the annuity is not fully guaranteed, and the annuitant bears some risks, then these risks and the circumstances that would result in a change in the annuity need to be appropriately communicated in the marketing and disclosure material.

Providers need to provide sufficient disclosure of these rules to annuitants and their advisers to understand them. Information needs to be provided to assist annuitants understand the potential range of outcomes they could experience from such shortfalls or surpluses[15].

Prospective annuitants can also be shown results from the actuary's stress testing to allow an understanding of the range of outcomes they could experience. The Australian Government Actuary's proposed risk metric for retirement income products discusses these issues in more detail.[16] Such stress testing will ideally consider all the sources of uncertainty mentioned in 4.6.4.

Importantly, this means that any comparison of the outcomes of different lifetime income streams which ignores the uncertainty around systematic mortality improvements will be invalid.

4.5.3 Reasonable benefit expectations

Professional Standard 201: Actuarial Advice to a Life Insurance Company or Friendly Society refers to "reasonable benefits", which need to be considered in this context. Contractual rights of members of the pool may become modified (i.e. overridden) if marketing material and practices occur that are not explicitly covered in the contracts or product disclosure statement (PDS) but are legitimately inferred to be different by a reasonable annuitant. Communication with annuitants, particularly about how the product works, the risks and any changes that may be made, is therefore a critical issue.

Of particular concern in this respect are discretions that can be exercised – such as for charges or profit shares accruing to shareholders or other operators of the fund – where management (and their actuaries) may face a conflict of interest. These conflicts need to be managed or it may be preferable that such conflicts are avoided by not permitting discretions, or involving independent third parties to advise on the discretion.

Other questions relate to the extent to which the investment returns are likely to match inflation and how volatile the survival credits are likely to be. In managing a pool of risks over time, it is also important to

[15] For example, to assist with the management of systematic longevity risk, the National Association of Pension funds (NAPF) in the UK define six possible scenarios for how population mortality rates could change in the future. The scenarios are designed to cover the spectrum of what systematic longevity improvements could look like. They range from a "back to the fifties" scenarios where mortality increases to an "Extended Youth" scenario where most major diseases are cured. Similar type scenarios ought tp be stress tested by lifetime income stream providers and the results shared so help annuitants and prospective annuitants understand the likely range for their retirement income.

[16] Retirement Income Risk Measure – AGA Technical Paper, Dec 2018 https://treasury.gov.au/sites/default/files/2019-03/Retirement-Income-Risk-Measure-FINAL-Consultation-1.pdf

understand the risk of being too conservative and Members are encouraged to familiarise themselves with the effect referred to as the 'lucky hump' or 'tontine effect'[17].

4.5.4 Expense charges

All costs and charges that impact annuitant outcomes need to be disclosed in sufficient detail for annuitants to understand the impact on their retirement outcomes. This will include costs of insurance / reinsurance fees paid from annuitants' assets (i.e. that are not necessarily attributed to individual annuitants). The same charges for investment management and guarantees may be perceived as more expensive than in the accumulation phase if they are compared to the annuity paid rather than being compared to the account balance or actuarial reserve. (e.g. a charge of 1% of the reserve may be more than 10% of the annual income from an immediate annuity.)

Annuitants may be exposed to the risk of increasing expenses or charges for insurers or other service providers. Additional risk arises wherever annuitants cannot respond by transferring their interest easily and without loss, as they may be exposed to higher charges than could be obtained in other competitor products. The following provisions could be considered:

- A product design where the provider of the product cannot change the charging structure and level. This creates certainty for the annuitant and is similar to the guarantees inherent in guaranteed annuities. This introduces additional costs relating to the capital required to support the guarantees. However, the additional cost is known at purchase so products can be compared.
- A product design where the administrative charges (except for statutory imposts and tax) will not increase by more than the inflation rate. This design will also impose additional cost to cover the guarantee.
- That charges will not increase unless it is justified by an increase in the costs that relate to the product as certified by an independent expert.
- The provider will not make a profit more than a percentage of the charges – as is the case with participating life insurance contracts as defined by the Life Insurance Act (1995), where the ceiling is 20%. This could also potentially require certification to ensure that the policies are allocated no more than their fair share of overhead expenses.

4.5.5 Surrenders / Withdrawals / Commutations

For these products, part or all of an annuitant's total balance of assets can be outside the mortality pool – at least for a fixed number of years after inception. These allow for withdrawal and death benefits to be paid. For example, Treasury's May 2018 Retirement Income Covenant Position Paper[18] anticipated that up to 85% of a 'Comprehensive Income Product for Retirement' (CIPRs) would be invested in an ABP.

[17] Qiao, C., & Sherris, M. (2013). Managing Systematic Mortality Risk With Group Self-Pooling and Annuitization Schemes. *Journal of Risk and Insurance*, 80(4), 949-974. (page 18 - 19) https://www.jstor.org/stable/24548362

[18] https://treasury.gov.au/sites/default/files/2019-03/c2018-t285219-position-paper-1.pdf

Withdrawals or surrenders of amounts in a mortality pool create a risk of anti-selection in that annuitants with deteriorating health are more likely to withdraw. Survival credits may then resemble select rather than ultimate rates. Most products do offer early withdrawal options even though it could be seen to unfairly advantage those who have the capability and opportunity to leave when their health deteriorates. If the withdrawal benefit exceeds the death benefit, there is a risk that the annuitant's heirs may seek compensation for failure to inform the annuitant that they could have preserved their benefit by withdrawing.

Protection against anti-selection can be achieved if withdrawing annuitants are required to submit evidence of good health relative to age if the withdrawal amount exceeds the annuitant's death benefit. The reasons may need careful communication to make it clear that the offer cannot be made to those in poor health, except perhaps at a discount that takes their health into account.

4.5.6 Management of reserves

Participating products need actuarial management of reserves even if this is not yet legislated for superannuation funds. These reserves may arise from a number of sources where outcomes differ from expectations, depending on the rules of the product e.g. investment performance, longevity experience, cost outcomes.

There need to be clear statements of intent about how these reserves will be managed. These rules would be expected to cover or at least consider:

- What experience profits (losses) accrue to the reserves, e.g. longevity, investment, expense?
- How are these shared among in-force entrants, and potentially new entrants?
- How big the reserves can be compared to the value of in force income streams (liabilities), e.g. max 15% of liabilities, before the excess is distributed by increasing income streams?
- Will income streams be increased for their full term or just on an annual basis?
- How low can reserves be compared to liabilities before income streams are reduced, e.g. 0%?
- Can reserves be applied as profit distributions to shareholders? If so, how much and under what circumstances?
- How are liabilities determined and does the actuary opine on the appropriate level of reserves and/or the financial condition of the pool? How often (annually, triennially)?
- How the above questions work when the change in reserve is caused by a change in the future assumptions (rather than just observed experience).
- Is there a need based on equity to treat separate cohorts differently?

The possibility of tontine situations needs to be recognised so that reserves are distributed in a timely and equitable way.

If a life insurer/reinsurer is involved to provide a level of smoothing around either longevity or investment risks, or both, this would allow for effective management of reserves. Consideration could be given to whether this may be classified by the Life Act as participating business. If so, at least 80% of the reserves would need to be distributed to beneficiaries.

4.5.7 Actuarial Valuation of annuitants' interests

Members may be requested to provide certificates to value annuitants' interests in a pooled product for tax reporting or other purposes, e.g. in the event of a transfer – to manage a spouse's interests against the cap in retirement income stream products ($1.9m in 2024), for instance.

Such valuations need to consider the product's rules. In general, it is expected that:

- Where the concept of an account balance is relevant, the annuitants' interests could be the account balance adjusted, if appropriate, for undistributed mortality credit and investment returns.
- The annuitants' interests could be set to a minimum of any withdrawal or surrender benefit – if such benefit was available without evidence of health.

5 RISK MANAGEMENT

The previous sections highlighted issues that are relevant to the risk management of these products. Members and boards of the companies or funds issuing these contracts need to be comfortable with the risk exposure they are accepting. These risks include:

- Significant improvements to longevity (Section 4.1.4). The big risk is a sudden unexpected systemic improvement in mortality that never reverts[19] (e.g. finding a cure for cancer). This would cause policyholder payments to drop substantially and permanently, or cause significant losses to insurers.
- The risk inherent in the clarity of the communication to policyholders of all the uncertainties discussed above in both marketing and disclosure documents.
- The creation of unreasonable benefit expectations for annuitants that do not accord with the company's intentions, and their ongoing management (Section 4.5.2 above).
- Integration including a holistic view of the annuitant' funds and income – (Section 4.4).
- Anti-selection risks when the assumptions differ from the best estimates that would apply to an individual account. The risks may arise from new business, and if the individuals can decide to change annual income, to withdraw or to change their death benefit (Section 4.5.5).
- Management of equity across cohorts and over time (Section 4.5).
- Legacy risks if products or even cohorts are closed to new business. They may arise after a sizable portfolio has developed but are perhaps more likely where the product fails to gain traction and a viable portfolio size is never reached (Section 4.5.1).

[19] For the extreme view, consider https://content.actuaries.asn.au/resources/resource-ce6yyqn64sx3-786882053-5302

APPENDIX 1: SUPERANNUATION INDUSTRY (SUPERVISION) REGULATIONS (SIS REGULATIONS) SECTION 1.06A

(3) The governing conditions comply with this sub regulation if they ensure that:

(a) no payment of the benefit is made before the primary beneficiary satisfies a condition of release mentioned in item 101, 102, 102A, 103 or 106 of Schedule 1; and

(b) after payments of the benefit start, the benefit is payable throughout the life of the beneficiary (primary or reversionary); and

(c) the amount of benefit payments is determined using a method that ensures that those payments are not unreasonably deferred after they start, having regard to the following:

(i) to the extent that the payments depend on the returns on investment of the assets supporting the benefit--when the payments are made and when the returns are derived;
(ii) to the extent that the payments depend on the ages, life expectancies or other factors relevant to the mortality of other individuals who are beneficiaries of that kind of benefit--the age, life expectancy or other factors relevant to the mortality of each of those other individuals;
(iii) to the extent that the payments do not depend on the returns mentioned in subparagraph (i) or the ages, life expectancies or other factors relevant to mortality mentioned in subparagraph (ii)--the relative sizes of the annual totals of the payments from year to year;
(iv) any other relevant factors; and

(d) if the benefit is commuted on or after the retirement phase start day for the benefit--the commutation amount does not exceed the amount worked out for the benefit under regulation 1.06B; and

(e) if the benefit is commuted before the retirement phase start day for the benefit--the commutation happens only in accordance with the rules set out in regulations 6.16, 6.18, 6.19 and 6.22A, if those rules applied in relation to the benefit as if:

(i) the benefit were in a regulated superannuation fund; and
(ii) the beneficiary were a member of the fund; and
(iii) the provider of the benefit were a trustee of the fund; and

(f) the benefit is transferable to another person only on the death of the beneficiary (primary or reversionary, as applicable); and

(g) the capital value of the benefit and the income from it cannot be used as a security for a borrowing.

APPENDIX 2: TYPES OF ANNUITIES

Pooled annuities and Group Self-annuitisation (GSA) products. For the purpose of this paper, pooled/GSA annuities are taken in the broadest sense as lifetime income products which involve sharing of longevity experience within a pool. These include investment linked annuities (ILAs), with-profit annuities (WPA's) and Group Self-annuitisation products, some forms of which are widely used internationally, but not in Australia. Pool members share longevity risk and so, if the pool is large enough, idiosyncratic (individual) risk can be almost eliminated although the members are still exposed to systematic changes in longevity. Some of the common forms are separately discussed below, but a wide variety of designs is possible:

- With longevity risk, providers can absorb some risks (particularly shorter-term risks when the pool is small), and there are different ways of sharing idiosyncratic and systematic risks between cohorts.
- Investment risk varies with the underlying investments, with some providers providing a variety of smoothing arrangements and guarantees.
- Under some structures, initial payments are based on assumptions as to expected mortality rates, fees and investment returns. Subsequent payments are adjusted to reflect actual investment returns and mortality. Providers use a variety of methods to vary payments as a consequence of changes to future expectations.

Variable annuities (VAs) or Investment Linked Annuities (ILAs). These products are a form of annuity and provide an income throughout life where the income is defined as the value of a particular number of investment units each payment period (e.g. month, quarter or year). The number of units does not have to be constant but is specified in advance. Just as with traditional lifetime annuities, the product provider can price the product based on estimates of future mortality. It can effectively fully insure the longevity risk, or alternatively pass some of the systemic risk back to the annuitants. Strictly speaking, investment risk remains with the individual not with the provider, although they are often sold with guarantees, of which one type is GMLWBs, described below.

Guaranteed Minimum Lifetime Withdrawal Benefits (GMLWBs). These are investment-linked products which offer protection against a combination of longevity and adverse investment experience. In retirement, the product is similar to an account-based pension with an optional guarantee that pays an annuity for life if the account balance has been exhausted. The GMLWB is typically expressed as a fixed percentage of the highest account balance achieved at a prior policy anniversary. In Australia, several life insurers have launched GMLWBs but take up has been limited.

Participating (with-profit) Annuity (WPAs). These products share both investment and longevity risk between the retiree and product provider. They feature a guaranteed annuity at a rate that is less generous than the equivalent rate for a non-participating annuity supplemented by additional bonuses if investment and longevity experience is favourable. Some versions set the initial payments at a level that will reduce annually if bonuses are not earned. Recent versions use dynamic hedging to match the guarantees.

Deferred Lifetime Annuities (DLAs). These can take any of the forms set out above, but initial payments start after a set deferment period and are then payable for life. The benefit payments are typically large relative to the initial purchase price. This feature of a DLA would provide a way to protect retirees against the risk of outliving their retirement savings after an advanced age. GSA/mortality pool products can be structured to provide similar longevity protection but without a guaranteed level of income.

Enhanced or Impaired Life Annuities. Annuity rates that take no account of the annuitant's individual life expectancy do not provide good value to groups with lower life expectancy. Providers may offer enhanced annuities, under any of the above arrangements, which pay higher incomes to people with lower life expectancies. It is not expected that special rules are required for these. Payments would be higher and terms on average shorter, than for non-impaired lives. However, if these were products to be widely taken up it is possible that the mortality of those taking up non-impaired products could be lower (more select) than otherwise.

Contingent Annuities – These are deferred annuities where payments are made, or the annuity commences, on the occurrence of a contingent event. Such an event could be the death of another person, a defined decline in health or entry into care, or after a particular investment loss has occurred.

APPENDIX 3: ALTERNATIVE ANNUITY FORMULAE

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