

## Retirement explainer series

# Investments in the retirement phase

Edition 8

Updated July 2024

David Bell & Geoff Warren

### Technical rating

Boffin

Industry  
professional

Novice

**Brief synopsis:** The role and structuring of investments in the retirement phase is examined from the perspective that they constitute one component of retirement solutions alongside income streams and a drawdown strategy. Two key functions are identified – return generation, and a source of accessible funds – and how investments can be managed to fulfil these functions outlined. Potential investment ‘building blocks’ for use in retirement solutions are discussed, including growth, defensive, capital stable and balanced portfolios. Considerations for the governance and structuring of retirement investments by super funds are noted. The need for purposeful design of investments to be used in retirement solutions is emphasised.

### Questions addressed:

1. What role and functions do the investments play in retirement solutions?
2. How might portfolios for retirement be structured, designed and managed?
3. What approaches might be used when investing for retirement?
4. What issues arise for super funds in structuring their retirement portfolios?

**Key terms:** Investment objectives; investment risk; sequencing risk; inflation exposure; tax; liquidity; portfolio design; retirement solutions; building block approach; governance and organisational structure.

**Who should be interested?** Chief Investment Officers, portfolio managers, investment committees, retirement specialists, retirement leads, product designers, financial advisers, regulators, people wanting a career in the retirement income space.

## Introduction

This explainer discusses the investment component of retirement solutions. We draw on our March 2024 report [Investing for retirement](#) that addresses how the investment function of superannuation (super) funds might be configured to support a fund’s retirement income strategy (RIS), reinterpreting the research for a broader audience. This includes touching on the implications for individual retirees operating under financial advice or self-direction, where appropriate.

We start by describing the role of investments within retirement solutions, and the two main functions they perform – generating returns, and acting as a source of accessible funds. We discuss portfolio design for retirement solutions; outline considerations for super funds in the governance and structuring of their investments for retirement; and emphasise the benefit of purposeful design of the investments to be used in retirement solutions. Appendices explain the nature of sequencing risk, and comment on other approaches including goal-based investing and bucketing, liability-driven investing and income framing.

## Role of investments in retirement solutions

Retirement sees a shift from accumulating assets to deploying those assets, in particular to generate income. One consequence is that the *primary aim shifts* from generating returns through *portfolio outcomes* to delivering *member outcomes* for individual retirees. Member outcomes are delivered through retirement solutions where investments form but one component alongside other income streams such as the Age Pension and possibly lifetime income products and a drawdown strategy. The investments thus moves from the lead actor to a supporting act. This shift has various implications for how the investments should be structured and managed, of which the following are most relevant:

- **Objectives differ** – Objectives in retirement are framed around member outcomes rather than investment outcomes. For instance, the retirement income covenant (RIC) requires fund trustees to assist their retired members to: (a) maximise expected income, (b) manage income risk, and (c) provide flexible access to funds. Some members may also have other objectives, e.g. desire to leave a bequest. Objectives in accumulation largely relate to returns, including real return targets and relative returns versus benchmarks or peers.
- **Member differences matter** – Differences in circumstances, needs and wants are highly relevant to the outcomes that individual members require in retirement (see [Explainer #4](#)). This calls for a capacity to deliver solutions that are tailored for retiree types (or cohorts) if not individual retirees (i.e. personalisation). In accumulation, all members share a common desire for higher returns, with the main difference being the risk they are willing to bear in pursuit of better returns.
- **Longevity uncertainty enters the frame** – Uncertainty over how long the member will live and thus the income and assets need to last joins return uncertainty as a second major risk that needs to be managed.

The role of investments in retirement thus becomes one component within retirement solutions that are tailored to deliver outcomes to retirees with differing needs and wants while managing longevity risk. We suggest that investments might best play this role through being supplied as *building blocks* that can be used in retirement solutions designed by either a retirement function or segment within a super fund, a financial planner or the member themselves. By contrast, in accumulation the investments take the form of stand-alone products, and are often structured as a menu of pre-mixed or asset class investment options.

## Distinction between managing member outcomes and pooled portfolios

An important distinction that is most relevant for super fund investment teams is between managing member outcomes through retirement solutions and managing pooled portfolios. Member outcomes need to be addressed at the individual member level, or at least the member cohort level. Meanwhile, the mandate of investment teams relates to pooled portfolios that invest the assets of many members. This distinction impacts on how delivering member outcomes relates to portfolio construction.

*Management of liquidity* is a prime example. Individual members need liquidity as they will be selling assets to generate income or fund other spending. However, investment teams are managing pooled portfolios with their own cash flow profile that depends on various aspects, including the balance of members entering the retirement pool as they retire versus those withdrawing funds to generate income or access a lump sum. Switching between funds is also relevant. It is by no means a forgone conclusion that retirement portfolios will necessarily be in outflow. The implication is that liquidity needs to be analysed and managed on portfolio-by-portfolio basis.

*Management of risk* is another area of distinction. Responsibility for the overall level of investment risk should reside with the retirement solution designer, as it may be influenced by the presence of other income sources such as the Age Pension or lifetime income streams. Responsibility for longevity risk also resides with the solution designer. The investment team would aim to deliver investment building blocks that support the solution designer to manage these risks as appropriate. Meanwhile, some risks such as exposure to portfolio drawdowns and inflation need to be managed within the portfolios delivered, as discussed below.

## Two functions within retirement solutions

Investments perform two main functions within retirement solutions:

- 1) **Generation of returns** – Generating returns to support better outcomes is the central function that investments play in retirement solutions. Higher returns will boost income, while a trade-off exists between seeking higher expected income and the income risk that accompanies greater investment risk (as discussed in [Explainer #4](#)). In this way, investments feed into the RIC income objectives of maximising expected income while managing income risk

(see [Explainer #2](#)). Return generation may also support other outcomes such as bequests or entry into aged care later in life.

- 2) **Source of accessible funds** – The investments also act as a source of funds that the member can access, and so are central to the flexible access to funds objective under the RIC. [Explainer #3](#) notes four potential motivations for members desiring flexible access to funds, including: (a) meeting unplanned spending needs not covered by regular income, i.e. precautionary savings; (b) providing for bequests; (c) supporting potential access to aged care; and (d) having a capacity to respond to change or opportunities.

Below we outline some considerations in how the investments might perform these two functions.

## Function #1: Generating returns

The question arises as to what type of return streams might be suitable for retirement solutions. In [Investing for retirement](#) we discuss how the investments might be set out to maximise expected returns in order to maximise expected income. Meanwhile, income risk may be better managed through other mechanisms such as lifetime income streams, access to the Age Pension and the drawdown strategy, rather than through reducing investment risk. In this context, a 100% growth portfolio might be appropriate as the return-seeking building block of retirement solutions. Nevertheless, there are two reasons why investment risk might be toned down, even if at the cost of sacrificing some level of expected returns and hence income:

- **Members may be uncomfortable with high growth exposure** – Members may be wary of having an entirely growth portfolio within their retirement account, say because of an aversion to short-term fluctuations in the account balance or the tendency to view the investments in isolation of the other defensive exposures such as the Age Pension (i.e. narrow framing). Reducing volatility can also help limit the risk of members responding to market sell-offs by de-risking inappropriately.
- **Managing sequencing risk** – Sequencing risk arises from the interaction between investment risk and portfolio cash flows, and is relevant in retirement because portfolios are in drawdown. Appendix 1 addresses sequencing risk in some

detail. It shows how it amplifies the impact of investment risk only under fixed drawdown amounts (e.g. income target objectives, see [Explainer #2](#)) but not under percentage drawdown rates. The mechanics are that fixed drawdowns lead to a higher percentage being taken from a lower account balance following poor returns, thus speeding up erosion of the balance and leaving less assets available to fund future drawdowns.

Other considerations when investing for return generation in retirement include:

- **Investment risk as portfolio drawdowns** – Arguably large and extended declines matter most rather than volatility per se, as significant and sustained reductions in their balance may be stressful for retirees and could exacerbate sequencing risk (see Appendix 1). We thus see a case for focusing on *portfolio drawdown risk*, meanwhile de-emphasising risk measures such as standard deviation, tracking error and peer risk. Focusing on risk of losses that are sustained over the long run (e.g. permanent loss of wealth) may also be helpful<sup>1</sup>.
- **Tax** – Retirement is a tax-free environment<sup>2</sup>. The main implication is that franking credits can be more valuable in retirement as they are paid out as tax credits by the Australian Tax Office.
- **Inflation exposure** – What matters in retirement is the *real* spending power of the income generated from the assets. Inflation<sup>3</sup> has a negative impact only if associated with reduction in the real value of the assets so they fund lower real income going forward. Retirement portfolios might be designed to limit exposure to inflation risk<sup>4</sup> through favouring investments that can keep up with inflation<sup>5</sup>. Managing inflation exposure through the investments involves some complexities. Investments often identified as inflation hedges – such as infrastructure, property and inflation-linked bonds – typically offer inflation-hedged *cash flows*. Other considerations include: expected returns; exposure to discount rate risk, which may vary with inflation and can result in shorter-term price volatility; and risk from economic exposures. Traditional nominal long bonds are highly exposed to inflation risk

---

<sup>1</sup> See Warren, G. (2021) [Investment Risk for Long-Term Investors](#) for discussion of risk over long horizons.

<sup>2</sup> This compares to headline tax rates of 15% on income and 10% on capital gains in accumulation.

<sup>3</sup> The specific exposure to be hedged is inflation in the cost of living for retirees, rather than the general inflation rate.

<sup>4</sup> For a discussion of the impacts of cash flow and discount rate effects, see [Investment Risk for Long-Term Investors](#).

<sup>5</sup> The Age Pension provides inflation protected income for those eligible. This reduces the potential impact of inflation at the retirement solution level, taking some of the load in managing inflation risk.

while typically offering modest returns, raising questions over their role in retirement portfolios.

- **Liquidity** – The requirement to invest in liquid assets depends on the context. As individual retirees require liquidity to facilitate selling assets to generate income or fund other spending, retirement solutions should be invested in assets or funds that the retiree can readily liquidate. The extent should reflect personal need. As discussed above, the need for liquidity in pooled investment portfolios will depend on the particular portfolio.

## Function #2: Source of accessible funds

Accessible funds in retirement have traditionally taken the form of an account-based pension (ABP). Bequests, access to aged care and capacity to respond to change can all be facilitated through an ABP<sup>6</sup>. Funding bequests and aged care may be assisted by relatively high growth exposure within the ABP, given the long horizons involved.

The precautionary savings motive might be better supported through a source of funds that can be relied on to maintain its value. The precautionary motive might be facilitated through a ‘contingency account’ (‘rainy day fund’) invested in a *capital stable portfolio* managed under the objective of maintaining the real value of the capital. Provision of capital stable portfolios is discussed below.

## Portfolio design

This section discusses four types of investment portfolios that could potentially be used as building blocks within retirement solutions:

- Growth portfolio
- Defensive portfolio
- Capital stable portfolio
- Balanced portfolios

Here we are implicitly addressing the building blocks that the investment team of a super fund (or perhaps a financial planning group) might supply for deployment by a retirement solution designer. The main aim is to supply the designer with the tools required to generate tailored solutions to meet the needs of individual members or cohorts.

We see advantages in offering a growth portfolio alongside defensive and/or capital stable portfolios as distinct building blocks, to support solutions

designers to tailor appropriate levels of overall portfolio risk. Nevertheless, some super funds or financial advisers might wish to use pre-mixed balanced portfolios due to their familiarity or as an extension of options already offered in accumulation. We consider pre-mixing portfolios as second best due to less flexibility to design solutions.

Some retired members may wish to form their own investment portfolio through combining asset class portfolios, managed funds or direct investments, perhaps under direction from a financial adviser. We acknowledge this possibility, but choose not to drill down into this level of detail here.

## Growth portfolio

The primary role of the growth portfolio would be to maximise returns to boost wealth accumulation and hence potential income *over the long run*. As a return-seeking portfolio, the growth portfolio may be viewed and managed as the retirement counterpart of ‘high growth’ options in accumulation. Considerations for managing growth portfolios for retirement could include<sup>7</sup>:

- **Primary objective** – This might be to maximise *compound real returns* over the long term.
- **Investment risk** – As discussed earlier, the aim might be to *limit portfolio drawdown risk* in recognition of the aversion of many members to large and sustained reductions in their account balance and to manage sequencing risk. However, care needs to be exercised as sacrificing returns in limiting the risk of shorter-term loss can actually *increase* the risk of generating lower income over the long run<sup>8</sup>. More defensive ‘mid-risk’ assets such as property, infrastructure, hedge funds and possibly credit might be suitable if they offer competitive real returns. Dynamic strategies might also help manage risk, if the investment team has the required skill<sup>9</sup>.
- **Limit inflation exposure** – Assets that hedge inflation risk might be favoured to limit long-term income risk, provided any reduction in expected return is limited. This opens up a role for assets with cash flows offering some inflation protection such as infrastructure and property where real returns are competitive. Inflation-linked bonds can be unattractive for supporting long-term income generation due to low expected returns.

<sup>6</sup> Drawdowns also impact on the retention of accessible funds over the course of retirement, see [Explainer #5](#).

<sup>7</sup> Many of these principles also apply to accumulation portfolios, albeit to a lesser degree to the extent that tracking error and peer risk objectives are at play.

<sup>8</sup> See [Investment Risk for Long-Term Investors](#).

<sup>9</sup> Hedging strategies, such as options, can entail significant sacrifice of returns over the long run if maintained as a constant feature of the portfolio.

- **Franking credits** – Access to franking credits might be favoured, on the assumption that franking is not fully priced into the market and hence acts as a ‘return bonus’ for retirees.
- **Liquidity** – As discussed above, the need to manage liquidity depends on the portfolio context.

## Defensive portfolio

Defensive portfolios could be used in retirement solutions as a low investment risk building block and a potential diversifier if negatively correlated with the growth portfolio. A problem with repurposing the traditional defensive portfolios supplied in accumulation is they often contain a high weighting to nominal long bonds that thus tend to be exposed to inflation risk, rendering them as risky for underwriting a level of real income. This suggests giving consideration to using either a capital stable portfolio or purposely designing a defensive portfolio for use in retirement solutions. Selected considerations for designing such portfolios include:

- **Objectives** – Defensive portfolios for retirement might be designed to reduce overall portfolio variability when combined with a growth portfolio, while limiting exposure to inflation risk and being mindful of sacrificing real returns.
- **Duration** – Duration exposure needs to be approached with caution, to the extent that longer bonds may be associated with higher inflation exposure even if they may offer higher expected returns. One advantage of duration is that it can offer diversification benefits, although this largely depends on the equity-bond correlation which varies over time and tends to be regime specific.
- **Credit** – Credit exposure can boost expected returns and reduce inflation exposure if floating rate debt is favoured (to the extent that short-term rates adjust with inflation). On the other hand, credit brings economic exposure which reduces diversification benefits.
- **Inflation-linked bonds** – The fact that inflation-linked bonds offer inflation-hedged cash flows make them a possible contender. The downside is that they may offer low expected returns and can increase portfolio volatility through their high sensitivity to changes in real yields.
- **Defensive alternatives** – Alternatives such as hedge funds might play a role as a diversifier with reasonable real return potential (subject to fees).

## Capital stable portfolio

The primary use for capital stable portfolios within retirement solutions would be as a precautionary saving ‘pot’ that the member can access as required. Secondary roles might include providing members with confidence to take risk elsewhere in knowledge that they ‘have something set aside, just in case’, or to reduce overall portfolio variability in combination with a growth portfolio. The precautionary and confidence roles might be best performed by a portfolio of reliable real value that emulates a real risk-free asset as closely as possible. Considerations for designing such a portfolio include:

- **Objectives** – The primary objective would be to avoid reductions in the real value of the capital invested over the short term *and* the long term. Seeking higher returns where safe to do so provides a secondary objective.
- **Broad approach** – One approach to managing capital stable portfolios might be to first identify the minimum risk asset, and then consider seeking higher real returns subject to limiting the risk of real loss of capital to acceptable levels.
- **Investments** – Short duration inflation-linked government securities are in theory the minimum risk asset in the context, but may not be readily available. Short duration nominal fixed income securities might be viewed as having limited risk to the extent that their returns can be expected to equal or exceed inflation over the longer run<sup>10</sup>. Longer-term inflation-linked securities are highly exposed to fluctuations in capital values as real yields change, and thus do not reliably provide stability of capital over shorter horizons. Nominal long bonds are even riskier as they carry both inflation and price risk.
- **Liquidity** – As a pot of funds that is intended to be readily accessible, capital stable portfolios might be managed to ensure sufficient liquidity to meet correlated redemption requests across members (as might happen in times of economic stress).

## Balanced portfolios

Balanced portfolios might be incorporated directly into retirement solutions as the return-seeking component (as currently typical for ABPs), instead of specifically using a growth portfolio for the purpose. Balanced portfolios could be formed by the retirement solution designer combining building blocks, or supplied by an investment team or other

<sup>10</sup> This criterion would be met if the central bank manages cash rates to be positive in real terms.

provider as *pre-mixed* investment options. Balanced portfolios could be formed to this effect in four ways:

- **Combining growth and defensive retirement portfolios** – This approach could be more appropriate where the defensive portfolio either offers a significant return premium over the capital stable portfolio, or the stock-bond correlation is clearly within a negative regime.
- **Combining growth and capital stable retirement portfolios** – The capital stable portfolio would act similar to a ‘risk-free’ asset that reduces portfolio volatility, but could lower returns relative to using a defensive portfolio. The advantage is that a capital stable portfolio would be explicitly managed to limit inflation exposure.
- **Constructing dedicated balanced retirement portfolios** – A super fund investment team or other provider could supply balanced portfolios that are explicitly designed for retirement, in line with the considerations outlined above.
- **Repurposing accumulation options** – The balanced funds used for accumulation could be repurposed. This could offer some efficiency benefits, but may be sub-optimal relative to using portfolios explicitly designed for retirement.

## Governance and organisational structure

Governance and organisational structure for the investment teams of super funds is addressed in [Investing for retirement](#), where we identify and discuss three key decisions:

- **Responsibility for retirement portfolios** – Responsibility could be assigned to either the existing investment team or a dedicated retirement investment team be created. The latter could be housed within either the investment function or the retirement function. The preferred approach will depend on the structure of the overall organisation. In many cases the most effective approach might be establishing a dedicated retirement investment team within the investment function that works closely with the retirement function.
- **Shared versus segregated portfolios for retirement and accumulation** – Segregated retirement portfolios seem preferred as this supports constructing portfolios that are tailored

to the needs of retirees. The benefits in doing so should out-weigh any efficiency losses.

- **Performance evaluation** – The shift in focus to member outcomes in retirement and the possibility of delivering purposefully-designed investment building blocks requires a different perspective on performance evaluation. Portfolio performance should be viewed as one component within a much broader member outcomes assessment<sup>11</sup>, rather than an end in itself (as it is in accumulation). Performance evaluation of retirement portfolios might be framed around their purpose. For example, growth portfolios might be assessed against a representative benchmark of growth assets with high expected returns as a gauge of how well the portfolio manager has captured available return opportunities. Capital stable portfolios might be benchmarked against a real return of zero to align with the primary objective, as well as perhaps short duration government securities to capture the opportunity set.

See [Investing for retirement](#) for further discussion.

## Other notable approaches

Appendix 2 comments on other approaches. We argue that goal-based investing and bucketing might play a role, while querying the practicalities of using liability-driven investing or income framing in managing portfolios for use in retirement solutions.

## Our take: Purposeful investment design is required to support retirement solutions

A central message of this explainer is that some specific requirements and challenges arise when investing for the retirement phase. Investments are best designed to meet the particular needs of retirees and flexibly used in constructing retirement solutions that cater for differing needs and wants. Consideration should be given to managing portfolio drawdown risk, inflation and franking credits; and accommodating flexible access to funds including possibly supporting precautionary saving motives through a capital stable fund. All these features call for purposeful design. In a super fund context, this might be delivered through a dedicated retirement team supplying purpose-built retirement portfolios.

---

<sup>11</sup> Assessment of retirement income strategies is discussed in two Conexus thought pieces found [here](#).

## APPENDIX 1:

### Sequencing risk in the retirement phase

Sequencing risk relates to the sequence of returns (rather than their overall level) and how they interact with portfolio flows. In a retirement context, investing in riskier assets provides potential to generate higher income at the risk that income might turn out lower if returns are poor. This appendix shows how investment risk is amplified by sequencing risk but *only under fixed drawdowns*, as might occur under an income target objective (see [Explainer #5](#)). We also show that the impact of sequencing risk can be modest, unless there is a sustained sequence of poor returns. While we focus on income, noting that sequencing risk applies and may be exacerbated when drawing a lump sum.

The intuition behind sequencing risk is that drawing fixed amounts diminishes the account balance at a faster rate following poor investment returns when the balance is low, than after good investment returns when the balance is high. Diminishing the balance at a faster rate reduces the amount left over to support drawdowns going forward, and can lead to faster exhaustion of the account and hence the period over which a given income can be sustained. Drawing a percentage amount still leaves the balance and hence income exposed to reduction though poor investment returns. However, there is no interaction effect with percentage drawdowns through which the impact of lower returns is compounded by the drawdown.

We illustrate these effects by examining drawdown of income under differing assumptions about returns and their sequence. The table over compares the change in balance after three years from differing sequences of returns that accumulate to the same 3-year compound return. We explore:

- *Zero volatility*: +5% each year; acts as the baseline
- *Modest volatility*: returns of +12%, +8% and -4%; standard deviation ~8%, similar to 50/50 fund
- *High volatility*: returns of +17%, +12% and -12%; standard deviation ~16%, similar to equities.

The analysis is based around a \$100,000 balance and a drawdown of either fixed amount of \$9,000 (upper panel) or 9% of balance (lower panel), where the latter equates to the standard minimum drawdown rate for retirees aged 85-89. The set-up allows us to isolate the impact of sequencing risk stemming from the quantity of investment risk and the type of drawdown (i.e. fixed versus percentage) by comparing the change in year 3 balance against the zero-volatility baseline.

The marginal impact on the balance at the end of year 3 of the negative return occurring in year 1 and the large positive return being delayed to year 3 is -1.8% under modest volatility and -3.4% under high volatility under fixed drawdowns, but zero under percentage drawdowns. This illustrates that sequencing risk only applies under fixed drawdowns and is amplified by investment risk. Positive impacts on the balance in year 3 of a comparable magnitude emerge under fixed drawdowns when the return sequence is reversed.

Also of interest is that the impact of one year of bad (or good) returns occurring earlier at around  $\pm 2\%$ - $3\%$  is relatively modest, even though we have assumed a relatively high drawdown of around 9% of balance. The message is that care should be taken not to overstate sequencing risk as a consideration, noting the impact of one poor year is not overly substantial if it is followed by a recovery.

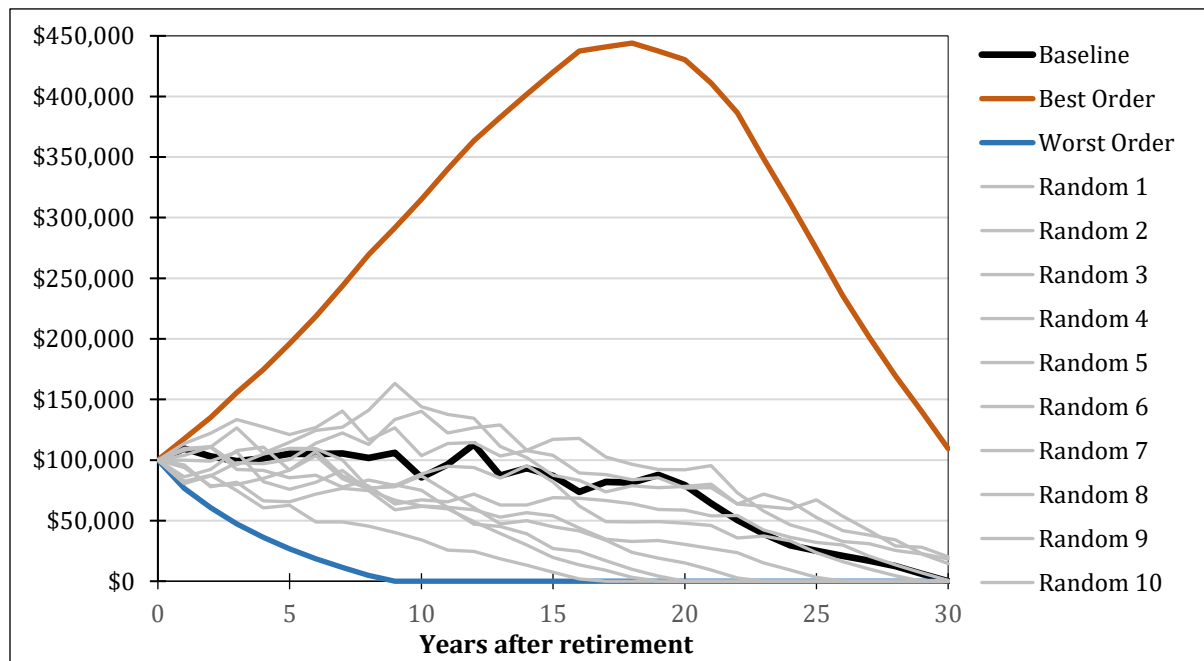
The chart following the table extends the illustration by conducting simulations over a 30-year horizon. To construct this chart, we generate a single 30-year return series that is designed to just exhaust a \$100,000 retirement account in year 30 under fixed drawdowns of \$6,000 per annum. This return series has a compound real return of 2.85% per annum with standard deviation of 12%, not dissimilar to what might be expected for a balanced portfolio with 70%-75% growth exposure. Sequencing effects are gauged by reordering the return series and recalculating the trajectory of the account balance, and thus the risk of being unable to sustain the \$6,000 real income target over the 30-years.

One series is created where the returns are re-sequenced from lowest in year 1 to highest in year 30, representing the worst possible return ordering. Here the account balance is exhausted in year 9. A best possible return ordering is also created, where returns are sequenced from highest to lowest. This results in a residual (real) account balance at year 30 of \$109,000 or 109% of the initial balance. Ten random re-sequencings are then generated for illustration, resulting in a spread of outcomes sitting between the worst order and best order. Half of these random re-orderings result in the balance being exhausted between year 15 and year 25. The analysis suggest that sequencing risk has potential to translate into a meaningful level of income risk if an extended sequence of negative (or positive) returns are experienced early in retirement.

### Illustration of the nature and potential impact of sequencing risk

Scenario	Period	Opening balance (\$)	Return	Drawdown (\$)	Closing Balance (\$)	Change in year 3 balance vs. baseline
<b>Fixed drawdowns</b>						
Baseline	1	100,000	5%	-9,000	96,000	
	2	96,000	5%	-9,000	91,800	
	3	91,800	5%	-9,000	<b>87,390</b>	
Up then down, modest volatility	1	100,000	12%	-9,000	103,000	
	2	103,000	8%	-9,000	102,240	
	3	102,240	-4%	-9,000	<b>88,844</b>	<b>1.7%</b>
Down then up, modest volatility	1	100,000	-4%	-9,000	86,700	
	2	86,700	8%	-9,000	84,636	
	3	84,636	12%	-9,000	<b>85,792</b>	<b>-1.8%</b>
Up then down, high volatility	1	100,000	17%	-9,000	108,200	
	2	108,200	12%	-9,000	112,400	
	3	112,400	-12%	-9,000	<b>89,946</b>	<b>2.9%</b>
Down then up, high volatility	1	100,000	-12%	-9,000	79,030	
	2	79,030	12%	-9,000	79,672	
	3	79,672	17%	-9,000	<b>84,375</b>	<b>-3.4%</b>
<b>9% drawdown rate</b>						
Baseline	1	100,000	5%	-9,450	95,550	
	2	95,550	5%	-9,029	91,298	
	3	91,298	5%	-8,628	<b>87,235</b>	
Up then down, modest volatility	1	100,000	12%	-10,080	101,920	
	2	101,920	8%	-9,907	100,167	
	3	100,167	-4%	-8,627	<b>87,232</b>	<b>0.0%</b>
Down then up, modest volatility	1	100,000	-4%	-8,613	87,087	
	2	87,087	8%	-8,465	85,589	
	3	85,589	12%	-8,627	<b>87,232</b>	<b>0.0%</b>
Up then down, high volatility	1	100,000	17%	-10,548	106,652	
	2	106,652	12%	-10,770	108,894	
	3	108,894	-12%	-8,627	<b>87,232</b>	<b>0.0%</b>
Down then up, high volatility	1	100,000	-12%	-7,923	80,107	
	2	80,107	12%	-8,089	81,791	
	3	81,791	17%	-8,627	<b>87,232</b>	<b>0.0%</b>

### Retirement balance under re-ordered return sequences





## APPENDIX 2:

### Other notable approaches

#### Goal-based investing (GBI) and bucketing

GBI refers to structuring investments to meet particular goals or outcomes, rather than a risk/return objective. Much of the GBI literature adopts a 'bucketing' approach, where assets are spread across pots each directed towards achieving a specific goal. An advantage of bucketing is that it recognises and exploits a tendency for many retirees to engage with retirement as series of individual decisions rather than an integrated process, i.e. 'narrow framing'.

The idea of dividing the investments into building blocks comprising a growth portfolio, defensive portfolio and/or capital stable portfolio aligns with the intuitions underpinning GBI, in particular the use of a capital stable portfolio as a contingency account. Another common application of bucketing is dividing the assets into a defensively-invested bucket to support regular income needs over the shorter term, and a growth bucket invested in higher returning assets directed towards the goal of sustaining income (or building wealth) over the long run. This approach can conceptually be extended to incorporate additional buckets that address precautionary or bequest motives.

#### Liability-driven investing (LDI)

LDI focuses on the use of assets to service a liability. In a retirement setting, LDI can involve translating the problem into asset and liability space and managing the 'funding ratio'. Assets include the retirement account and the present value of any lifetime income streams and social security; while liabilities include the present value of future income needs. An alternative LDI approach entails 'cash flow matching' through managing the assets so they can be deployed to fund income as required. LDI may be applied by first identifying the 'risk-free' asset that hedges the liability, and then deciding how much to allocate to risky assets in pursuit of better outcomes.

A LDI lens presents a useful conceptual framing of the retirement problem by placing attention squarely on the fact the assets are intended to fund income. Nevertheless, LDI faces a number of significant shortcomings as a paradigm for managing retirement *investment portfolios*:

- **LDI applies at the individual member level rather than the portfolio level.** The management

of the 'liability' sits with the designer of retirement solutions, while the investment team or provider is typically charged with delivering investment outcomes rather than managing the retiree's balance sheet.

- **The retirement 'liability' is stochastic, complex and particularly hard to define.** Income is not a fixed commitment, but rather is discretionary and may be adjusted in response to realised returns or changes in income needs. Its valuation is also impacted by uncertain mortality.
- **The Age Pension is endogenous.** Further complication arises because the value of the Age Pension is conditional on asset returns through their impact on account balance.

While there may be scope to apply LDI in designing retirement solutions, applying LDI in a portfolio management context is problematic. Working with defined investment mandates seems more practical.

#### Income framing

An approach proposed by some commentators and occasionally used by retirees is investing to harvest the investment income (i.e., dividends, interest, etc.), with the intent of spending that income while leaving assets intact. We are highly sceptical of this approach for the following reasons:

- Making a distinction between investment income and capital gains is somewhat illusory. Retirement outcomes will be maximised by maximising total returns and wealth generation, rather than income.
- The approach will result in failure to convert assets into the income stream that is affordable, as assets are not being run down. It can lead to assets growing in value and large unintended bequests.
- The approach can generate increasing income over retirement to the extent that dividends grow, at odds with observed retiree spending patterns.

We can see two advantages of income framing. First, focusing on long-term income generation encourages investing for the long run and helps mitigate the risk of over-reacting to market volatility. Second, the approach might be suitable for retirees with strong bequest motives. On balance, though, for most retirees the income framing approach is likely to be unhelpful and sub-optimal.