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A Holistic Framework for Life Cycle Financial Planning

CONTENTS

1 EXECUTIVE SUMMARY

This paper examines how financial planning frameworks need to be adapted and updated to account for recent fundamental changes to the economic environment.

Evolving market conditions and the increasing shift toward asset decumulation by the Baby Boomers have highlighted flaws in existing approaches to financial planning and their ability to appropriately communicate risk.

New products are challenging the way companies and advisors think about, plan for, and implement retirement-accumulation and wealth-preservation strategies. Coupled to this is an increasing understanding of, and appreciation for, the risks involved in retirement. As a result, providers and advisors are considering more complex strategies based on something more sophisticated than expected investment returns.

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This paper outlines a new holistic financial planning framework, centrally based upon the concept of risk–how it changes and how it can be managed over the various stages of an individual's financial life cycle. This framework also incorporates human capital and how it affects the central wealth-management decisions.

The paper describes how alternative product and investment strategies can be analysed within this framework, and demonstrates the importance of applying sophisticated modelling techniques consistently for a fair assessment of each strategy's risks and benefits. Indicative examples that include relatively new, guaranteed unit-linked products help bring the framework to life. The paper also discusses the implications of the latest developments in behavioural finance on how clients assess the value of alternative strategies.

Implementing such a framework for targeting particular distribution channels requires a thorough knowledge of insurance and investment products and how to generate stochastic economic scenarios, as well as the appropriate tools and systems.

The paper starts with an overview of the history of retirement planning, which is useful in understanding how and why the industry currently does things the way it does. Then it outlines what we think a modern holistic financial planning framework should look like, attempting to bring some of that framework to life through the use of an illustrative case study to assess alternative product and investment choices. The paper also considers the issues involved in how different people come to different assessments of what constitutes *value* when faced with the same series of outcomes, discusses the industry forces driving change towards such a framework, and takes up some of the practical challenges and solutions in implementing that framework.

2   THE HISTORY OF RETIREMENT PLANNING

When it comes to financial planning, the use of specialist advice is still relatively new. The development of a market for advice has paralleled the increasing expectation of meaningful retirement benefits for the mass market, the shift toward providing for personal retirement through defined contribution (DC) systems, and an explosion in the legislation accompanying these systems.

2.1   Early 20th-Century Introduction of the Old-age Pension

As outlined by Wickham (2007), the first pension systems focused on state-sponsored benefits, primarily to provide for those in the military or civil service. Relatively low life expectancies meant that, for many, the likelihood of a retirement period, let alone a pension, was small. However, over time, many governments introduced retirement support for the masses via social security. In the UK the government established the Old Age Pensions Act in 1908, with the Australian government establishing an old-age pension in 1910.

Although these acts established a state-sponsored retirement safety net, the general lack of wealth in the mass market, low life expectancies, the family support network, and modest expectations of retirement living standards caused many to take the view that planning simply to reach retirement was a sufficient life goal.

2.2   Employer Responsibility

Over the course of the 20th century, retirement expectations changed from a *rest before death* to a *reward for hard work*. This transformation, along with the widespread introduction of defined benefit (DB) schemes, prompted individuals to take a more active role in their retirement planning, albeit with significant assistance from employers. Generous salary-linked retirement benefits became the primary pillar of retirement provision for the mass market throughout the mid- to late 20th century.

Over the most recent decades however, the liabilities of these schemes have increased dramatically, as what were once promises made on a *best endeavours* basis slowly but surely solidified into hard liabilities sitting on the balance sheets of sponsoring companies. Significant increases in life expectancy added further to the liabilities, and sponsoring companies became aware that they had become exposed to a significant longevity risk. However, it was market risk that proved to be the ultimate downfall of these schemes. Two equity bear markets during the first decade of the 21st century resulted in the evaporation of sizeable portions of retirement plans' asset bases, and falling interest rates further increased liabilities, resulting in significant deficits. Consequently, employers have closed the vast majority of these schemes to new members over the last decade or two, particularly in the Australian and UK markets.

For those lucky enough to have a material amount of retirement wealth locked away in a DB pension scheme, the increased complexity of contribution rules and taxation has created a need for advice on how to best optimise their financial position. Despite this complexity, many have adopted relatively simple strategies involving contributing the maximum amount possible subject to personal financial constraints.

2.3   Private Pension Provision

With the recent shift toward defined contribution schemes across most developed markets, and in particular the defined contribution superannuation system that Australians are now familiar with, the burden of retirement provision has shifted dramatically to the individual. To address this problem, the primary and most obvious focus to date has been on saving and accumulating as much wealth as possible. The financial planning industry has grown up on the back of this objective to maximise absolute wealth, which is partly why the focus has been solely on asset allocation, cost control, and tax optimisation, aside from the role the industry plays in distributing traditional protection products. Further facilitating the focus on this aspect of retirement planning has been:

- the growth in investment products and platforms
- the impact of legislation and the need to develop tax-efficient structures

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The resulting accumulation mindset has produced a financial planning analysis focused on the use of deterministic methodologies to demonstrate product benefit outcomes.[1] Such methodologies use fixed assumptions such as retirement ages and life expectancies, with little consideration of human capital or specific risks such as inflation, longevity, or annuitisation. Recently, the use of mean-variance optimisation models to determine asset class allocations has become more common, but these models focus on a single measure of risk—the volatility of financial wealth—that does not relate well to post-retirement issues. In addition, the models typically assume perfectly rational, fully informed investors with symmetric risk profiles, which means that asset-return volatility is the only definition of risk that is considered necessary.

2.4 The Future
As DC systems mature and the proportion of self-funded retirees increases, the need for advice will evolve, along with product innovation. The increased responsibility of individuals to provide for their retirement creates opportunities for financial planners to take an active role in quantifying the value of assets beyond superannuation and the age pension on retirement outcomes.

Innovation in many markets is well underway with a move toward products that provide explicit risk protection.

Innovation in many markets is well underway with a move toward products that provide explicit risk protection. Examples include variable, equity-indexed, and inflation-linked annuities, equity-release mortgages, structured products, and longevity insurance. These are increasingly being provided on an unbundled basis, enabling the advisor to tailor each product/investment strategy/risk strategy to meet the unique needs and risk preferences of each customer. As a consequence, advisors and their customers now have the more complex task of deciding whether to use a single bundled product or multiple bundled products, or whether to *manufacture* solutions by controlling or selecting strategic asset allocation, tactical asset allocation, or risk protection (for market, annuitisation, longevity risks, etc.), in addition to optimising tax considerations. Current illustration tools are inadequate for helping to make these decisions, as it is effectively impossible to assess the distribution of benefit outcomes and consequently the *real value* of products that provide a guarantee within a deterministic framework. Unfortunately, this also makes it extremely difficult to fairly compare alternative products and the financial solutions upon which they are built.

As a result, product manufacturers and distributors are in the difficult position of trying to provide products that meet customer retirement needs, but are unable to properly demonstrate how their products fit into and contribute toward a holistic financial planning solution. This is particularly the case in the UK and European markets, where the marketing of the new variable annuity products has met resistance by some advisors, who find it difficult to assess the value of the guarantee and its effect on financial outcomes. In many cases, these products are not assessed properly, with the consequence that the main point of comparison is price rather than the range of benefit outcomes and how they meet customer needs. This is a key hurdle for virtually all new product concepts that come to market, and it is a significant challenge for wealth-management companies that are currently introducing variable annuities and other innovative retirement-related products.

Two key ingredients are required in order to address these issues: a holistic planning framework and sophisticated planning tools.

2.4.1 Holistic Planning Framework
A holistic framework on which advisors can base their financial planning decisions, along with on and the explicit recognition of the various sources of wealth-management risk over the life cycle, are critical components of next-generation financial planning analysis.

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1   In the UK, policy illustrations are mandated by the Financial Services Authority (FSA), to be undertaken assuming various constant investment return.

The framework outlined in the following section is an attempt at identifying and interrelating the key life-cycle financial needs, capital sources, and associated risks. At its core, an appropriate framework should:

- reflect all sources of capital/wealth and household liabilities in the decision-making process
- identify and deal with the asymmetric risk profile of individuals (individual risk preferences)
- provide an appropriate basis for the comparison of financial products
- acknowledge behavioural biases and educate investors of the potential ramifications
- be accessible in a range of formats and varying levels of sophistication
- be flexible and reflect the tendency of circumstances, needs, and wants to change over time

2.4.2 Sophisticated Planning Tools

Distributors who make financial planning decisions within this framework require the support of tools, to be used by financial planners or provided online as an integral component of a limited advice model. Such tools will become important because they offer increased sophistication together with efficiency gains.

The following factors provide some reasons why more sophisticated tools will be adopted:

- the changing needs of consumers as Baby Boomers march toward retirement

- increased product sophistication and structuring options and solutions targeted at managing or mitigating specific retirement-related risks

- the drive for efficiency gains necessitated by:

  — general fee pressure and the trend toward fee-for-advice models

  — the adoption of limited-advice models and other approaches to adequately reach the mass market

  — greater demand pressures on the financial planning industry resulting from increased demand for services amid falling numbers of planning professionals

  — increasing regulatory oversight

Not only will more sophisticated advisor tools, illustrations, and calculators help to demonstrate value-adding analysis and advice, but the incorporation of such tools within a holistic financial planning framework will help to develop long-term relationships with clients. The tools will also become increasingly important in non-advised channels where illustrations and calculators are provided by product manufacturers or other institutions such as superannuation or pension funds.

Such tools will also help product manufacturers explain and demonstrate how their products fit into consumers' financial life cycles, which in turn will help advisors and customers better assess their value proposition. Ultimately, this will enhance individuals' understanding of their own retirement needs and issues, help them contribute toward the savings system, and improve overall levels of financial literacy.

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2.4.3 Challenges

The development of a wide-ranging solution is not a simple task. There are numerous challenges facing advisors and other stakeholders across the range of distribution channels within the industry. These include:

- regulatory compliance, disclosure requirements, and their changing natures

- flexibility of DC systems and the need to adapt to the wide range of available products and strategies

- the public's financial literacy levels

- difficulties in accurately capturing and quantifying individual preferences and behavioural biases

- tailoring the advice framework to different distribution channels

- implementation and maintenance costs

Despite these challenges, there are a number of potential areas for improvement in the current provision of financial advice across most distribution channels. The following sections of this paper explore some of these areas in more detail.

3 HOLISTIC PLANNING FRAMEWORK

For the majority of the population, the importance and complexity of managing life-cycle wealth is increasing. In many developed markets, particularly in Australia, the UK, and the US, the responsibility for life-cycle wealth management has been undergoing a transition from institutions to individuals. State retirement benefits are not sufficient to support the living standards of the majority of the population, and employers have scaled back their support of life-cycle wealth-management funding through DB pensions.

All of this has created a need on the part of individuals to purchase or invest in personal wealth-management products such as managed funds, life insurance, and retirement products. The choice of how to allocate wealth among these products in order to achieve one's objectives is the central problem of wealth management today.

Many people find it difficult to make financial and consumption decisions over the long term, partly because of the difficulty in assessing their future needs, but also because doing so involves the short-term cost of lowering their personal consumption. To make such decisions, it is important to understand how people's wealth-management needs change over the course of their lives.

Faced with an inability to assess the value of future income and savings, and compounded by the long duration until retirement and the tendency towards event-driven planning, it is common for individuals to disengage from the financial decision-making process. Financial planning business models based on promoting products that provide high commissions can lead to short-term planning decisions that may not be in the best interests of consumers. One of the consequences of this is that providers tend to view younger customers as less valuable than those who are at retirement, whereas in reality younger customers can provide a significant source of value through repeat business if long-term relationships can be developed.

Financial planning business models based on promoting products that provide high commissions can lead to short-term planning decisions that may not be in the best interests of consumers.

We refer to this long-term view as the wealth-management life cycle of an individual. For the purposes of this paper, we have excluded those people at both extremes of the income and wealth distributions: the very rich (extreme high net worth) and the poor (low end of the mass market), as these two groups have significantly different wealth-management requirements. Instead, we focus on the vast majority of people (mass market, mass affluent, high net worth) whose financial life cycle can be reasonably described by the framework we are describing. Clearly there will be further differences depending upon the makeup of individual households.

3.1 Sources of Wealth
One of the central tenets of a holistic financial planning framework is that it needs to incorporate all material sources of net wealth, tangible and intangible. These include both financial and human capital.

3.1.1 Human Capital
Human capital represents the value of a person's future earning potential. It is an intangible asset that typically dominates the personal balance sheet of younger people, whose yield is represented by wage income. We calculate it as the present value of expected after-tax wage earnings as follows:

$$\text{Human Capital} = \sum_{i=0}^{n} \frac{\text{Current wage income} \times (1 + \text{wage growth})^i \times (1 - \text{tax rate})}{(1 + \text{discount rate})^i}$$

Human capital depends upon a number of factors, including:

- **Current wage income**

- **Wage growth**: This will depend upon a range of factors unique to the individual such as education, occupation, career aspirations, career stage, etc.

- **Tax rate**: This is an estimate of the average tax rate that applies to wage income.

- **n**: The number of working years left, i.e., retirement age − current age.

- **Discount rate**: This should be a risk-adjusted rate, reflecting the long-duration, risk-free rate, in addition to a risk premium that reflects the riskiness of future wage earnings. It is beyond the scope of this paper to determine what an appropriate risk premium should be, although a simple high/medium/low rating corresponding to risk premiums in the order of 1%−6% would seem to be reasonable.

Determining an individual's human capital provides a starting point for assessing his or her ability to generate future savings, wealth creation, and retirement income.

Determining an individual's human capital provides a starting point for assessing his or her ability to generate future savings, wealth creation, and retirement income. It also provides a framework for the individual to assess the relative merits of various life choices such as further education, the benefits of taking a new job, moving to another country with an alternative tax regime, or flexible work that involves a trade-off between current income (e.g., bonus or overtime) versus future income (wage growth). In all of these decisions, it is important to consider both the prospect for future wage growth and the riskiness of this wage growth.

By way of example we show in Figure 1 a calculation of human capital for three people at different stages in their life.

FIGURE 1: HUMAN CAPITAL EXAMPLE CALCULATIONS			
	PERSON A	**PERSON B**	**PERSON C**
PERSON	25 YO GRADUATE	40 YO EXECUTIVE	40 YO TEACHER
CURRENT WAGE	50,000	150,000	50,000
WAGE GROWTH	5%	7.5%	5%
TAX RATE	40%	45%	40%
WORKING YEARS (N)	40	25	25
DISCOUNT RATE	9.00%	11.00%	6.00%
HUMAN CAPITAL	634,269	1,441,948	670,929

There is also a direct link between human capital and the need for life insurance. The purpose of life insurance is to protect the family from a loss in human capital that is due to disability or death. The amount of insurance purchased should be roughly equivalent to the amount of human capital. As human capital declines over time, so does the need for life insurance, which is why term insurance products that have a benefit that reduces over time meet the core needs of consumers.

3.1.2 Financial Capital
Financial capital represents the amount of net assets that are available to provide for future consumption, whether for necessities, comfort, enjoyment, or bequeathing. Seen in this light, financial wealth is simply a mechanism to shift consumption from one period to another—saving shifts consumption into the future, whereas borrowing shifts consumption to the present. Given its relative ease of identification and measurement, financial capital forms the basis for most financial planning frameworks.

3.1.3 Financial Life Cycle

Human capital is converted into wage income, which is used for present-day consumption, paying down liabilities such as mortgages, and saving for retirement. The savings are converted into financial capital, which is invested in order to generate income for funding retirement consumption and bequests. Thus, the wealth-management life cycle relates to the process of managing human and financial capital in order to meet lifestyle objectives throughout a person's life.

At the start of one's career, typically in the early 20s, existing financial capital is effectively zero. However, one's human capital—the measure of future earning potential—is very high. Human capital is defined as the present value of a person's future wage earnings. It is increased through education and career decisions, and for most people it peaks early in their career and declines toward zero at retirement. Whereas human capital is clearly an intangible asset, it can be used as collateral to support loans (e.g., a mortgage) in order to bring consumption forward. In this way it can be converted from an intangible asset into tangible cash. Although it is largely ignored in current financial planning frameworks, it plays a critical part in life-cycle finances and retirement funding.

Figure 2 illustrates the typical financial life cycle of a person in real terms.

The wealth-management life cycle relates to the process of managing human and financial capital in order to meet lifestyle objectives throughout a person's life.

#### FIGURE 2: FINANCIAL LIFE CYCLE IN REAL MONETARY TERMS
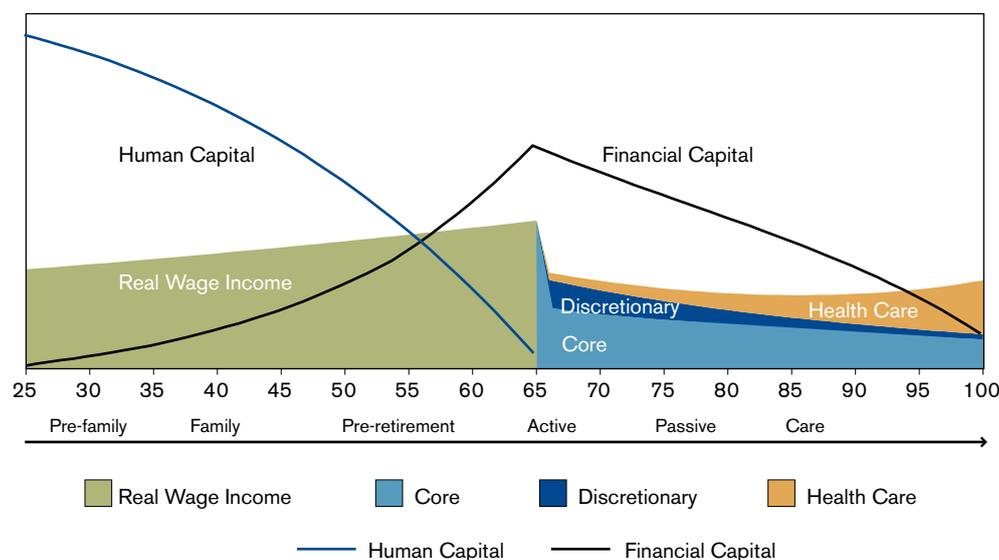
Figure 2 illustrates the need to start retirement planning as early as possible, when human capital is still large in comparison with financial capital. The transition from human to financial capital that takes place throughout one's working life is the mechanism that enables the funding of retirement consumption.

A greater understanding of the relative value of human capital will encourage younger segments to begin planning earlier in life and provide advisors and distributors with a framework that can be applied to this segment. Each of the stages is discussed further in the sections that follow.

Within most developed markets, it is also necessary to factor in social security benefits such as the government-sponsored old-age pension. This in itself should be viewed as a financial asset, dependent on a range of factors and allowing for the application of the range of rules and means

tests that apply. Currently 80% of Australians aged 65-plus receive an age pension, with 55% on a full pension,[2] indicating that it is a significant source of post-retirement income for a large proportion of Australian retirees. Despite the maturing of the DC system, current Australian budget projections estimate that 73.6% of the population aged over 65 will continue to claim the age pension (either in part or full) by 2050,[3] assuming that current rules are maintained.

3.2 Working Life

3.2.1 Pre-family Independence

The start of a person's working career is usually characterised by a period of independence, involving few commitments, with a focus on personal consumption with low savings and financial capital. This phase is relatively simple from a financial-management perspective, because financial capital is low relative to human capital. Any financial capital that is used for retirement planning can be aggressively invested because of the long time horizon. Most workers in this phase have no need to protect their human capital with life insurance, because the financial consequences of death are insignificant.

3.2.2 Family

The next phase of the financial life cycle centres on meeting the needs and desires of building a family. A household's human capital may continue to increase for those in skilled professions, but for others it will slowly begin to decline from its early peak as it is converted into income to meet immediate consumption and short- to medium- or long-term savings needs. The need for life insurance coverage becomes apparent for the main breadwinner, in order to protect the loss of human capital for the household in the unfortunate event of their death. The amount of life insurance coverage needed is a function of each wage earner's human capital, which is many multiples of current income and existing financial wealth.

The majority of wage earners' savings will be used to meet short- to medium-term needs such as housing, children's education, and lifestyle asset purchases.

The majority of wage earners' savings will be used to meet short- to medium-term needs such as housing, children's education, and lifestyle asset purchases. Structured long-term savings for retirement planning are likely to be in the form of tax-advantaged products such as DB and DC pension plans.

3.2.3 Pre-retirement

As the financial needs of family life decline, the balance of savings tends to transition more toward retirement planning. Although this phase can vary considerably, it typically occurs around the ages of 45 through 65. Financial planning is critical in this phase. Human capital is declining, and financial capital is hopefully becoming material. Planning for retirement now becomes essential as people need to carefully manage their human and financial capital to achieve their retirement objectives and manage their retirement risks. If a shortfall in financial capital at retirement is expected, there are only a few ways of addressing the problem:

- increasing human capital by working harder, smarter, or longer
- increasing financial capital by saving more or investing more aggressively
- reducing one's life expectancy, which is usually contrary to most people's objectives

Determining an appropriate investment strategy for financial capital during this stage is very important, but not straightforward. Ideally, it needs to take into consideration retirement lifestyle objectives, existing financial capital, human capital/future income/future savings, expectations of future returns, personal life expectancy, and personal risk preferences. Retirement plans rarely capture all, or even some, of these considerations.

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2   Australian Government, Department of Families, Housing, Community Services & Indigenous Affairs, Portfolio budget Statement 2007–2008.
3   Harmer, Dr. Jeff, Pension Review Report, 27 February 2009. Based on modelling by Treasury. The actual rates are 45.3% claiming part pension and 28.3% claiming full pension by 2050.

3.3 Retirement

Historically, retirement was a well-defined phase in life that began at a certain age. However, the modern view is that retirement contains various phases relating to consumption needs, with no clearly defined start. We refer to these phases as active retirement, passive retirement, and elderly care.

3.3.1 Active Retirement

For the majority of the population, retirement no longer unambiguously starts at a particular age, such as 65 for males. For many who have accumulated insufficient financial capital to meet their retirement objectives, continuing to work to some degree will be the only practical solution. Consequently the *start* of retirement involves a gradual shift away from employment. Lifestyle needs are not likely to change significantly, as retirees' health is generally good during this phase. Indeed, in the early years from 60 through 70, discretionary spending may be relatively high as people fill their time with travel, sport, and hobbies that have been on their *to do* lists for many years. In fact, many governments support tax-free cash lump-sum payments that may provide incentives for pursuing these activities.

Individual income needs vary considerably from individual to individual, but a general rule of thumb is that a suitable target for post-retirement income is around two-thirds of a person's final working income. A significant portion of this will be used for discretionary consumption, with the core consumption required to meet basic needs somewhat lower than the two-thirds mark.

For people entering this phase, determining an appropriate risk and investment strategy is the central objective of the financial planning problem. This is because financial risks are very acute at the start of this phase. Financial capital is at or near its maximum, and for many there is little or no ability to recover from adverse market scenarios. For example, those who retired at the start of 2008 and had a material asset allocation in equities and other *growth* assets, suffered a devastating blow to their financial capital as equity markets fell by about 40%. Those caught in this position will inevitably experience a real reduction in the supportable standard of living during their retirement.

Depending on the degree of sufficiency (or insufficiency) of financial capital at the start of retirement, exposure to risky asset classes is both necessary and desirable. The fact that life expectancies are continuously increasing creates both the need and the opportunity to allocate greater proportions of one's financial capital to growth assets. This makes it possible to gain from expected risk and liquidity premiums, which can help offset the effects of inflation and contribute to meeting overall retirement objectives.

It is also very important to consider the volatility and skewness characteristics of one's asset portfolio. The volatility of returns relates to the degree to which they vary from year to year; skewness or downside risk relates to the degree and likelihood of negative returns. For people with a low tolerance for losses, traditional financial planning frameworks would deal with this by reducing the allocation to risky assets, which reduces overall risk but also leads to a reduction in expected return. However, new products are now becoming available that provide option-like payoffs that eliminate downside risk while retaining a large portion of the upside for a clearly defined cost. This feature permits investment strategies that generate return distributions more closely aligned to individuals' risk preferences.

The final consideration during this phase is the bequest motive. Those who have sufficient financial capital to meet their own consumption requirements during retirement will likely want to bequeath some capital to their beneficiaries. This can be done in various ways with varying degrees of certainty or risk for the expected inheritance amount.

3.3.2 Passive Retirement

Most people will gradually reduce their levels of activity during the central retirement years of 70 to 85+, which means lower levels of discretionary spending. For many people, lower energy levels will limit their travel and active hobbies, and they will spend more time on less-expensive activities. Some will enjoy good health, at least for a while, but for others their health will start to gradually deteriorate.

They may need to use some of their financial resources to fund one-off medical expenses, such as operations, to the extent that they are not covered by insurance. They will need some liquidity in their financial capital to cover this risk.

Most will continue to live in their homes, but some will downsize to houses or flats requiring less physical and financial maintenance. Expenditures on basic needs are likely to remain level or even decline in real terms. Over the entire course of retirement, total consumption may actually drop to its lowest level in real terms.

The main risks during this phase are not materially different from those of the active retirement phase, but health, inflation, and longevity risks do become relatively higher. It is important to manage or hedge at least part of these risks because financial capital provides little or no capacity to deal with a significant health event, high inflation, or increasing longevity.

3.3.3 Elderly Care

The final phase of retirement relates to being very old, over age 85. For most, health gradually deteriorates as lifestyle becomes more sedentary. Consumption becomes focused on meeting core living needs and medical expenses. Core living needs may continue to fall in real terms, but consumption on health-related expenses may increase materially, although there may be some level of government support to cover these. Increasing expenses are driven by failing health as well as the generally higher inflation rates for medical expenses relative to other consumption items. This will be enhanced by those who choose to transition from their personal home to a nursing home or retirement village.

For the increasing number of those living to the elderly care stage, some form of medical and longevity protection is desirable.

We live in an uncertain world containing many risks that affect our ability to meet retirement-related needs.

The framework outlined above is the starting point for an assessment of retirement needs. It is, however, not sufficient in itself because we live in an uncertain world containing many risks that affect our ability to meet retirement-related needs. Thus, the management of retirement-related risks forms the next foundation of a holistic life-cycle financial planning framework.

3.4 Retirement-related Risks

3.4.1 Risk Identification

The management of retirement starts with identifying the risks. Figure 3 identifies the major risks individuals face regarding their retirement wealth and income.

FIGURE 3: RISKS TO RETIREMENT WEALTH AND INCOME

RISK	DESCRIPTION
MARKET RISK	The risk of poor market returns that reduce financial capital and, consequently, post-retirement income. This risk increases as retirement approaches and financial capital increases relative to human capital.
ASSET ALLOCATION RISK	The risk that financial capital is not appropriately invested. This relates to having an appropriately balanced portfolio of well-diversified systematic risks for which the market pays appropriate risk premiums.
INTEREST RATE RISK	The risk that interest rates fall, leading to lower returns on future financial capital.
EMPLOYMENT RISK	The risk that employment income doesn't reach expected levels because of insufficient wage growth, redundancy, or the inability to extend employment to the desired retirement age.
CORRELATION RISK	The risk of an unfavourable correlation between human capital and all sources of financial capital.
INFLATION RISK	The risk that inflation leads to an erosion of the real purchasing power of retirement income.
HEALTH/LIQUIDITY RISK	The risk that deteriorating health brings about a need to liquidate financial assets in order to cover non-insured medical expenses.
MORTALITY RISK	The regret risk of dying too early post-annuitisation, or the loss of any material human capital needed to supplement retirement incomes.
LONGEVITY RISK	The risk that life expectancy increases, eroding one's ability to finance the increasing length of retirement.
BEHAVIOURAL RISK	The risk of behavioural biases leading to sub-optimal or inappropriate retirement planning decisions, including saving too little.
COUNTERPARTY RISK	The risk that a financial institution providing guaranteed benefits fails, resulting in a loss in retirement income or wealth.
LEGISLATIVE RISK	The risk of a change in legislation that reduces future income.

As demonstrated by Figure 3, there is an extensive range of risks that may potentially affect individuals. One risk that may be notable by its absence is property risk, which for the purposes of this paper we view as a component of market risk. However, we do acknowledge that property may be viewed differently from other financial assets, with consumers attaching different risk preferences or utility to it. Any mortgage backing a property should also be treated as a liability (negative asset) in determining net financial capital.

3.4.2 Risk Matrix

Section 3.1 above showed that, as a person ages, the profile of wage income, human capital, and financial capital changes. Consequently, the risks that a person is exposed to changes over time as well. One way of illustrating how these risks change over time is by using a heat map that identifies the relative magnitudes of these risks into broad high, medium, and low categories.

There is an extensive range of risks that may potentially affect individuals.

Figure 4 is such a heat map of these risks over the various life-cycle stages.

FIGURE 4: CHANGING RISKS TO RETIREMENT WEALTH AND INCOME						
	WORKING LIFE			RETIREMENT		
	PRE-FAMILY	FAMILY	PRE-RETIRE	ACTIVE	PASSIVE	ELDERLY
RELATIVE CAPITAL AND INCOME PROFILES						
HUMAN CAPITAL	SIGNIFICANT	SIGNIFICANT	MODERATE TO LOW	LOW	NONE	NONE
FINANCIAL CAPITAL	NONE TO LOW	LOW TO MODERATE	SIGNIFICANT	SIGNIFICANT BUT FALLING	MODERATE	LOW TO NONE
WAGE INCOME	LOW	MODERATE	HIGH	NONE TO LOW	NONE	NONE
RISKS THAT GRADUALLY DECREASE OVER TIME						
ASSET ALLOCATION		LOW	HIGH	HIGH	MODERATE	
MARKET		LOW	HIGH	HIGH	MODERATE	
INTEREST RATE		HIGH	HIGH	MODERATE		
EMPLOYMENT		HIGH	MODERATE			
CORRELATION		HIGH	MODERATE	MODERATE	LOW	
MORTALITY		HIGH	MODERATE	MODERATE	LOW	
BEHAVIOURAL		HIGH	HIGH	HIGH	MODERATE	LOW
RISKS THAT GRADUALLY INCREASE OVER TIME						
INFLATION		MODERATE	MODERATE	HIGH	HIGH	HIGH
HEALTH		HIGH	LOW	LOW	HIGH	HIGH
LIQUIDITY		HIGH	MODERATE	LOW	MODERATE	HIGH
LONGEVITY			MODERATE	MODERATE	MODERATE	HIGH
COUNTERPARTY		MODERATE	MODERATE	MODERATE	HIGH	HIGH
LEGISLATIVE			MODERATE	HIGH	HIGH	LOW

We can classify these risks into two broad groups: those that decrease over time versus those that increase over time.

We can classify these risks into two broad groups: those that decrease over time versus those that increase over time. Those that tend to decrease over time are generally a direct function of either or both human and financial capital, such as employment and market risk. Those that tend to increase over time relate more to the ability to generate or access income to cover post-retirement expenses.

Risks tend to be high at either end of the life cycle (family and elderly stages) but transition from one to the other in the pre-retirement phase. Given that most of the wealth in the UK, Australian, US, Japanese, and other developed markets currently sits in the pre-retirement phase, products that help these consumers manage the risks in transition (market, asset allocation, and behavioural) as well as the elderly stage (inflation, health, longevity, liquidity, counterparty, etc.) will be ideally placed to meet a core customer need.

3.5   Redesigning Strategic Asset Allocation

One of the important implications from inclusion of human capital in the financial planning process is that it will have an effect on the asset allocation of one's financial wealth. Maximising financial wealth toward the end of one's working life involves maximising the risk return of the yield on total assets, including both human and financial capital. Just as diversification across many asset classes that are not perfectly correlated is central to traditional strategic asset allocation, the correlation between human capital and various asset classes is also critical.

To optimise the asset allocation of financial wealth, one should attempt to invest in assets whose returns have a low or negative correlation to the return on human capital (i.e., wage growth). A high correlation will lead to a painful scenario when both human and financial capital falls and should, therefore, be avoided. *The appropriate asset allocation of financial wealth is highly specific to the individual.* This is the opposite to many of the approaches currently used that determine a *suitable* asset allocation based simply upon age or a simple measure of risk tolerance.

It is somewhat difficult for many people to change the riskiness of their human capital, which is heavily influenced by their industry of employment, but it is easy to change the asset allocation of their financial wealth. Gerhard (2009) found that, unfortunately, there is a strong bias for people to invest their financial capital in the same industry that they are employed in (an *own-industry* bias) as shown in Figure 5.

Unfortunately, there is a strong bias for people to invest their financial capital in the same industry that they are employed in.

FIGURE 5: *OWN-INDUSTRY* BIAS IN INVESTMENT ALLOCATION

		INVESTMENT ALLOCATION			
EMPLOYMENT INDUSTRY		FINANCIAL SERVICES	IT	HEALTH	TECHNOLOGY	AVIATION
	FINANCIAL SERVICES	15%	5%	9%	8%	8%
	IT	10%	21%	9%	13%	12%
	HEALTH	1%	2%	3%	2%	2%
	TECHNOLOGY	11%	11%	8%	17%	10%
	AVIATION	<1%	<1%	<1%	<1%	7%

Source: Gerhard (2009)

The table above is based upon a study of German investors, and should be read by comparing the results across the rows. It shows that employees in the IT industry invest around twice as much in IT securities than others in different industries. Pilots in the aviation industry invest around seven times more wealth than others in their own industry. Gerhard also found that financially sophisticated investors are less affected by this basis, suggesting that they do take their human capital risk into consideration when making investment decisions.

This own-industry allocation bias, in which human and financial capital are highly correlated, will be particularly strong for those people with significant wealth in DB pension plans whose future benefits are strongly linked to the credit risk of the employer, which in turn is influenced by the industry and economy they are in. To mitigate this risk, financial capital should be generally allocated away from assets linked to one's employer and industry, and toward areas with lower correlations to human capital. This will result in an overall more efficient risk return allocation of total capital. The higher the degree of correlation between human and financial capital, the lower the allocation should be to risky asset classes. Some examples illustrating this correlation include:

- Executives in the financial services sector will likely have a high correlation between their human capital, equity-market returns, and economic growth.[4]

- Doctors will likely have a zero correlation between their human capital and most asset class returns and economic growth.

- Bankruptcy lawyers may have a negative correlation between their human capital, equity market returns, and economic growth.

3.6   Financial Planning Process
The financial planning process within which the above framework sits is broadly summarised in Figure 6. This is somewhat generic in nature, and may be adapted to particular advice channels.

The financial planning process is somewhat generic in nature, and may be adapted to particular advice channels.

FIGURE 6: FINANCIAL PLANNING PROCESS SUMMARY	
1. PERSONAL FACT FIND	Objective: age, family status, current wealth and income, pension Subjective: goals, income needs, risk preferences, flexibility, control
2. INITIAL ANALYSIS	Projection of human and financial capital, wage income, consumption, savings, insurance protection needs
3. IDENTIFICATION OF POTENTIAL STRATEGIES	Identify broad capital / income shortfalls relative to goals, working needs. Identify return requirements and shortlist of potential strategies
4. IDENTIFY POTENTIAL PRODUCT AND SOURCE TERMS	Strategic asset allocation, wealth accumulation / decumulation products, guarantee needs including life insurance
5. COMPARE AND CONTRAST STRATEGIES AND PRODUCTS	Quantitative: distribution of wealth & income to assess risks and returns Qualitative: pros / cons, flexibility, control, risks, align with preferences
6. RECOMMEND / DECIDE ON STRATEGY AND PRODUCT(S)	Recommend / decide / execute optimal strategy. Determine future review thresholds / milestones
7. ONGOING MONITORING AND REVIEW	Regular reviews and modifications in light of unfolding market scenario and personal circumstances

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4   We have seen an example of this in 2008–2009; the global financial crisis has led to not only significant negative returns on financial capital with equity exposure, but also lower income through lower discretionary bonuses, redundancies, and wage renegotiations in some sectors of the financial services industry.

The process starts out with fact finding. This involves collecting all relevant financial information and goals, such as:

- age
- family status
- health status
- personal life expectancy
- expected/desired retirement age
- current wealth and its sources
- current income, its sources, and expected future wage growth
- accrued pension entitlements and their forms (DB or DC)
- expected future consumption, savings, and any large lumpy expenses such as travel, cars, etc.
- long-term financial goals and preferences
- retirement income goals: minimum floor, preference for different levels of discretionary income (distinguish between real and nominal income)
- retirement wealth goals: minimum floor, preference for different levels of discretionary wealth
- bequest preferences: minimum floor, preference for different levels of discretionary or guaranteed amounts
- retirement housing requirements
- order of priority of each goal
- degree control, liquidity, and flexibility desired

When this raw information has been gathered, it is possible to conduct a high-level deterministic projection analysis in order to determine the broad life-cycle profile of capital (human and financial), income, and expense requirements. It is best to conduct this analysis in real (as opposed to nominal) terms because doing so highlights whether retirement goals are achievable or not and opens the discussion on the pros and cons of the alternative ways in which any savings gap can be met (e.g., continued employment, lower retirement income, reduced bequests, or more risk).

At that point it is possible to identify a range of alternative investment and risk-protection (wealth/income/life insurance) strategies that might meet retirement goals. Each strategy is defined and characterised by the following decisions:

- **risk-management decision**: an explicit recognition of how each risk will be managed (fully hedged, partly hedged, or left unhedged)

- **product-class-allocation decision**: how wealth is allocated to each product class, such as traditional annuities, variable annuities, income drawdown, life insurance, reverse mortgages, etc.

- **investment-strategy decision**: how wealth is to be allocated to various asset classes within each product class, thereby determining the extent to which any risk premiums will help meet retirement goals

- **product-strategy decision**: the specific products (protection, annuity, and investment) that can be used to execute the strategy

Research on individual products would be necessary to determine a short list of the best products in each appropriate class (e.g., life insurance, traditional annuities, or variable annuities) for fulfilling each component of the strategy. Product features, costs, and terms would be sourced for this short list and fed into the comparative analysis for the detailed analysis step.

The analysis step consists of examining how well each strategy meets retirement goals and maximises overall utility. This requires both an absolute and a relative comparison between all strategies, both qualitatively and quantitatively. The qualitative assessment compares overall strategy and product features such as income, liquid wealth, flexibility (to keep options open), degree of

When this raw information has been gathered, it is possible to conduct a high-level deterministic projection analysis.

control, residual risks, etc. The quantitative analysis compares the range of financial outcomes for each strategy in order to determine how well each meets retirement income, wealth, and bequest goals—and, importantly, the residual risks associated with each of these.

In many cases, the results and discussion of the analysis will lead to further refinements.

When the detailed analysis is complete, the advisor and customer can discuss the choices available. In many cases, the results and discussion of the analysis will lead to further refinements in customers' risk preferences and goals as they become better educated and more informed about their choices. Thus, the process may require a number of iterations before reaching a final solution. It is then a relatively simple process to execute the strategy. The final stage of the process involves establishing an ongoing monitoring/review schedule according to a certain elapsed time (e.g., once every three years) or pre-specified events dependent upon actual market experience or personal events.

4 ASSESSMENT OF RETIREMENT PLANNING NEEDS AND PRODUCT OUTCOMES

4.1 Assessing Alternative Strategies and Product Value Propositions

The objective of financial planning is to determine the most appropriate or optimal wealth-management strategy that meets a customer's retirement goals. When faced with multiple strategies, it is important for a planner to assess how well each potential strategy meets overall retirement goals and preferences through the assessment of benefit outcomes, costs, and residual risks.

To achieve this, it is necessary to provide supplementary stochastic analysis applied on a consistent basis across all wealth-management strategies and products. Although most product manufacturers provide marketing material that illustrates how the features of a particular product work, there is no consistency beyond the current minimum regulatory illustration requirements, which are generally inadequate. For example, recent developments have made product and investment strategy decisions more difficult to assess; it is very difficult to compare a decumulation variable annuity (e.g., a GMIB or GMWB) against a traditional annuity (level, escalating, inflation-indexed), an income drawdown product, and other investment approaches such as life-cycle funds or long-term deferred annuities. In the accumulation space, it is difficult to compare an accumulation variable annuity such as a single or regular premium GMAB, GMIB, or GMWB against a traditional investment strategy, constant-proportion portfolio insurance (CPPI), or other structured product.

The only way to properly assess the relative benefit outcomes, costs, and risks of various strategies is to conduct stochastic analysis. This involves projecting the benefit outcomes for each strategy or product across a range of scenarios. Each scenario has a series of randomly generated asset-class returns and interest rates. Other relevant variables such as inflation can also be modelled. Various types of models can be used to generate these scenarios, and they can be calibrated in many ways. For the purposes of financial planning, the most appropriate scenarios are likely to be real-world scenarios that incorporate risk premiums and expected levels of realised volatility and correlations.

The next step is to calculate benefit outcomes for products under each strategy at each duration. This information set can then be summarised using statistical measures to summarise the key results for wealth, income, and returns. Examples include:

- mean or median outcomes representing the profile of the most likely outcomes

- downside risk measures such as VaR75 and VaR90, which capture the probability at the 25% and 10% levels of achieving a bad outcome[5]

- upside risk measures such as VaR25 and VaR10, which capture the probability at the 75% and 90% levels of achieving a good outcome

This analysis can also be undertaken under various assumptions about mortality in order to quantify the mortality or longevity risk, such as:

- mortality risk: the risk of dying early, say in five years' time
- longevity risk: the risk of living for a very long time, say until age 95
- expectation and probabilistic outcomes based upon an objective mortality basis
- expectation and probabilistic outcomes based upon the subjective personal expectation of death
- expectation and probabilistic outcomes based upon death at life expectancy based, in turn, upon either an objective or subjective mortality basis

When faced with multiple strategies, it is important for a planner to assess how well each potential strategy meets overall retirement goals.

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5   Value at Risk: the xth percentile outcome.

Stochastic analysis can be useful for understanding mortality risk, which plays a central role in the likely attractiveness of insurance products that provide the benefit of mortality (and lapse) pooling versus investment products that generally provide no pooling benefits.

It is important to understand that the assessment of the *value* of a strategy or product has two separate components.

It is important to understand that the assessment of the *value* of a strategy or product has two separate components. The first relates to an objective calculation of the distribution of benefit outcomes under each strategy or product. This is independent of the end consumer and is thus the same for everyone of the same age status, health status, or other defining category. The second value component relates to the subjective amount of satisfaction or utility, in economic parlance, which is derived from each potential outcome. The degree of satisfaction derived from each strategy is different for everyone: two people with exactly the same wealth and personal profiles, facing the identical choices, may choose different strategies or products, depending purely on their different utility preferences. This section discusses the first element; the second element is discussed in the next section.

4.2   Illustrative Examples

In this section we provide some sample illustrations of the stochastic analysis described above and how it can be used within the financial planning process. For this analysis we have priced the products from first principles on a consistent basis. The assumptions underlying this pricing basis are outlined in Appendix A. The assumptions are based on a simplified world of flat interest rate and equity volatility term structures in order to provide a comparable basis across all products by eliminating duration-based effects. As a consequence, the pricing results are indicative only and will differ from real-world market prices, which vary continuously as capital markets change.

We modelled unit-linked guarantee products on a risk-neutral stochastic basis using MG-Hedge®[6] to determine appropriate guarantee costs. We then added margins on top of these to arrive at an indicative price for the model point specified. We assessed the product benefits under a real-world stochastic scenario basis, on the assumption of volatilities consistent with those used in the pricing basis, and allowing for a 2% equity risk premium.

Although we focus on an at-retirement or post-retirement situation, the approach is equally applicable for earlier stages of life during which human capital would also be modelled on a stochastic basis consistent with other risk factors.

Consider a 65-year-old male who has just retired with 100,000. Various strategies are available for converting the man's financial wealth into income. The following product strategies are considered in this analysis:

A. **Unit-linked/income drawdown**. This involves investing in unit-linked investments and making systematic withdrawals of an amount equal to 5.5% of the initial premium. We use 5.5% based on a life expectancy of 18 years beyond the date of retirement.

B. **GMWB for life**. This is equivalent to strategy A, with a minimum guaranteed income provided through the purchase of a withdrawal guarantee option. This guarantee does not require annuitisation of the underlying assets, which will revert to the estate on the death of the policyholder. The guaranteed income level is set at 5.5% of the initial premium and increases to lock in positive market performance every three years.

C. **Indexed annuity**. This involves purchasing an annuity indexed at 3% per annum, at a price sufficient to fund a lifetime withdrawal amount starting at 5.7% of the initial premium.

D. **Fixed annuity**. This involves purchasing a fixed annuity at a price sufficient to fund a lifetime withdrawal amount equivalent to 7.7% of the initial premium.

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6   Milliman's proprietary stochastic valuation and risk-management system.

E. Unit-linked/income drawdown + longevity annuity (ID + LA). This is a hybrid strategy that involves purchasing a longevity (deferred) annuity that starts in 20 years at age 85 and invests the remainder in an income drawdown product. The amount invested is such that the income level generated under each product is equal at 5.2%. This results in an allocation of 5%[7] to the longevity annuity and 95% to income drawdown.

Compared with the accumulation products, the comparison of these strategies is necessarily more complicated. That is because there is more than one variable of interest. Both income and residual wealth are important to consider, depending on the strength of the individual's bequest motive.

Please note that we have chosen these products for illustrative purposes only. Other products that produce retirement income, such as social security and property/reverse mortgages, could be readily incorporated into the above framework.

The most obvious form of comparison is between the starting income levels for these strategies. The fixed annuity generates the highest initial income level of 7.7%. This is significantly higher than the 5.5% generated from the income drawdown product based on life expectancy, as the income drawdown product, in contrast to the annuity, is unable to take advantage of the mortality credit. To obtain some general protection from inflation,[8] the indexed annuity is required; however, the additional cost of this is reflected in the lower initial starting income level. The combination of these products in Strategy E results in a lower starting income level, again at 5.2%, although the income relativities between the two products could be altered by investing a higher or lower amount into the longevity annuity. The GMWB provides a comparable starting-income-level benefit for an additional cost, as it is uniquely able to take advantage of both the mortality and lapse credits.

The following graphs and tables summarize our quantitative analysis of the distribution of outcomes of the key variables for the 10th, 50th, and 90th percentile results for key durations. The analysis shows what the policyholder would receive upon survival to each age or duration.

> Compared with the accumulation products, the comparison of these strategies is necessarily more complicated.

FIGURE 7: DISTRIBUTION OF PROJECTED INCOME LEVELS BY PERCENTILE: INCOME DRAWDOWN


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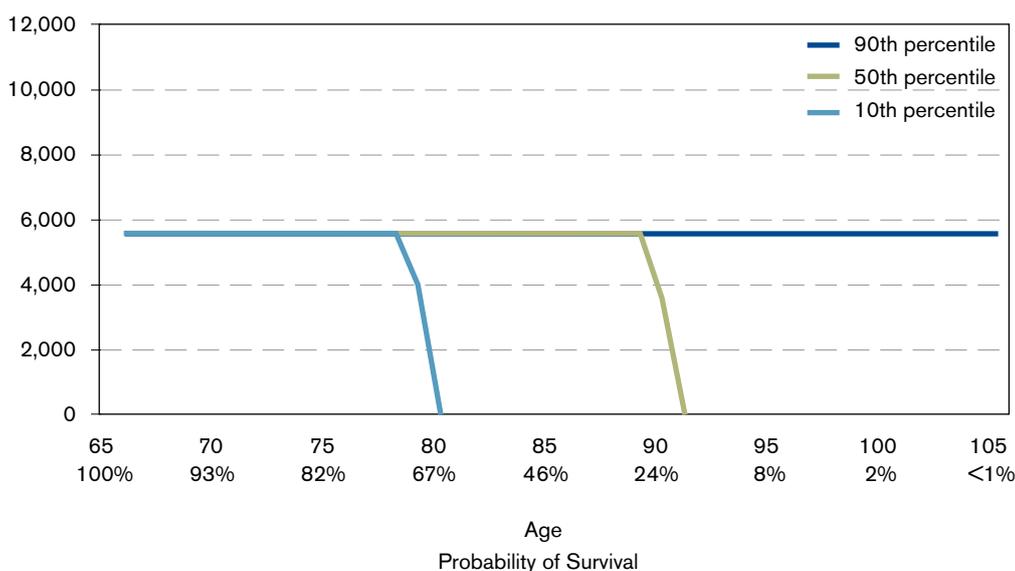
7   Higher allocations could clearly be used, but these would increase the risk of the account value's running out.
8   Full inflation protection requires the purchase of an inflation-indexed annuity, the price of which is highly dependent upon the level of inflation-indexed bonds and swaps at any given time.

FIGURE 8: DISTRIBUTION OF PROJECTED INCOME LEVELS BY PERCENTILE: GMWB

Age
Probability of Survival
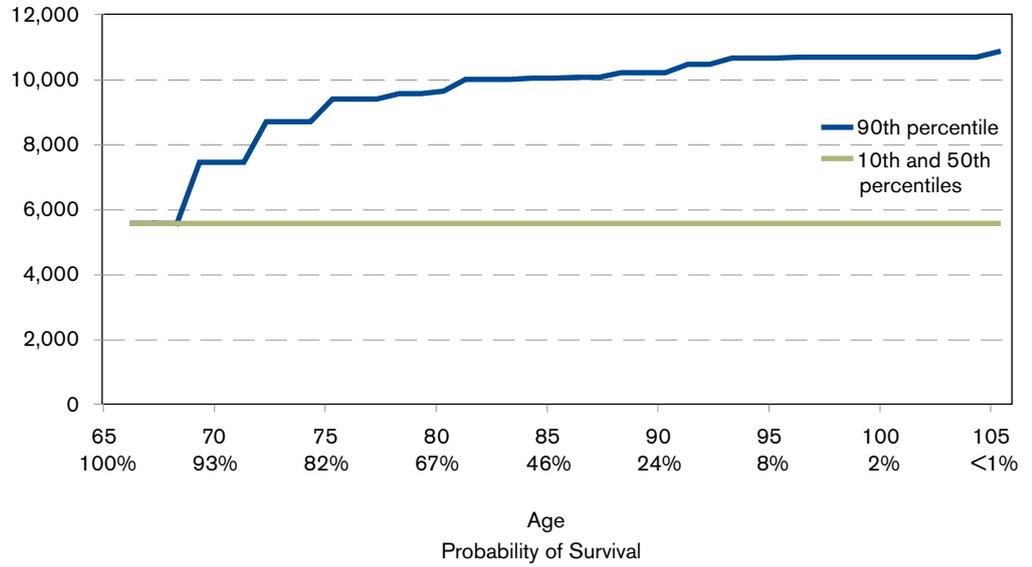
**FIGURE 9: DISTRIBUTION OF PROJECTED INCOME LEVELS BY PERCENTILE: INCOME DRAWDOWN + LONGEVITY ANNUITY**

Age
Probability of Survival
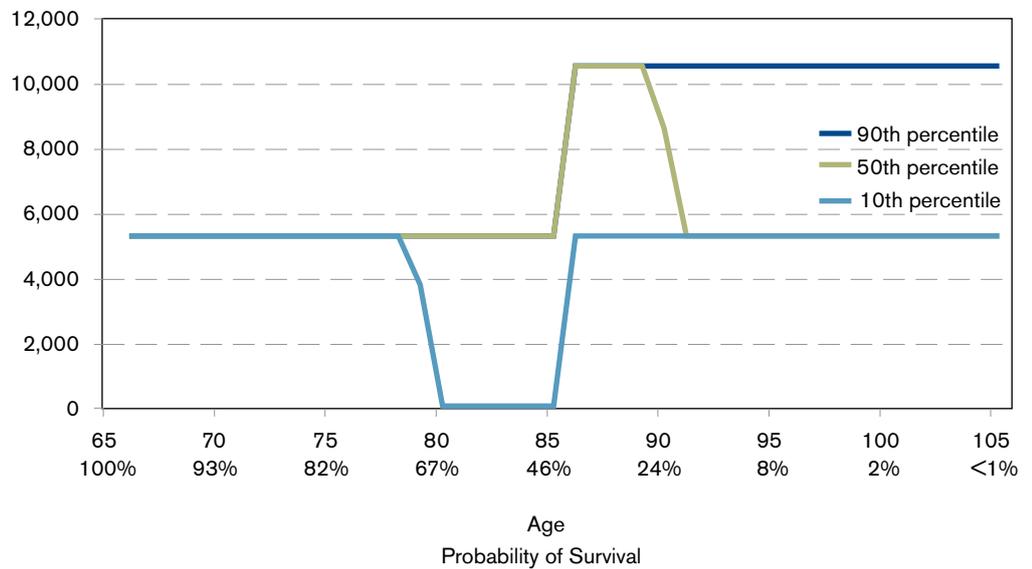
FIGURE 10: DISTRIBUTION OF PROJECTED INCOME LEVELS BY PERCENTILE: ANNUITIES
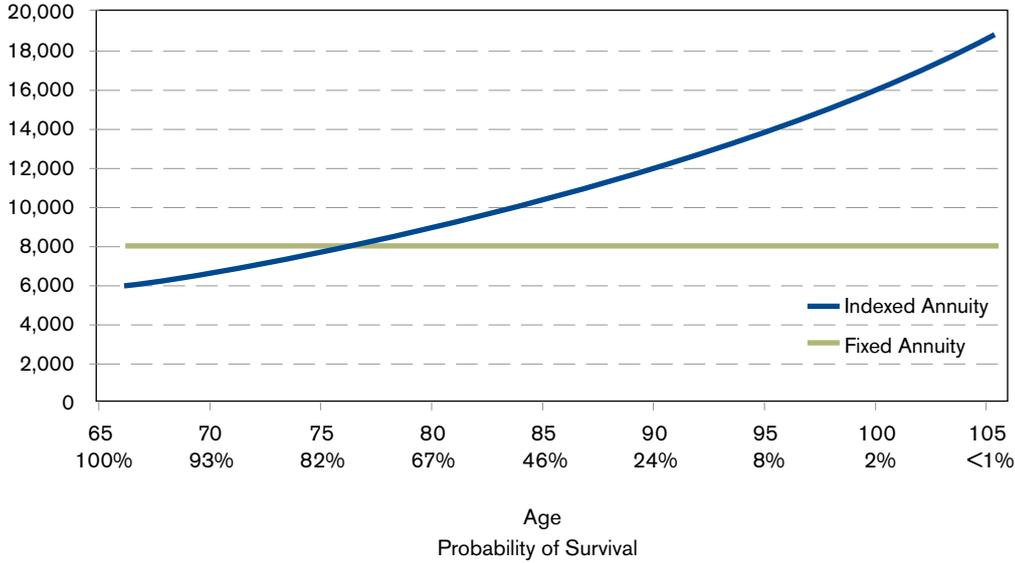
FIGURE 11: DISTRIBUTION OF PROJECTED ACCOUNT VALUES: INCOME DRAWDOWN AND GMWB
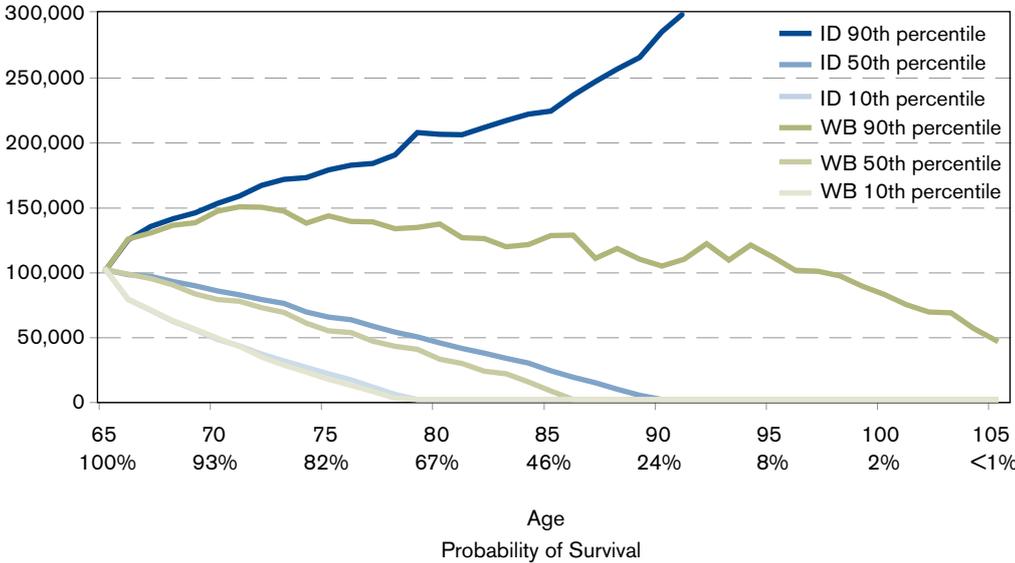
For a complete picture, it is necessary to compare the actual quantitative results.

Figures 7–11 give an insight into the broad profiles and risks for both income and wealth under the various strategies. For a complete picture, however, it is necessary to compare the actual quantitative results as shown in the tables in Figures 12–14 below. The combination of graphs and tables presents the full range of outcomes at each duration.

FIGURE 12: PRODUCT FEATURES AND SURVIVAL PROBABILITIES BY KEY DURATIONS AND STRATEGY					
STRATEGY	A	B	C	D	E
PRODUCT	INCOME DRAWDOWN	GMWB FOR LIFE	INDEXED ANNUITY	FIXED ANNUITY	ID + LONGEVITY ANNUITY
BENEFIT LEVEL	5.5%	5.5%	5.70%	7.70%	5.2%
BENEFIT INCREASE	NONE	3 YR RATCHET	3%	0%	N/A
CHARGES	1.5% P.A.	2.50%	N/A	N/A	1.50%
PROBABILITY SURVIVAL					
AGE 65	100%	100%	100%	100%	100%
AGE 70	93%	93%	93%	93%	93%
AGE 75	82%	82%	82%	82%	82%
AGE 85	46%	46%	46%	46%	46%
AGE 95	8%	8%	8%	8%	8%

This may vary depending upon the type of product assessed, e.g. simple versus joint life.

FIGURE 13: INCOME OUTCOMES BY SCENARIO AND STRATEGY FOR THE KEY DURATIONS

STRATEGY	A	B	C	D	E
PRODUCT	**INCOME DRAWDOWN**	**GMWB FOR LIFE**	**INDEXED ANNUITY**	**FIXED ANNUITY**	**ID + LONGEVITY ANNUITY**
INCOME (IN THE YEAR AFTER YR N)					
1. MEDIAN SCENARIO (50TH PERCENTILE)					
AGE 65 (YR 0)	5,500	5,500	5,700	7,700	5,226
AGE 70 (YR 5)	5,500	5,500	6,608	7,700	5,226
AGE 75 (YR 10)	5,500	5,500	7,660	7,700	5,226
AGE 85 (YR 20)	5,500	5,500	10,295	7,700	10,452
AGE 95 (YR 30)	0	5,500	13,835	7,700	5,226
YR INCOME=0	26	NEVER	NEVER	NEVER	NEVER
2. DOWNSIDE RISK (10TH PERCENTILE)					
AGE 65 (YR 0)	5,500	5,500	5,700	7,700	5,226
AGE 70 (YR 5)	5,500	5,500	6,608	7,700	5,226
AGE 75 (YR 10)	5,500	5,500	7,660	7,700	5,226
AGE 85 (YR 20)	0	5,500	10,295	7,700	5,226
AGE 95 (YR 30)	0	5,500	13,835	7,700	5,226
YR INCOME=0	15	NEVER	NEVER	NEVER	16
3. UPSIDE RISK (90TH PERCENTILE)					
AGE 65 (YR 0)	5,500	5,500	5,700	7,700	5,226
AGE 70 (YR 5)	5,500	7,386	6,608	7,700	5,226
AGE 75 (YR 10)	5,500	9,331	7,660	7,700	5,226
AGE 85 (YR 20)	5,500	10,001	10,295	7,700	10,452
AGE 95 (YR 30)	5,500	10,622	13,835	7,700	10,452
YR INCOME=0	51	NEVER	NEVER	NEVER	NEVER

FIGURE 14: ACCOUNT VALUE OUTCOMES BY SCENARIO AND STRATEGY FOR THE KEY DURATIONS

STRATEGY	A	B	C	D	E
PRODUCT	INCOME DRAWDOWN	GMWB FOR LIFE	INDEXED ANNUITY	FIXED ANNUITY	ID + LONGEVITY ANNUITY
LIQUID ASSETS (ACCOUNT VALUE)					
1. MEDIAN SCENARIO (50TH PERCENTILE)					
AGE 65 (YR 0)	100,000	100,000	0	0	95,023
AGE 70 (YR 5)	83,796	76,939	0	0	79,625
AGE 75 (YR 10)	63,662	52,977	0	0	60,494
AGE 85 (YR 20)	22,325	6,601	0	0	21,214
AGE 95 (YR 30)	0	0	0	0	0
YR AV=0	25	21	N/A	N/A	25
2. DOWNSIDE RISK (10TH PERCENTILE)					
AGE 65 (YR 0)	100,000	100,000	0	0	95,023
AGE 70 (YR 5)	46,416	47,162	0	0	44,106
AGE 75 (YR 10)	19,803	15,608	0	0	18,817
AGE 85 (YR 20)	0	0	0	0	0
AGE 95 (YR 30)	0	0	0	0	0
YR AV=0	14	14	N/A	N/A	14
3. UPSIDE RISK (90TH PERCENTILE)					
AGE 65 (YR 0)	100,000	100,000	0	0	95,023
AGE 70 (YR 5)	151,241	145,170	0	0	143,713
AGE 75 (YR 10)	177,022	141,552	0	0	168,211
AGE 85 (YR 20)	222,162	126,483	0	0	211,104
AGE 95 (YR 30)	345,743	109,730	0	0	328,534
YR AV=0	51	46	N/A	N/A	51

Our analysis highlights both the returns and the risks involved in each strategy. The income distribution results show that:

- The income drawdown product (Strategy A) suffers from market and longevity risk as income falls to zero in the 26th year under the median scenario and in the 16th year under the 10th-percentile results.

- The GMWB-for-life product (Strategy B) provides a steady income for life that is protected against poor market performance. However, in the upside scenarios it increases through the operation of the ratchet, providing some protection against inflation.

- The indexed annuity (Strategy C) provides a steady, known income amount that increases in nominal terms, providing some protection against inflation regardless of the path of actual realised inflation. In some cases income will be insufficient to maintain living standards, and in others it will grow in excess of inflation.

- The fixed annuity (Strategy D) provides a steady, known income amount in nominal terms. Note that it takes 11 years for a 3% indexed-annuity income to exceed the income from the fixed annuity.

- The results of the ID + LA product (Strategy E) are that income runs out in the downside scenarios, leaving a gap until the annuity starts, and in over 50% of the upside scenarios it *overpays* for income as income is generated from both the income drawdown product and the longevity annuity. In this sense, the product is inefficient and results in too much income risk.

Our analysis highlights both the returns and the risks involved in each strategy.

The key question becomes
what product is best suited
to providing for the expected
post-retirement income profile.

The key question becomes what product is best suited to providing for the expected post-retirement income profile first outlined in Section 3. In order to judge this, it is necessary to adjust the results of our analysis for the effects of inflation. The table in Figure 15 illustrates the real-income distributional profiles on a real basis under the assumption of a 3% per annum inflation rate.[9]

FIGURE 15: REAL INCOME OUTCOMES BY SCENARIO AND STRATEGY FOR THE KEY DURATIONS

STRATEGY	A	B	C	D	E
PRODUCT	INCOME DRAWDOWN	GMWB FOR LIFE	INDEXED ANNUITY	FIXED ANNUITY	ID + LONGEVITY ANNUITY
REAL INCOME (IN THE YEAR AFTER YR N)					
1. MEDIAN SCENARIO (50TH PERCENTILE)					
AGE 65 (YR 0)	5,500	5,500	5,700	7,700	5,226
AGE 70 (YR 5)	4,744	4,744	5,700	6,642	4,508
AGE 75 (YR 10)	4,093	4,093	5,700	5,730	3,889
AGE 85 (YR 20)	3,045	3,045	5,700	4,263	5,787
AGE 95 (YR 30)	0	2,266	5,700	3,172	2,153
YR INCOME=0	26	NEVER	NEVER	NEVER	NEVER
2. DOWNSIDE RISK (10TH PERCENTILE)					
AGE 65 (YR 0)	5,500	5,500	5,700	7,700	5,226
AGE 70 (YR 5)	4,744	4,744	5,700	6,642	4,508
AGE 75 (YR 10)	4,093	4,093	5,700	5,730	3,889
AGE 85 (YR 20)	0	3,045	5,700	4,263	2,894
AGE 95 (YR 30)	0	2,266	5,700	3,172	2,153
YR INCOME=0	15	NEVER	NEVER	NEVER	16
3. UPSIDE RISK (90TH PERCENTILE)					
AGE 65 (YR 0)	5,500	5,500	5,700	7,700	5,226
AGE 70 (YR 5)	4,744	6,371	5,700	6,642	4,508
AGE 75 (YR 10)	4,093	6,943	5,700	5,730	3,889
AGE 85 (YR 20)	3,045	5,537	5,700	4,263	5,787
AGE 95 (YR 30)	2,266	4,376	5,700	3,172	4,306
YR INCOME=0	51	NEVER	NEVER	NEVER	NEVER

---

9   Ideally, inflation would be modelled on a stochastic basis consistent with each scenario in order to derive scenario-specific real income profiles. For simplicity, we present here the effect of a constant inflation rate.

Figure 15 further highlights some of the effects discussed previously. The indexed annuity maintains real income over time, whereas the fixed annuity results in declining real income under all scenarios. The GMWB-for-life product provides real income levels similar to Strategy E, but the GMWB for life mitigates inflation risk in upside scenarios exceptionally well. The income drawdown product also provides inflation protection in upside scenarios as additional capital is generated to draw down from, but it suffers significantly in the downside scenarios.

Those who wish to bequeath wealth to their estate as a secondary goal after providing for their primary income need to take into account the distribution of liquid assets during their decision-making process. The distribution results of liquid assets (account value) show that:

- The income drawdown product (Strategy A) clearly provides the highest possible residual assets under any option, reflecting the increased risk associated with this strategy.

- The GMWB-for-life product (Strategy B) also provides a respectable profile in terms of residual asset distribution. In most scenarios, there is little material difference between this profile and the income drawdown profile—e.g., under the median scenario, the year account value (AV)=0 is the 21st year, compared with the 25th year for the income drawdown product.

- The indexed annuity (Strategy C) and fixed annuity (Strategy D) provide no residual assets that can be bequeathed. Bequests must therefore come from financial assets outside of those used for retirement income.

- The ID + LA product (Strategy E) also provides residual assets similarly to the income drawdown product, with the difference depending on the allocation of assets between the two products.

Those who wish to bequeath wealth to their estate as a secondary goal after providing for their primary income need to take into account the distribution of liquid assets.

The third way of assessing the relative outcomes is in terms of net return, the results for which are outlined in Figure 16.

FIGURE 16: NET RETURN (IRR) BY SCENARIO AND STRATEGY FOR THE KEY DURATIONS					
STRATEGY	**A**	**B**	**C**	**D**	**E**
PRODUCT	**INCOME DRAWDOWN**	**GMWB FOR LIFE**	**INDEXED ANNUITY**	**FIXED ANNUITY**	**ID + LONGEVITY ANNUITY**
BENEFIT LEVEL	5.5%	5.5%	5.70%	7.70%	5.2%
BENEFIT INCREASE	NONE	3 YR RATCHET	3%	0%	N/A
CHARGES	1.5% P.A.	2.50%	N/A	N/A	1.50%
NET RETURN (IRR % P.A.)					
1. MEDIAN SCENARIO (50TH PERCENTILE)					
AGE 75 (10 YRS)	2.2%	1.0%	-6.4%	-4.5%	1.5%
AGE 85 (20 YRS)	2.4%	1.4%	4.3%	4.5%	2.3%
AGE 95 (30 YRS)	3.6%	3.6%	7.0%	6.6%	4.0%
AGE 105 (40 YRS)	4.6%	4.6%	8.0%	7.2%	4.8%
2. DOWNSIDE RISK (10TH PERCENTILE)					
AGE 75 (10 YRS)	-4.1%	-5.0%	-6.4%	-4.5%	-4.8%
AGE 85 (20 YRS)	0.9%	0.9%	4.3%	4.5%	-3.1%
AGE 95 (30 YRS)	3.6%	3.6%	7.0%	6.6%	1.5%
AGE 105 (40 YRS)	4.6%	4.6%	8.0%	7.2%	3.0%
3. UPSIDE RISK (90TH PERCENTILE)					
AGE 75 (10 YRS)	10.3%	9.7%	-6.4%	-4.5%	9.6%
AGE 85 (20 YRS)	8.1%	8.4%	4.3%	4.5%	7.8%
AGE 95 (30 YRS)	7.8%	8.3%	7.0%	6.6%	8.0%
AGE 105 (40 YRS)	7.6%	8.1%	8.0%	7.2%	8.0%

Although we believe that assessing the relative outcomes in terms of net return is a much less useful way of framing post-retirement choices, we recognise that the vast majority of people will attempt to use the same return and wealth-maximising framework and concepts familiar to them during their wealth-accumulation years.

Figure 16 shows the net annualised return (after fees) for each product by duration.[10] Our comparison of these results shows that:

- Returns for the two annuity products are significantly negative in the first 10 years. This highlights one of the problems people have with these products: that of the regret of dying too early. Ignoring the obvious fact that someone who's not alive is unable to experience the feeling of regret, This risk plays an important role in customer behaviour, as evidenced by the high proportion of annuities purchased (in the UK) with term-certain (guaranteed) periods, together with the underdeveloped nature of the annuity market in Australia.

- Strategies A, B, and E all provide very similar return profiles across all scenarios. This is interesting, as it highlights the fallacy of thinking that the additional 1% cost of the GMWB has a material impact on overall returns. Our analysis indicates that, in terms of net return, the GMWB outperforms the income drawdown product, particularly after 20 years, because of the lifetime income guarantee.

One of the benefits of this type of analysis is that it enables the decision about bequests to be framed directly in terms of its opportunity cost with respect to both income and net return. For example, comparing the GMWB product to an immediate fixed annuity allows an advisor to frame the bequest question as:

> *Do you prefer a fixed income of 7,700 for life with no bequests, or are you prepared to take a reduced immediate income of 5,500 with a chance that it may increase in the future with the profile as shown in Figure 13, as well as have the residual account value profiles as shown in Figure 14, which are available for bequests (or to supplement income if needed)?*

The above analysis objectively illustrates the strengths and weaknesses of each strategy. Given this information, the question then becomes one of utility maximisation, which is inherently client-specific as each person has unique preferences for the outcome distributions of income, bequests (residual assets), and returns.

It is possible to approach this problem by hypothesising various utility curves for income and residual wealth. One could then calculate total utility for each scenario stochastically, averaged across the full distribution of possible outcomes for each strategy. Optimisation could then be done in order to determine which strategy maximises overall utility. Although this option is technically viable, it is perhaps not very realistic when it comes to making financial planning decisions in the messy real world.

One of the benefits of this type of analysis is that it enables the decision about bequests to be framed directly in terms of its opportunity cost with respect to both income and net return.

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10   This is based on the cash flows received up to each duration, as well as any residual account value at that point.

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4.3 Summary

A useful way of presenting the residual risks of each product strategy is in the form of a risk heat map, which is shown in Figure 17.

FIGURE 17: RESIDUAL RISK HEAT MAP					
STRATEGY	**A**	**B**	**C**	**D**	**E**
PRODUCT	**INCOME DRAWDOWN**	**GMWB FOR LIFE**	**INDEXED ANNUITY**	**FIXED ANNUITY**	**ID + LONGEVITY ANNUITY**
BENEFIT LEVEL	5.5%	5.5%	5.7%	7.7%	5.2%
BENEFIT INCREASE	NONE	3 YR RATCHET	3%	0%	N/A
FLEXIBILITY	HIGH	HIGH	LOW	LOW	HIGH
RESIDUAL RISKS (POST-PURCHASE):					
INCOME	HIGH	LOW	LOW	NONE	MODERATE
MARKET	HIGH	LOW	NONE	NONE	MODERATE
INTEREST RATE	MODERATE	LOW	NONE	NONE	LOW
INFLATION	MODERATE	MODERATE	LOW	HIGH	MODERATE
LIQUIDITY	NONE	NONE	HIGH	HIGH	LOW
MORTALITY	NONE	NONE	HIGH	HIGH	LOW
LONGEVITY	HIGH	NONE	NONE	NONE	LOW
HEALTH[11]	LOW	LOW	HIGH	HIGH	MODERATE

As Figure 17 shows, both the income drawdown and annuity products involve an element of high risk. Income drawdown products are particularly exposed to running out of income because of market and longevity risk, and they may also have exposure to interest-rate risk if there is a desire to annuitise at some point in the future. Annuity products suffer from mortality risk (the regret risk of dying too early), liquidity risk (the unexpected need for cash), and health risk (to the extent that this is not insured separately); inflation risk applies specifically to the fixed annuity.

In contrast, Strategy E (ID + LA) mitigates many of these risks. The main risk that Strategy E is exposed to is the risk of a shortfall in income caused by market downturns before the longevity annuity starts. The GMWB-for-life product has mitigated virtually all of these risks, with only a moderate residual risk to inflation.

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11   That is, level of health-related risk to the extent that health insurance is funded out of residual wealth.

4.4   Limitations

It is important to note that the above analysis is a simplified view of reality for the purposes of illustrating the main concepts.

The analysis also does not consider the impact of income taxes, estate taxes, real estate, social security, country-specific pension legislation (e.g., the impact of tax-free lump sums, means testing), etc. These features could and should be incorporated into this analysis in order to develop a holistic financial view and to capture product-specific features, although they would likely not change the nature of the framework that we have outlined above.

5 ASSESSMENT OF VALUE

Faced with a range of possible outcomes for multiple alternative strategies, the advisor or the consumer must determine which one is the most appropriate, the most optimal, and has the most value. To make this determination, it is necessary to assess the amount of satisfaction or utility a person derives from each potential outcome. As each person has a unique set of utility preferences, the most optimal solution will naturally vary from person to person.

Consequently, the assessment of *value* from a particular strategy is an individual thing. Helping individuals apply their utility preferences to a range of alternative possible financial strategies in order to assess which one maximises their utility is a core service of financial advisors.

Helping individuals apply their utility preferences to a range of alternative possible financial strategies in order to assess which one maximises their utility is a core service of financial advisors.

5.1 The Quest for Value Optimisation (Utility Theory)

Both modern portfolio theory and modern financial economic theory are built upon the central assumption that the primary economic agent faced with making investment decisions is one who is fully informed of all market information, and that people act rationally in trying to maximise their utility.

The utility function implicitly used for this investor is linear with respect to wealth. That is, satisfaction continues to increase at the same rate from each unit of increase in wealth, *ad infinitum*. Investment problems are constructed within this framework in such a way that utility can be determined through optimisation of end wealth under the different probability states. As all investors have access to all market information, these probabilities are objectively determined and are the same for everyone.

Much academic literature is based upon this premise. For example Ibbotson et al. (2007) use a power utility function to assign levels of satisfaction to various benefit outcome states, which makes it possible to determine a mathematically optimal strategy through the maximisation of utility.

However, in real life such assumptions and pure utility functions do not hold. People are far from fully informed and consequently have different subjective views on the likelihood of different events. Wealth is not the only variable to be considered in the financial planning process; income and bequests also play an important role. People are highly unlikely to have linear utility functions, as most people have a much more severe aversion to losses than to gains, and therefore their utility or risk preferences will likely be asymmetric. Their utility functions are also likely to flatten out as wealth increases, that is, as the marginal satisfaction derived from each incremental additional unit of wealth is achieved (e.g., the satisfaction of affording a second house is significantly less than that of affording the first house). In the real world, it is highly unlikely that either advisors or their clients will specifically determine which mathematical utility function applies, given limited time and cost resources, as well the complexity of the problem. In practice, the assessment of utility is undertaken more qualitatively, by understanding the broad risk preferences with respect to wealth, income, bequests, and residual risks, along with their order of priority.

5.2 Behavioural Biases

Behavioural finance has very important implications for retirement-planning decisions. In particular, behavioural-finance effects may lead to self-selection against appropriate strategies and products such as fixed and variable annuities. It is critical for both advisors and consumers to understand these issues and their roles in influencing the decision-making process.

Behavioural finance is the study of how people make financial decisions. It brings together the fields of economics, finance, and psychology. Behavioural finance is increasingly being recognised for its insights into why many people fail to act rationally. In Figure 18, we outline the main ideas in the field of behavioural finance and assess the effect each one is likely to have on the life-cycle financial planning process.

It could be argued that one of the primary ways in which advisors can add value is to help their clients be aware of, and where appropriate counter, the effect of their personal behavioural influences that would otherwise lead them into making sub-optimal decisions.

The table in Figure 18 summarises the main types of behavioural biases encountered in a financial planning context, and identifies possible means by which they can be mitigated.

FIGURE 18: SOURCES OF BEHAVIOUR BIASES, THEIR CONSEQUENCES AND POTENTIAL MITIGANTS			
BIAS	**DESCRIPTION**	**CONSEQUENCE/EXAMPLE**	**MITIGANT**
MENTAL ACCOUNTING	Occurs when risky outcomes are not evaluated in terms of their potential outcomes on total wealth or income, but as outcomes more narrowly defined within one's own mental accounts. This leads to separation of wealth into different pools of money that are perfectly interchangeable, such as savings for education versus retirement. In the context of an at-retirement decision about whether to purchase an annuity versus other income-generating solutions, the annuity is typically considered in a narrow frame in which a person views the purchase decision as a gamble on longevity that is unrelated to other assets. Read, Loewenstein, and Rabin (1999) argue that people are more likely to frame narrowly when cognitive limitations on analytical processing power come into play. This is very likely to be the case for decisions involving fixed- or variable-annuity products. In this case, one might frame the decision as "do I expect to live long enough to recoup my initial investment?" Framing the decision in this way leads to the view that the purchase of a lifetime annuity involves the relatively high risk of dying "too early." Thus, rather than regarding annuities as insurance against longevity risk, people tend to form the opinion that annuities may pose an increased risk in retirement.	Individuals are likely to evaluate financial decisions in compartmentalised or narrow frames, which typically leads to sub-optimal decisions. Hu and Scott (2007) find that mental accounting helps explain the popularity of term-certain annuities (which are guaranteed for the first n years) in the UK and the US: the "bond" component mitigates the risk of early death. By way of comparison, a lifetime GMWB product would look significantly different under this framework because the risk of dying "too early" is naturally mitigated via access to the current account value.	Incorporating all assets into life-cycle financial planning decisions. Considering the annuity in a consumption framework rather than a wealth frame is the appropriate way to frame post-retirement investment/product alternatives. The analytical framework outlined in Section 5 of this paper is designed to significantly reduce the cognitive burden on the advisor and client by providing an objective, quantitative assessment of future benefit outcomes under each strategy. This enables the adoption of a broad, more robust mental-accounting frame under which a more complete holistic view of future outcomes for wealth and income can be considered. The effect of different assessments of personal life expectancy can be directly and objectively examined.

BIAS	DESCRIPTION	CONSEQUENCE/EXAMPLE	MITIGANT
CUMULATIVE PROSPECT THEORY (CPT)	CPT postulates that one determines the relative value of a financial decision through an assessment of the range of potential gains and losses relative to a reference point, such as current financial wealth. This assessment then assigns subjective decision weights to each relative gain or loss, which may differ from their true, objectively expected probabilities, in order to determine the *value* of the strategy or product. The choice of what decision weights or function to apply to the range of relative outcomes typically exhibits rank dependence: low-probability outcomes are overweighted and high-probability outcomes may be underweighted relative to their objective probability.	This approach can be useful, but the reference point needs to be chosen with care. Choosing which gain or loss outcomes to show from a distribution of results becomes important. It is necessary to synthesise the full range of possible outcomes into the most relevant outcomes at important durations. The choice of the number of percentiles to show, as well as their probability levels, will determine how the outcomes will be used in the decision-making process. This will determine the way people interpret the analysis in forming their opinions about what constitutes *value*.	It is essential to define the reference point appropriately. For at-retirement decisions, the reference point should not be current financial wealth, but rather the minimum risk strategy set with respect to the combination of retirement goals relating to income, wealth, and bequests. This makes it possible to define the marginal benefits, opportunity costs, and risks in a holistic manner.
AVAILABILITY HEURISTIC	The decision weights that individuals place on possible outcomes can be heavily influenced by the use of simple heuristics. Events or facts that are more easily imagined (i.e., more available to the mind) carry greater prominence and hence are assigned greater likelihood than other, less available events or facts. A prominent recent example is the poor investment performance of 2008, which will remain in people's memories for quite a while and likely lead to an overweighting of decision weights placed on extremely large negative outcomes.	In the case of annuities, the availability heuristic may play a role by overemphasising the possibility of dying shortly after the annuity is purchased because individuals can imagine their imminent demise in many ways (illness, accident, etc.). The likelihood of greatly outliving one's life expectancy may not have as much prominence, except in those cases where family members or friends have survived to advanced ages.	Financial planning advice is necessary to help people determine what relative risk weights to put on potential outcomes.
CONJUNCTION FALLACY	Related to the availability heuristic, the conjunction fallacy refers to the situation in which individuals mistakenly believe that a combination of events is more likely than either event alone. The conjunction fallacy, combined with the availability heuristic, can lead to placing a greater emphasis on the potential loss because of early death than on the potential gains from outliving one's life expectancy.	For example, probability assessment can lead to an overstatement of the likelihood of early death if the individual imagines death from car accidents, airplane crashes, heart disease, cancer, etc., as separate events. In contrast, the prospect of living a very long time is more difficult to disassemble into several compound events that would be separately overweighted.	Again, financial planning advice is necessary to help people determine the true probabilities associated with various future outcomes.
HYPERBOLIC DISCOUNTING	Inability to equate the value of today's dollars with the value of future dollars. Typically this means either using a low or zero discount rate by simply comparing nominal dollars at different time periods, or using a very high (hyperbolic) discount rate.	From a savings perspective, a dollar put aside today is seen as growing quickly in the short run but slowly thereafter, so benefits more than a short period away have very little value. This makes many lifetime annuity income streams seem unattractive.	Financial advice to help people properly compare outcomes across various time periods. The use of inflation-adjusted or present-value outcomes may help.

BIAS	DESCRIPTION	CONSEQUENCE/EXAMPLE	MITIGANT
AMBIGUITY AVERSION	Individuals are more averse to *uncertain* gambles (with unknown probabilities) than to *risky* gambles (with known probabilities). E.g., many individuals prefer to bet on the colour of a single ball drawn from an urn with 50 black and 50 red balls rather than an urn with 100 balls of an unknown composition of black and red balls.	Retirees who are uncertain about their survival probabilities will be more averse to annuities than those who are more certain about survival probabilities. In a comparison of immediate and deferred annuities, the degree of uncertainty may be more relevant for deferred annuities because outcomes for deferred annuities depend more on events further in the future. This helps explain why annuities are unpopular in markets such as the US and Australia, where there is no obligation to annuitise. In a market such as the UK, where there is a pseudo obligation to annuitise, it helps explain why the vast majority of annuity sales are in fixed annuities rather than inflation-linked or escalating annuities that help maintain real purchasing power over time.	Communicating survival probabilities and the need for longevity protection is an important part of the financial planning process.
MYOPIA	Lack of foresight, interest, or engagement in making long-term financial planning decisions.	Lack of appreciation for changing risks over time, and for why maintaining the status quo is not an ideal solution.	Soft-compulsion at-retirement models, simple advice.
LACK OF SAVINGS DISCIPLINE/ CONSUMPTION FOCUSED	Postponing the start of saving for retirement has no immediate penalty, but saving comes at the direct cost of postponing consumption.	Lack of retirement savings, leading to reduced retirement consumption.	Soft-compulsion pension-accumulation models.
INERTIA	People have a strong preference to maintain current positions and to choose default options. This is partly due to procrastination, myopia, and lack of education or understanding about the financial and investment choices they face.	A single solution does not meet the needs throughout each life-cycle phase.	Soft-compulsion models. Frame financial planning strategies with knowledge that there will be a bias toward the *default* position.
PRIDE AND PREJUDICE	Pride can have an enormous influence on one's assessment of the relative value of investment or product decisions.	For example, those faced with *paper* losses in an asset will likely be more reluctant to sell their assets because this *crystallises* a loss, and that causes a loss of pride.	General education. Financial advice to help frame relative investment choices.

6 DRIVERS FOR CHANGE

A number of recent developments are making life-cycle financial decisions more complex and, as a result, require a change to the traditional approach to lifetime financial management. These developments include:

- a shift toward individual responsibility for retirement provision
- the consideration of human capital in wealth management
- a high incidence of individuals with insufficient retirement savings
- product innovation
- the increased availability of housing wealth as a source of retirement capital
- the increasing need for long-term care
- an increasing appreciation of retirement-related risks
- the trend toward fee-for-advice services
- the increased use of stochastic modelling and technology solutions

6.1 Individual Responsibility for Retirement Provision

In recent years, most developed markets have seen a shift toward placing the responsibility and associated risks for retirement provision onto the individual, rather than the employer or the government. As a result, DB pensions are struggling to stay open not just to new members, but also to future accruals for active members and employees. This is particularly the case in the UK and the US, with Australia having made the transition toward defined contribution schemes in the early 1990s.

The majority of people are not equipped with the financial and wealth-management knowledge that is essential to manage capital for meeting long-term consumption needs. Financial advice in some form is essential, whether it be full-service advice to high-net-worth individuals in the form of a personal CFO, as discussed by Mulcare (2008); standard financial advice provided by financial advisors to the mass affluent; or limited pre-packaged advice provided to the mass market by product manufacturers and pension funds.

As a result of this transition, advisors and product manufacturers will need to educate consumers about life-cycle wealth management and its associated risks, and present product propositions within this framework so that they can clearly demonstrate how they meet consumer needs and manage risks.

6.2 Consideration of Human Capital

As we discussed in Section 3 above, human capital plays an important role in wealth management. Most people have an intrinsic understanding of their own human capital, although they may not directly consider it within the context of a long-term wealth-management strategy or financial plan. There are important reasons why planners should explicitly account for human capital in the wealth-management process:

- Human capital is the dominant asset for young families, and it directly drives the demand for life insurance, typically for the primary earner.

- Its yield determines future income, which in turn determines savings, financial capital, and future consumption.

- It is correlated to key risk factors such as personal health, personal mortality, asset class returns (via economic growth and employment risk), and savings (e.g., via wage growth, interest rates, and inflation), all of which determine the level of financial capital. These correlations should form part of the risk assessment when one determines the appropriate investment strategy.

6.3 Insufficient Retirement Savings

Unfortunately, most individuals underestimate the amount of financial capital needed to fund their expected retirement consumption needs as well as to meet risk and bequest preferences. This is particularly the case in Australia, the UK, the US, and much of Europe, resulting in a widespread pension crisis that is drawing increasing attention from governments, the media, and financial institutions. Now, more than ever, consumers need to optimise their wealth-management strategy in order to make the most efficient use of limited resources for meeting their needs.

For many of those who have either had an insufficient savings rate or suffered losses as a result of the financial markets, by the time they draw near to retirement they have few options for bridging the wealth gap. One option is to continue investing in risky, illiquid assets. Given that the life expectancy for a 65-year-old male is in the vicinity of 20 years, there is still an opportunity to maintain exposure to risky, illiquid investments in order to earn any additional risk and liquidity premiums that may be available. This can be achieved through direct exposure (with or without guarantees) either on future financial capital or on future income.

In Australia, a number of industry participants have promoted potential measures to address retirement savings shortfalls. These include soft-compulsion models advocating increased superannuation contribution rates from the current level of 9%, greater equity exposure for those on low incomes via tax rebates, and allowances for broken working patterns such as those experienced by many women.

6.4 Product Innovation

One of the most important recent wealth-management developments in most developed markets is the introduction of innovative guarantee products. Insurance companies are developing and successfully selling optional guarantees sold as rider policies on top of a base unit-linked product. This type of product chassis makes it possible to tailor products to meet different customer needs at each stage of the wealth life cycle. The main types of guarantees are:

- **Guaranteed Minimum Accumulation Benefit (GMAB)**: provides a guaranteed minimum amount at a future date contingent upon survival

- **Guaranteed Minimum Death Benefit (GMDB)**: provides a guaranteed minimum amount upon death

- **Guaranteed Minimum Income Benefit (GMIB)**: provides a guaranteed minimum income benefit upon annuitisation at a certain date in the future

- **Guaranteed Minimum Withdrawal Benefit (GMWB)**: provides a regular minimum withdrawal amount, either for a fixed period or for life

Customers can purchase these guarantees on either a single- or regular-premium basis to meet the needs of each life-cycle phase. Guarantee products enable customers to manage their wealth, income, and bequest requirements in a way that directly mitigates downside risks in line with most people's risk preferences. Because they are insurance products, customers also benefit from the pooling of lapse and mortality risks, making it possible to offer benefits more attractive than those of pure investment products. The unique and valuable product proposition of guarantee products is the key reason for their success in the well-established US and Japanese markets; other developed markets, such as Australia, the UK, and much of Europe, have also introduced them over the last few years.

Products such as the GMIB and GMWB are blurring the boundary between pre- and post-retirement investment, as they can be designed to accumulate wealth and flexibly transition into retirement by providing guaranteed income without the need for making a single irreversible decision at retirement. Their popularity reflects the underlying nature of the major risks facing those approaching

One of the most important recent wealth-management developments in most developed markets is the introduction of innovative guarantee products.

retirement—risks that are not manifest at a single point in time but, rather, accumulate throughout the retirement-planning life cycle.

6.5   Housing Wealth as a Source of Retirement Wealth

Many of the Baby Boomer generation have invested a significant component of their net wealth in residential property, and a number of them will need to use the capital built up in property to supplement other retirement savings if they are to meet post-retirement needs.

In response to this situation, some financial institutions have over the last decade introduced products designed to transition this source of financial capital into retirement income. Such products, commonly known as either reverse mortgages or equity-release mortgages, provide guaranteed income for life in return for a partial or full share of ownership rights in the underlying property. They transfer some of the longevity, property, and interest-rate risk from the individual to the underwriter.

As reported by both the Australian Securities and Investments Commission (ASIC 2005) and the UK Institute of Actuaries (2005), equity-release products are expected to grow significantly in the future and play an important role in retirement-wealth management for a significant number of people, particularly those in the Baby Boomer generation. Other innovations, equity-release mechanisms, and structures may also evolve as the market matures.

6.6   Need for Long-term Care

Health risk is a major consideration during the later retirement years.

Health risk is a major consideration during the later retirement years. Planning, funding, and mitigating this risk is an important piece of the retirement jigsaw. For any given individual, the incidence and financial severity of health problems are highly uncertain, which is why long-term-care products are purchased for protection against the financial impact of sickness. For those who can afford it, the cost of this protection should be explicitly factored into retirement-income needs.

For those who choose not to mitigate their own health risk, it is important to appreciate that medical inflation is generally significantly higher than broader consumer inflation measures such as the consumer price index (CPI), and that it would be prudent to maintain access to a sufficient pool of liquid assets to meet the needs of any uncertain health event during retirement.

6.7   Increased Appreciation of Retirement-related Risks

Over recent years, the government, media, insurance companies, distributors, employers, and pension funds have made significant efforts toward educating the public about financial matters, particularly the need to save for retirement. To some degree they have been successful in raising people's awareness of the issues involved, although it is probably fair to say that there is still some way to go.

One consequence of the market turbulence during 2008 and 2009, particularly for those nearing retirement, is that it has highlighted some of the risks involved in retirement planning. It is clear to many now that equity and property markets do not always go up, and interest rates can fall to very low levels that erode annuity income for those wishing to annuitise. Advisors are certainly more aware of the risks that their customers are bearing, and the challenge is to find solutions that clearly manage these risks in line with risk preferences within the framework of meeting retirement objectives.

Product manufacturers face an increasing need to demonstrate how their products fit within the retirement framework from the perspectives of risk mitigation, benefit outcome, and cost.

6.8 Movement toward Fee-for-advice Services

In some markets, the distribution business models are under significant pressure to change. There is a move toward fee-for-advice services, where customers pay explicitly and separately for the advice they receive, rather than the product manufacturer's paying commissions to the advisor for selling their product.[12] The commission structure has been widely criticised because of the conflicts of interest such a system creates and the fact that the customer-paid fees ultimately have little to do with the quality of advice. As this trend continues, advisors will move toward business models that are based on providing holistic life-cycle financial planning advice more attuned to the long-term needs of their clients. Client retention will become increasingly important for extracting the full amount of value represented by long-term advisory relationships, and analysis that can support long-term life-cycle/retirement-planning decisions will also become increasingly important.

6.9 Developments in Stochastic Modelling and Technology Solutions

As we noted in Section 2, traditional financial planning has involved the use of relatively simple deterministic projections based upon constant investment returns. There has been some limited use of stochastic modelling based upon the concepts of modern portfolio theory and Markowitz mean-variance optimisation. But these approaches have been used mainly for portfolio selection in a world of normally distributed returns/benefit outcomes with the return variance being the definition of risk. Such analysis, although interesting, has significant limitations in addressing the needs and risks of retirement planning.

Despite this, significant advances have been made over recent years in the area of stochastic modelling. Stochastic modelling techniques are now being applied to the financial planning process in a holistic way, permitting a fair and transparent evaluation of risks and returns across multiple potential strategies. Not only are such analyses important for meeting the minimum regulatory requirements when presenting the key features of products, but they enable distributors and manufacturers to clearly demonstrate how they are treating customers fairly.[13] In addition, they give the distributor an opportunity to add value to the advice process.

For the industry as a whole, it is perhaps important to achieve a consensus on a consistent stochastic modelling basis under which product propositions can be fairly assessed. Such a basis would include assumptions about the nature and parameters for return distributions for various asset classes. Examples include expected risk premiums, volatilities, skewness and kurtosis parameters, asset-class correlations, inflation, and mortality expectations. To the extent that a consensus is achievable, it would provide a consistent basis for product manufacturers to illustrate risks and benefit outcomes that distributors can readily and appropriately use.

Stochastic modelling techniques are now being applied to the financial planning process in a holistic way.

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12   In the UK, the FSA's Retail Distribution Review has revealed the failings of the current system and is promoting change toward fee-for-advice services.
13   In the UK, compliance with the FSA's Treating Customers Fairly regulations is critical.

7 CHALLENGES AND SOLUTIONS

As we discussed in Section 2.4.3, a number of challenges are present in implementing, utilising, and maintaining the holistic financial planning framework outlined in this paper. The relative simplicity and familiarity of the accumulation mindset will naturally create an inertia that is difficult to overcome.

The increasing recognition that the wealth management problem is in fact becoming a risk-management problem will create incentives to adopt an improved approach.

However, the increasing demand of consumers and the increasing recognition that the wealth-management problem is in fact becoming a risk-management problem, combined with other pressures on the industry, will create incentives to adopt an improved approach. Technology systems will have a major role to play in helping advisors and consumers to understand and analyse sophisticated risk products, as well as to meet the challenges identified below.

7.1 Flexible and Changing Nature of DC Systems

It is a well-accepted condition of DC systems that they are inherently flexible and subject to change. The advent of member choice in the Australian market and the transition away from employer-sponsored or corporate schemes has further served to increase this flexibility.

With increased choice and variety in the industry, competitive forces have prompted the creation of a wide variety of products, each with particular value propositions. As we said earlier, the increasing importance of risk-management solutions will lead to more product innovation. Solutions, in terms of both risk analysis and systems, will need to adapt quickly as new products emerge.

There is also a tendency for the regulatory environment within which these products and systems operate to change, whether through tax, compliance, or disclosure, and that will add to the requirement for solutions that are relatively easy to adapt and modify over time.

In Australia, the consolidation of financial planners under dealer group umbrellas may also help to leverage scale and consolidate the effort required to manage this framework within a changing environment.

To the extent that regulations require specific scenarios to form part of the illustration process, supplemental information may also be beneficial. Regulators may also need to consider changing standards to better allow and create incentives for an improved advisory process.

7.2 Tailoring the Advice Framework to Different Distribution Channels

As this paper illustrates, a variety of considerations go into the development of a holistic planning framework. Financial literacy levels among the public are generally considered to be poor and, combined with the presence of behavioural bias, financial advice will be necessary for many to obtain the maximum benefit offered by a risk-based planning framework.

The implementation and communication of a holistic planning framework where the general public does not understand the concept of risk will be easier with the aid of planners, but more difficult where an intermediary is not involved. However, the ability and desire to give access to or educate consumers and members outside of the full-advice model may serve to differentiate industry participants. The increased adoption of Web-based calculators and other illustration tools has already been viewed as a source of differentiation and represents a service offered to customers and members. The logical next step is to incorporate a more accurate and sophisticated framework beyond many of the deterministic approaches currently in use.

The key to achieving this next step will be to disseminate information in appropriate ways through easy-to-understand illustrations and examples. In other markets, providers have developed Web sites dedicated to the needs of retirees and education about risk.[14] Systems will need to become simpler as intermediation diminishes and relies more on illustrations or stress scenarios designed to illustrate particular aspects of the wealth-management problem.

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14   One good example is the Web site of Prudential US, www.retirementredzone.com.

It may also be necessary to find an approach that deals with varying levels of understanding on the part of planners. Systems can dramatically help to encourage advisors to adopt such an approach, and regulation or education programmes may help to further develop and incentivise planners. It may also be possible to incorporate the new approach within a licensing framework that encourages planners to view it as a competitive advantage. That said, it will be important to ensure that the new framework does not increase the cost of financial advice.

7.3   Implementation and Maintenance Costs
The development and management of solutions, particularly with respect to IT systems, can be a significant source of cost. The prevalence of financial planning software, combined with the scale benefits achieved by dealer groups, will alleviate some of the financial strain.

What is ultimately required is a greater integration of the many techniques already common among industry and, in particular, the ability to model product outcomes within a stochastic framework. The integration of actuarial and software solutions will lead to more robust tools and advice.

To the extent that providers focus on simpler, limited advice or educational tools delivered via the Internet, increased sophistication may be achieved by expanding or enhancing existing illustration tools to incorporate risk assessment and modelling.

7.4   Summary
Shifting demographics, a maturing of existing DC systems, and a greater understanding of risk and its implications have exposed the need for advances in the financial planning framework. Greater competition for the retirement dollar and the introduction of innovative product solutions will create incentives and opportunities for those willing to adapt.

We believe that the adoption of a risk-management framework will lead to improved outcomes and, combined with the appropriate tools, will serve to educate the public in a meaningful way.

Shifting demographics, a maturing of existing DC systems, and a greater understanding of risk and its implications have exposed the need for advances in the financial planning framework.

APPENDIX A: PRICING ASSUMPTIONS

The table below outlines the pricing assumptions used to determine the benefit levels for each product. Note that the valuation of the annuity and GMWB products is undertaken on a risk-neutral basis.

VARIABLE	ASSUMPTION	PRODUCTS
MORTALITY	100% AUSTRALIAN LIFE TABLES 2005–2007	ANNUITIES AND GMWB
LAPSES	5% P.A.	
ANNUAL MANAGEMENT CHARGE	1.5% P.A. OF ACCOUNT VALUE	INCOME DRAWDOWN AND GMWB
GMWB CHARGE	1% P.A. OF ACCOUNT VALUE	GMWB
EQUITY/BOND ALLOCATION	70%/30%	INCOME DRAWDOWN AND GMWB
ASSET REBALANCING FREQUENCY	ANNUAL	INCOME DRAWDOWN AND GMWB
DISCOUNT RATE	4.5%	ANNUITIES AND GMWB
EQUITY VOLATILITY	25%	GMWB
BOND FUND DURATION	5 YEARS	GMWB
HULL WHITE VOLATILITY	1%	GMWB
HULL WHITE MEAN REVERSION	4%	GMWB
EQUITY EXCESS RETURN INTEREST-RATE CORRELATION	0	INCOME DRAWDOWN AND GMWB
NUMBER OF STOCHASTIC SCENARIOS FOR PRICING	10,000	GMWB
EQUITY RISK PREMIUM FOR REAL-WORLD SCENARIO PROJECTIONS	2%	INCOME DRAWDOWN AND GMWB
NUMBER OF STOCHASTIC SCENARIOS FOR REAL-WORLD PROJECTIONS	1,000	GMWB

The benefit levels developed for these products are indicative only and should not be relied upon for the launch of a product.

GLOSSARY OF TERMS

DETERMINISTIC	A financial projection methodology based upon a single future path where random variables such as investment returns are assumed to be constant from one period to the next.
KURTOSIS	The degree to which a distribution exhibits a concentration about the mean.
MEAN-VARIANCE OPTIMISATION	A methodology that attempts to solve for an investment allocation that results in the most optimal risk return characteristics. It is usually based upon a single definition of risk being the standard deviation of returns.
RATCHET	A product feature that enables the guarantee benefit level to increase at specific durations if the account value has risen relative to the prior period
SKEWNESS	The degree to which a distribution is non-symmetrical; i.e., skewed to one side.
STOCHASTIC	A financial projection methodology based upon multiple future paths where random variables such as investment returns are assumed to vary randomly from one period and scenario to the next.
UTILITY	A mathematical measure of a person's satisfaction with a particular outcome.
VALUE-AT-RISK (VAR)	A measure of downside risk, related to skewness. It is measured as the xth percentile result from the distribution of outcomes.
VOLATILITY / STANDARD DEVIATION	The degree to which data is distributed around the mean.

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