CMP Upgrade 2020/21

Subject SA4

CMP Upgrade

This CMP Upgrade lists the changes to the Syllabus objectives, Core Reading and the ActEd material since last year that might realistically affect your chance of success in the exam. It is produced so that you can manually amend your 2020 CMP to make it suitable for study for the 2021 exams. It includes replacement pages and additional pages where appropriate.

Alternatively, you can buy a full set of up-to-date Course Notes / CMP at a significantly reduced price if you have previously bought the full-price Course Notes / CMP in this subject. Please see our 2021 *Student Brochure* for more details.

This CMP Upgrade contains:

- all significant changes to the Syllabus objectives and Core Reading.
- additional changes to the ActEd Course Notes and Assignments that will make them suitable for study for the 2021 exams.

1 Changes to the Syllabus objectives

This section contains all the ***non-trivial*** changes to the Syllabus objectives.

There were no non-trivial changes to the Syllabus objectives for the 2021 Subject SA4 exam.

2 Changes to the Core Reading and ActEd material

This section contains all the ***non-trivial*** changes to the Core Reading and ActEd material since last year that might realistically affect your chance of success in the exam.

The following Core Reading was added:

At the time of writing (Spring 2020) the full effect of the Covid-19 pandemic on both the global economy and financial markets will not be known for some time. This version of the Core Reading (*ie* for the 2021 exams) **does not attempt to address these areas.**

Chapter 5

Page 11

The first paragraph of Section 3 now reads:

The Actuaries' Code sets out six core principles (integrity, competence and care, impartiality, compliance, speaking up and communication) which actuaries are expected to observe in their professional lives, and which must be complied with in both the spirit and the letter.

The first paragraph of ActEd text in Section 3 (starting 'An updated version …') has been deleted.

Page 12

The Core Reading about the Actuarial Profession Standards has been updated and now reads:

- **APS P1 – Duties and Responsibilities of Members Undertaking Work in Relation to Pension Schemes**

  The current version of this standard came in to effect on 1 July 2013. It is a mandatory standard and contains ethical material and builds on the Actuaries' Code.

- **APS X1 – Applying Standards to Actuarial Work**

  The current version of this standard came into force on 19 March 2019 and is mandatory.

- **APS X2 – Review of Actuarial Work**

  This standard is mandatory and came into force on 1 July 2015.

- **APS X3 – The Actuary as an Expert in Legal Proceedings**

  The current version of this standard came into force on 20 April 2018.

Page 14

In section 4.4 on APS X3: the first sentence now reads: **'APS X3 came into force with effect from 1 January 2015 and was updated with effect from 20 April 2018.'**

The final provision of the standard has been removed, and the fourth bullet point now reads:

- **Members should ensure that advice is independent and objective (and can reasonably be seen to do so) and they should not act if they cannot ensure this is the case.**

Chapter 13

Page 17

Section 2.13 on longevity bonds and swaps has been significantly rewritten. Replacement pages are attached. A corresponding description of longevity swaps has also been added to the exercise on pages 5 and 6 and to the chapter summary.

Chapter 14

Page 3

The following Core Reading has been added under the final Core Reading given on this page:

Another increasingly relevant consideration for trustees is environmental, social and governance factors (ESG) as well as social impact investing. These are described in more detail in Section 7 below.

A new section on environmental, social and governance (ESG) issues when investing as well as social impact investing has been added. This is Section 7 with the current Section 7 becoming Section 8. Additional pages are attached.

Chapter 15

This chapter has been significantly reordered, with some additions, reflecting changes to Core Reading (that were deleted from Chapter 18). A replacement chapter is attached.

Chapter 18

Section 7 has been removed with the current Section 8 becoming Section 7.

Chapter 26

The words '**from an insurer**' have been added to the end of the title of Section 4.5 '**Deferred or immediate annuities**'.

An additional option for discontinuing a pension scheme, 'transfer to a non-insurance consolidator' has been added and now forms Section 4.6 with the current Section 4.6 becoming Section 4.7. The new section is repeated below:

4.6 Transfer to a non-insurance consolidator

These are commercial organisations not operating as insurance companies.

Under this option, a scheme's liabilities and assets are transferred to the consolidator organisation. There may also be a need for a one-off additional payment from the scheme sponsor in order to increase the level of funding.

The consolidator will set the entry terms such that it targets making a profit over the term of the liabilities taken on.

Once the arrangement is in place, the link between the scheme and the original sponsor and trustees is removed.

As the consolidator is not subject to the reserving and regulatory requirements of an insurance company, the protection of members' benefits may not be as strong as it would be with annuities purchased from an insurer.

Therefore, it is important to consider the relative covenants of the original sponsor and the consolidator. Consideration is needed in relation to what benefits would be available to members in the event of the insolvency of the consolidator organisation.

However, the cost of transferring liabilities to the consolidator may be lower than the cost of purchasing annuities from an insurer.

Glossary

The following definition for '**Environmental, Social and Governance (ESG)**' investment or '**Responsible Investment**' has been added:

A strategy and practice to incorporate environmental, social and governance factors in investment decisions and active ownership. Factors considered under such a strategy might include climate change, employee relations and tax strategy.

See also *Social Impact Investing*.

The following definition for '**Social Impact Investing**' has been added:

An investment principle which focuses on investing in companies and projects that manufacture goods and services designed to have an explicit positive impact on society, while ensuring investors received a fair return on their capital contribution.

See also *Responsible Investment*.

3 Changes to the X Assignments

There have been a large number of changes to the X assignments. Please use the 2021 versions.

4 Other tuition services

In addition to the CMP you might find the following services helpful with your study.

4.1 Study material

We also offer the following study material in Subject SA4:

- ASET (ActEd Solutions with Exam Technique) and Mini-ASET
- Mock Exam and AMP (Additional Mock Pack).

For further details on ActEd's study materials, please refer to the 2021 *Student Brochure*, which is available from the ActEd website at **www.ActEd.co.uk**.

4.2 Tutorials

We offer the following (face-to-face and/or online) tutorials in Subject SA4:

- a set of Regular Tutorials (lasting three full days)
- a Block Tutorial (lasting three full days).

For further details on ActEd's tutorials, please refer to our latest *Tuition Bulletin*, which is available from the ActEd website at **www.ActEd.co.uk**.

4.3 Marking

You can have your attempts at any of our assignments or mock exams marked by ActEd. When marking your scripts, we aim to provide specific advice to improve your chances of success in the exam and to return your scripts as quickly as possible.

For further details on ActEd's marking services, please refer to the 2021 *Student Brochure*, which is available from the ActEd website at **www.ActEd.co.uk**.

4.4 Feedback on the study material

ActEd is always pleased to get feedback from students about any aspect of our study programmes. Please let us know if you have any specific comments (*eg* about certain sections of the notes or particular questions) or general suggestions about how we can improve the study material. We will incorporate as many of your suggestions as we can when we update the course material each year.

If you have any comments on this course please send them by email to **SA4@bpp.com**.

Question

Describe what is meant by:

- a hedge fund
- a private equity fund
- a commodity fund
- structured credit
- a PFI arrangement
- contingent assets
- LDI strategies
- longevity bonds
- longevity swaps
- diversified growth funds.

Solution

There is no precise definition of a ***hedge fund***. Hedging is the practice of attempting to reduce risk, but the aim of many hedge funds is to maximise returns. Thus, hedge funds differ from conventional actively managed funds in a number of areas. These differences mean that hedge funds are often much more risky investments than conventional managed funds.

A hedge fund is often an aggressively managed portfolio of investments that uses advanced investment strategies such as leveraged, long, short and derivative positions in both domestic and international markets. They often borrow considerable sums of money to invest (*ie* they can be highly geared).

For example, a short position arises when a hedge fund manager borrows a share and then sells it in the hope that the price of the share will fall and so the fund will make a profit when it purchases the share to return it to the lender.

A ***private equity fund*** invests in companies that are not listed on a stock exchange. Therefore it is not easy for the fund to buy and sell these investments. Funds often specialise in a particular area of private equity, for instance, venture capital (businesses in the early stages of development).

A ***commodity fund*** invests in commodities such as coffee, timber, gold, coal and copper. These funds offer diversification from conventional actively managed funds.

The term '***structured credit***' describes a whole range of products, which are usually created by investment banks. Structured credit products are generally created for a particular investor or group of investors who have specific risk / return preferences that cannot be satisfied easily with conventional assets.

For example, structured credit might be of interest to a pension fund that wishes to hedge its liabilities by investing in a bond of a particular term and credit rating. Where this bond does not exist in the conventional bond market, it is created, often by using derivatives.

Under a ***Private Finance Initiative (PFI) arrangement***, an investor such as a pension fund invests a capital sum in a public sector project. These arrangements allow councils and other parts of the public sector access to capital sums to fund major capital projects, for example, building new schools or hospitals. The public sector repays this money with interest over the life of the contract, say 25 to 30 years.

Contingent assets allow a scheme to be funded without it having control over the assets until it needs them. This usually involves setting aside assets that will be paid to the scheme if the sponsoring employer becomes insolvent. Alternatively, the assets might transfer across if the funding level falls below a certain level or if other triggers are met.

An ***LDI*** strategy is set with explicit reference to the liabilities. The aim is to broadly hedge inflation and interest rate risks, but this may be difficult due to the long duration of the liabilities compared with the available assets. For example, to control interest rate risks the scheme may enter into an interest rate swap to receive fixed payments in return for floating payments so that however interest rates move a fixed return is achieved.

With a ***longevity bond***, the coupon payments are usually linked to the mortality experience of a particular set of lives (usually relating to the national population) and will reduce over time in line with the mortality experience of that population. The longer this population lives the greater the coupons received. This helps hedge against the risk that members' pensions need to be paid for longer, assuming their experience is similar to the base population. However, this strategy does not remove all longevity risk – there is the risk that the pension scheme members live a long time relative to the population being tracked (unless it is the scheme members' mortality that is being tracked).

Longevity swaps may be written as derivatives or as insurance contracts and are generally offered to trustees of pension schemes by insurance companies. There are two types of longevity swap, a *named lives* swap which usually protects the pension scheme against *their* pensioners living longer than expected over a pre-agreed term and a *population index swap* which usually protects the scheme against non-pensioners, once retired, living longer than expected using a population index reference measure (such as the national index for the membership's location).

Diversified growth funds (DGFs) consists of a diversified portfolio of assets with the primary aim of achieving growth, *ie* capital appreciation, as opposed to paying income or dividends. Portfolios usually consist of investments in companies which reinvest their income.

The assets underlying DGFs include equities, but also assets which may not be available to, or practical for, smaller schemes to invest in, such as commodities, property, emerging markets and derivatives. The majority of diversified growth funds run on a pooled basis, but bespoke funds can be arranged for larger schemes.

UK example

Under a typical swap contract, the scheme will receive fixed payments for the duration of the contract in exchange for floating payments, the floating payments often being linked to London Interbank Offered Rate (LIBOR). The scheme will be able to meet the floating payments by investing the underlying assets on deposit to earn LIBOR or through a benchmarked return.

In other words, however interest rates move (as measured by LIBOR), the scheme is exchanging the floating rate it can achieve in the market at a given point in time with a fixed return. Such a strategy will reduce interest rate risk for the part of the fund invested in this way, although will introduce counterparty risk.

Question

Explain what is meant by counterparty risk?

Solution

Counterparty risk is the risk that one party to a transaction fails to meet their side of the bargain. An example of counterparty risk is settlement risk, which arises when a party pays cash or delivers assets before the counterparty is known to have performed their part of the deal.

2.13 Longevity bonds or swaps

Another major risk affecting defined benefit **pension schemes is longevity risk. This can be mitigated by investing in longevity bonds or swaps.**

At the time of writing (May 2020) the impact of the Covid-19 pandemic on this market is unclear.

Longevity bonds and swaps can be viewed as an intermediate step between funding the scheme on an on-going basis and buying out the liabilities in the form of annuities. Issues to be considered in relation to these investments include how the asset would be valued for scheme funding purposes (as it is unlikely there would be a quoted market for such investments) **and whether the asset could be sold or passed to an insurer in the event of the scheme moving to buy out the liabilities in full.**

Longevity bonds

Longevity bonds work where the coupon payments are linked to the mortality experience of a particular set of lives, such as a specific age group in the national population. Coupon payments will reduce over time in line with the mortality experience of that population.

If longevity is higher than expected, the coupon payments received will be higher, thus hedging the longevity risks of the pension scheme.

The hedge is not perfect if the population underlying the bond is not the same as that in the pension scheme.

For example, if the increase in the longevity of the pension scheme members is unexpectedly high and higher than that of the population being tracked. The hedge will also not be perfect if investment returns and / or pension increases are at a different rate than expected.

UK example

The market for longevity bonds is currently very limited, though it has been suggested that the UK Government could issue longevity bonds to help meet its borrowing requirement and address longevity risks to UK defined benefit **pension schemes and annuity providers.**

If the UK Government issues longevity bonds then longevity risk is being transferred from private defined benefit pension schemes to the UK Government. This may not be desirable for the UK Government as it is already significantly exposed to the risk that the national population lives longer than expected, through its State pension and public-sector pension promises.

Longevity swaps

These contracts may be written as derivatives or as insurance contracts and are generally offered to trustees of defined benefit **pension schemes by insurance companies.**

There are two types of longevity swap, a named lives swap and a population index swap and these are described below.

The two types of longevity swap differ according to the reference population being tracked and the members for whom longevity risk is being hedged.

Named lives swap

This type of swap protects the pension scheme against members (generally just those who are already receiving a pension) living longer than expected over a pre-agreed term.

The payments are therefore linked to the mortality experience of the scheme's *actual* **membership rather than the national population.**

The cashflows are as follows:

The **scheme pays:**

- **expected pension amounts (which may include pension increases and spouses' pensions)**
- **a contribution for the swap provider's expenses and profits.**

The **swap provider pays actual pension amounts (which may include pension increases and spouses' pensions).**

The details of pension increases and dependants' benefits will be set out in the contract.

In practice, the scheme will continue to pay the actual pensions as usual, and **a net** 'correction' **payment is made at regular intervals, such as annually,** to the scheme by the swap provider equal to the difference between the amounts actually paid and the expected amounts. The 'correction' payment could be negative in which case the scheme will make a payment to the swap provider.

This type of swap requires a lot of administration and documentation as it is necessary to track the actual scheme membership**. It is, therefore, suitable only for large pension schemes** with sophisticated administration systems**.**

Population index swap

Under this type of swap, the reference measure is a population index (such as the national index for the membership's location), rather than the actual scheme's experience.

Again, these contracts do not offer a perfect hedge if the population underlying the bond is not the same as that in the pension scheme.

These contracts tend to be focused on hedging improvements in longevity for members who are under pension age. This potentially mitigates longevity risk for non-pensioners where there is more exposure to longevity risk due to the expected longer term (than for pensioners who are mainly over pension age).

The swap provider pays out if the reference population experiences fewer deaths than expected (using a pre-agreed baseline assumption) **over the pre-agreed term, say 10 years, of the contract.** The pension scheme makes a payment to the swap provider if there are more deaths in the reference population than expected.

The main objective of the swap is not to hedge against pre-retirement mortality but to protect the pension scheme against post-retirement longevity improvements over the swap's term.

These contracts require far less administration. This is because it is not necessary to track the actual membership of the scheme.

2.14 Diversified growth funds (DGFs) and absolute return funds

This type of fund offers investors growth potential with generally lower risk than equity investment, while also utilising the expertise of the investment manager. DGFs will generally be actively managed, hence fees can be high. It consists of a diversified portfolio of assets with the primary aim of achieving growth, *ie* capital appreciation, as opposed to paying income or dividends.

The assets underlying DGFs include equities, but also assets which may not be available to, or practical for, smaller schemes to invest in, such as commodities, property, emerging markets and derivatives.

Fund managers will set an objective, relating to the target capital growth and are given an element of freedom over how they achieve that objective. The objective is typically defined as a set percentage in excess of a particular measure, such as LIBOR, as opposed to tracking an index. Managers of DGFs employ 'dynamic asset allocation' whereby the portfolio is continually monitored and rebalanced when market conditions change. This allows a scheme to achieve a diversified investment strategy without consuming too much management time.

This type of fund is gaining in popularity as an investment for defined benefit schemes and is becoming more common as an option in defined contribution schemes.

The majority of DGFs run on a pooled basis, but bespoke funds can be arranged for larger schemes.

UK example

The largest UK DGFs are absolute return funds with target rates of return unrelated to the market cycle, typically a margin over LIBOR, the benchmark interest rate, or an inflation index such as the Retail Prices Index (RPI). These absolute return funds target equity-type returns with lower volatility.

These absolute return funds are attractive to members of defined contribution pension schemes who are approaching retirement and wish to reduce their exposure to extreme market fluctuations, but would also like a positive return regardless of market conditions.

2.15 Employer-related investments

Employer-related investment (also known as self-investment) is best defined by example. Examples include:

- ownership by the pension scheme of the equity or bonds of the employer
- ownership of land or property used by the employer.

Additionally, unpaid employer contributions and scheme deficits could be viewed as employer-related investments (although is not for the purposes of the UK self-investment regulations).

2.16 Other investments

Other investments only usually form a tiny proportion of pension fund assets, but it is worth being aware that they exist. They include:

- Works of art
  - These have a subjective market price and possible marketability problems.
  - These are of limited use due to their lack of income other than by sale of the asset.
- Commodities (*eg* gold)
  - These are of limited use due to their lack of income other than by sale of the asset.

Chapter 13 Summary

Investment classes

The main advantage of *domestic equities* is that they are likely, over the long term, to produce a significant real return. Equity returns are, however, very volatile.

Overseas equities provide diversification. However, there is a currency risk (although this can work in the scheme's favour too).

Property is also expected to provide real returns over the long term. However, it has relatively poor liquidity and large unit sizes make it inaccessible directly to all but the very large schemes. However, indirect property investment is possible.

Index-linked government bonds can show a guaranteed real return and provide a suitable match for salary- and/or price-related liabilities. *Fixed-interest government bonds* can show a high running yield and a guaranteed nominal return. The long-term real return from government bonds is not expected to be as high as from domestic equities.

By investing in good quality *corporate debt*, a fund can seek to take advantage of the higher potential returns available without sacrificing much in the way of security.

Pension funds may invest in *overseas bonds* to provide diversification and take advantage of interest rates in economies at different stages to the economic cycle to the home country.

Cash is totally liquid, but liquidity is rarely a major constraint of pension fund investment. Cash is often used as a working balance.

Commodity and *infrastructure investment* can be considered to be real assets providing diversification from traditional real assets such as property and equities. Infrastructure is a much longer term investment than commodities and has a higher expected overall yield than equities.

Derivatives enable a pension scheme to reduce inflation, interest rate and currency risk. They might also be used to simulate or limit exposure to certain asset classes.

Liability driven investment (LDI) is an investment strategy which is set with explicit reference to the liabilities. The aim is to reduce, or hedge, inflation and interest rate risks.

Longevity bonds have coupon payments linked to the mortality experience of a particular set of lives, such as a specific age group in the national population or the scheme's own lives. Coupon payments will reduce over time with the mortality experience of that population.

Longevity swaps may be written as derivatives or as insurance contracts and are generally offered to trustees of defined benefit pension schemes by insurance companies. There are two types of longevity swap, a named lives swap and a population index swap.

Diversified growth funds consist of a diversified portfolio of assets with the primary aim of achieving growth, *ie* capital appreciation, as opposed to paying income or dividends. The intention behind such funds is usually to achieve growth whilst reducing the volatility associated with investing directly in growth assets.

Contingent assets

Contingent assets involves setting aside assets that will be paid to the scheme if the sponsoring employer becomes insolvent or if the funding level falls below a certain level or if other triggers are met.

This gives the scheme some security without the employer losing complete control of the assets – if the employer remains solvent and contributions are sufficient to pay all benefits, then ownership of the underlying asset will never be transferred to the pension scheme.

Insurance company investment contracts

Non-profit immediate annuities are where the life insurance company promises to pay the policyholder certain specified sums during the life of a particular person in return for a single premium.

A DB scheme may purchase these annuities to mitigate mortality, investment and expense risk but the overall cost of pension provision is likely to be higher.

Non-profit deferred annuities are normally only found as investments of DB pension funds when the fund is being wound up. Ongoing schemes rarely invest in these because they offer poor investment returns.

Annuities may be purchased in bulk as part of a *buy-out* or *buy-in* policy.

Under a *buy-out*, a scheme's liabilities are transferred to an insurance company in return for a premium and the scheme's obligation to the members is extinguished.

With a *buy-in*, the policy is held by the trustees as an asset of the scheme. The scheme maintains its responsibilities to, and link with, the scheme members. The policy will produce an income stream matching a tranche of the liabilities.

A managed fund offers a pooled direct link to the performance of underlying assets but with no guarantees. However, it will allow many schemes access to investment classes that they could not invest in directly, and may offer economies of scale through competitive fee structures.

7 Environmental, Social and Governance considerations (ESG)

7.1 Introduction

The United Nations' Principles for Responsible Investment (PRI) defines responsible investment as 'a strategy and practice to incorporate environmental, social and governance factors in investment decisions and active ownership'.

Factors typically considered in ESG are listed below:

Environmental

- **climate change**
- **resource depletion**
- **waste**
- **pollution**
- **deforestation**
- carbon emissions
- water management

Social

- **human rights**
- **modern slavery**
- **child labour**
- **working conditions**
- **employee** / local community **relations**

Governance

- **bribery and corruption**
- **executive pay**
- **board diversity and structure**
- **political lobbying and donations**
- **tax strategy**

ESG is described in more detail in the next three subsections. It is not necessarily the same as social impact investing, which is described in the final subsection.

7.2 Relevance of ESG factors to investment performance

An investment strategy taking into account ESG factors may be driven by ethical principles.

This may negatively impact on investment performance as:

- **it may restrict the range of assets available for investment**
- it may restrict the underlying company's business activities, and so reduce sales and profit
- it may increase costs for the underlying businesses, and so reduce profit
- it may increase the costs for the scheme of monitoring investments
- it may increase transaction costs for the scheme, *eg* if disinvestment must take place from companies that no longer comply with the scheme's desired ethical standards.

However, arguments exist to support the view that incorporating ESG factors can improve investment performance through increasing returns and/or reducing risk.

For example, ESG-motivated companies might:

- **reduce costs through more efficient use of energy and raw materials**
- **be subject to less financial impact if governments** subsequently make changes to legislation that intend to improve the quality of life, *eg* **impose pollution taxes or minimum wages**
- **benefit from any government incentives and subsidies designed to encourage global goals on climate, energy and sustainable development – this is discussed in more detail below**
- **avoid reputational damage from controversial practices such as modern slavery**
- **see greater returns arising from better working conditions for staff which aids recruitment, retention and motivation (a virtuous circle).**

Question

Explain why ESG risks should be allowed for when determining a company's credit rating.

Solution

A credit rating agency will assess a company's long-term financial strength …

… *ie* its likelihood of default and potential losses in the event of default.

A good ESG rating will positively affect the 'goodwill' towards the company:

- increasing demand for its products and so its profitability
- increasing demand for its shares
- reducing its cost of borrowing
- reducing political risks for the company …

… and so ESG risks should be included as they are likely to be a key indicator of financial strength.

Strong risk control and governance mechanisms are likely to include ESG issues …

… which are an indication of a company which will achieve long-term business success …

… and may be demanded by investors as ESG is seen as an important factor.

7.3 Climate change

There is scientific consensus that warming of the climate is unequivocal and linked to increasing atmospheric concentrations of greenhouse gases, of which a key driver is the burning of fossil fuels.

The effects are already apparent and further warming is inevitable due to inertia in the climate system which means it can take decades for the full effect of emissions to be felt.

Risks and opportunities from climate change

In its 2015 report, 'The impact of climate change on the UK insurance sector', the Prudential Regulation Authority described three categories of risk arising from climate change:

- **physical risk**
- **transition risk**
- **liability risk.**

More details can be found at:

https://www.bankofengland.co.uk/prudential-regulation/publication/2015/the-impact-of-climate-change-on-the-uk-insurance-sector.

Climate change brings opportunities as well as risks. Companies that offer solutions to climate change, such as lower emission technologies and energy-efficiency measures, are well placed to benefit from a low carbon transition.

Physical risks

Physical risks arise from the effects of a changing climate itself.

Such risks may arise:

- **in the short-term; from damage to property and from business disruption due to extreme weather events**
- **in the longer-term; chronic impacts may dominate, such as rising temperatures, rising sea levels and changes to rainfall patterns affecting use of land for agriculture.**

Transition risks

Transition risks arise from the shift away from fossil fuel use.

Sources of transition risk include:

- **policy measures (*eg* carbon taxes and energy efficiency standards)**
- **technological change (*eg* a move to renewable energy and electrical vehicles)**
- **changing customer preferences (*eg* increased demand for 'green' products).**

Transition risk is a particular concern for fossil fuel-dependent companies and associated infrastructure.

Liability risks

Liability risks relate to the potential costs from third parties seeking compensation because they have suffered loss or damage from the effects of climate change.

It is possible that actuaries and their clients could face legal claims themselves in future if they fail to consider climate-related risks.

Financial impacts of climate change

It is currently very unclear where the world will end up on the spectrum between rapid transformation of the energy system (with associated transition risks) and massive climate change (with associated physical and liability **risks).**

There is widespread concern among policymakers and financial regulators of the damage that climate change could cause to the financial system and, conversely, the role that the financial system can play in achieving an orderly transition to a low carbon economy.

In May 2017, the IFoA issued a risk alert highlighting that actuaries are expected to consider climate risks and communicate their approach.

More details can be found at:

https://www.actuaries.org.uk/system/files/field/document/Risk%20Alert%20-%20Climate%20Change%20FINAL.pdf.

A particular challenge is that the future may look very different to the past, so models that are calibrated using past data may give misleading results.

Question

Discuss how a pension scheme's investments could be affected by climate change.

Solution

Equities

Additional costs arise for companies in dealing with climate change issues …

… this reduces their profitability, and so dividends, and so their share price.

Industries that contribute to climate change may do particularly badly, *eg* the oil industry …

… whereas 'green' industries may do well, *eg* renewable energy providers.

Corporate bonds

Lower company profits increase the risk of investing in corporate bonds, leading to falls in prices.

The collateral used as security may reduce in value, also increasing risk.

Property

Property may be at greater risk of natural disasters (*eg* fires and floods) due to climate change …

… especially in certain locations and for older properties.

This may reduce demand and so prices.

The costs of dealing with the physical effects of climate change may be expensive.

Government bonds

There is likely to be less of a direct impact on government bonds.

There may be a secondary impact as prices may increase due to falling demand for other assets.

7.4 Legislative requirements and regulatory expectations

One of the drivers for the rising interest in ESG investment has been increasing legislative requirements and regulatory expectations.

Many pension schemes may choose to take account of ESG investment considerations as part of their investment strategy.

However, schemes who have chosen not to reflect ESG principles in their investment strategy may find that they are more affected by increasing legislative requirements.

Trustees' fiduciary duty

For the reasons outlined above, it is now widely agreed that incorporating ESG factors can improve investment performance and hence that consideration of ESG factors forms part of trustees' fiduciary duty to act in the best interests of beneficiaries.

UK example

In the UK for example, this has been clarified by The Pensions Regulator's guidance which says that 'when considering investment decisions / setting investment strategy, you should take into account all ESG and other factors that are financially material to the performance of an investment'.

The Pensions Regulator's guidance can be found at:

- **https://www.thepensionsregulator.gov.uk/en/document-library/regulatory-guidance/db-investment/investing-to-fund-db**
- **https://www.thepensionsregulator.gov.uk/en/trustees/managing-dc-benefits/investment-guide-for-dc-pension-schemes-**

In relation to 'non-financial factors', The Pensions Regulator's guidance continues to say that 'trustees may take account of non-financial factors if:

- **they have good reason to think that scheme members share a particular view**
- **their decision does not risk significant financial detriment to the fund'.**

For example, The Pensions Regulator's guidance with regard to ESG investment states that considering ESG factors involves looking at:

- their financial materiality and nature
- the short and long-term financial risks and opportunities by considering the current practices of the organisations to be invested in
- the demographics of the scheme.

Sustainable finance

Sustainable or 'green' finance is a popular topic among policymakers wishing to use financial markets to help them achieve sustainability and climate change objectives.

Climate change

As noted above, climate change is a particular concern of policymakers and financial regulators. Concerns about these systemic risks has catalysed various initiatives around the world.

EU example

For example, the European Insurance and Occupational Pensions Authority (EIOPA) includes climate change in its stress tests for pension schemes from 2019.

7.5 Social impact investing

Social impact investing focuses on investing in companies and projects that manufacture goods and services designed to have an explicit positive impact on society, while ensuring investors received a fair return on their capital contribution.

An example of ESG investing, but not necessarily social impact investing, might be investing in a restaurant which sources its food and staff from within its general locality. An example of social impact investing might be investing in a restaurant which aims to rehabilitate ex-offenders through teaching the relevant skills to enable them to find employment within their kitchen or elsewhere.

UK example

A pension scheme may be social impact investing by holding assets in a company which partners with, or employs the graduates of, the Clink Charity. The Clink Charity works to reduce reoffending by providing training for prisoners in several of its restaurants.

8 Investment Governance – UK examples

8.1 The Pensions Regulator's DB investment guidance for trustees

On 30 March 2017 the Pensions Regulator issued guidance on DB investment aimed at trustees of occupational pension schemes, which will also be of interest to advisers and sponsors.

TPR suggests that this guidance should be consulted after reading its Code of Practice 3: Funding defined benefits.

Trustees of some schemes, for example those with fewer than 100 members, wholly-insured schemes or small self-administered schemes, are subject to different requirements.

At the time of writing (May 2020), this guidance can be found at:

https://www.thepensionsregulator.gov.uk/en/document-library/regulatory-guidance/db-investment

It contains examples of approaches and factors to consider when investing scheme assets to fund defined benefits. The Pensions Regulator expects trustees to have suitably documented investment arrangements that are appropriate for their scheme's circumstances, including their level of complexity.

The guidance has six sections which are summarised in checklist format below.

The six sections are:

- Governance
- Investing to fund defined benefits
- Matching assets
- Growth assets
- Implementation
- Monitoring

Chapter 14 Summary

Fundamental principles

The basic principles of pension fund investment are to:

- minimise the risk of failing to meet the liabilities of the pension scheme
- maximise the investment return within an acceptable level of risk.

Any investment strategy should consider matching the nature, term, currency and certainty of the assets and liabilities. However, a mismatched strategy may be followed to reduced costs, if higher returns are anticipated by such a strategy, and the risk is acceptable, for example if the sponsor covenant is strong.

Choosing and monitoring investments

The trustees set out overall guidance, restrictions and explanation in terms of the scheme's investment strategy.

This often involves setting a benchmark, or strategic investment norm, plus operating bands around the benchmark.

It is important to review and monitor investment performance, being aware of any limiting effects on performance of restrictions or constraints placed on investment managers.

The scheme's circumstances

When considering the investment strategy for a scheme, the issues that need to be considered include: liability profile; funding position; size of the scheme; expected cashflow; strength of sponsor covenant; attitude to risk of the trustees and the sponsor.

The status of the scheme will influence these circumstances. For example, a new scheme with no past service is likely to have a very different liability profile, size and cashflow position to, say, a mature scheme that is closed to accrual. The funding position, sponsor covenant and attitude to risk may also differ significantly.

Risk and reward

Equities were traditionally considered a highly suitable asset holding for salary-related liabilities, since they were expected to give the greatest long-term return and could be expected to provide a real return in the long term. However, there is no guarantee that equities will perform well in the future, or that equity return will be closely correlated to salary inflation, even in the medium to long-term. The trustees should consider the consequences of underperformance.

A portfolio with a substantial proportion of bonds may be considered in order to more closely match the liabilities and reduce risk.

DC and hybrid schemes

Members might choose to take their benefits from a DC or hybrid scheme in a number of ways, for example by purchasing an annuity, taking a cash lump sum or using income drawdown. Each option suggests a different investment approach close to and in retirement.

Environmental, Social and Governance considerations

Environmental issues include climate change, resource depletion, waste, deforestation and pollution.

Social issues include human rights, modern slavery, child labour, working conditions and employee relations.

Governance issues include bribery and corruption, executive pay, board diversity and structure, political lobbying and donations and tax strategy.

The key risks of climate change are:

- physical risks – arising from the effects of a changing climate
- transition risks – arising from the shift away from fossil fuels
- liability risks – relating to potential compensation payments to third parties because they have suffered loss or damage from the effects of climate change.

Social impact investing focuses on investing in companies and projects that manufacture goods and services designed to have an explicit positive impact on society, while ensuring investors received a fair return on their capital contribution.

UK investment governance

The Pensions Regulator has issued guidance on DB investment and DC investment governance. The main sections of the guidance are listed below.

DB schemes	DC schemes
Governance	Investment governance
Investing to fund defined benefits	Financial and non-financial factors
Matching assets	Designing investment arrangements
Growth assets	Strategy and performance monitoring and review
Implementation	Changing investment funds
Monitoring	Security of assets

15

Valuations

Syllabus objectives

4.3 Discuss how to determine values for assets, past and future benefits and future contributions, including:

- the reasons why the assumptions and methods used may differ in different circumstances
- the extent to which values should reflect investment / risk management strategy
- valuing guarantees and options
- sensitivity analysis and reasonableness checking

and be able to perform calculations to demonstrate an understanding of the main methods used.

0 Introduction

Chapter 15 provides an overview of the considerations in determining the valuation approach and a summary of the valuation process with specific elements discussed in more detail in Chapters 16 to 20. In particular Chapter 16 covers methods and models, Chapter 17 discusses data, Chapter 18 concerns the assumptions and Chapters 19 and 20 cover managing and analysing experience.

Whilst there are often differences in approach, an actuarial valuation broadly requires a procedure along the following lines:

- Determine with the client:
  - the purpose of the valuation
  - the objectives of the client
  - a timescale for production of results
  - an agreed fee.
- Gather information about the scheme, *eg* rules, booklets, announcements, accounts, minutes, previous actuarial correspondence, actuarial factors used *etc*. Request and validate membership data and asset data (Chapter 17).
- Consider with the client the choices for the:
  - methods *ie* the valuation method to determine the discount rate and the funding method (Chapter 16)
  - assumptions (Chapter 18)

  Chapters 16 and 18 address the various methods in typical use for valuations and how to set appropriate assumptions. This part of the course focuses on choosing the appropriate valuation method and assumptions relevant to the purpose(s) of the valuation as described in Section 1 below.
- Perform the full valuation and summarise the results.
- Reconcile the results with a previous (similar) valuation (Chapters 19 and 20).
- Discuss the results with the client, who may need to discuss or negotiate possible actions with other interested parties, and then:
  - determine the need for any revised figures or further calculations
  - agree the contributions to be paid (if required).
- Finalise the report, statements, certificates, *etc*, and issue to the appropriate parties.

The purpose of this chapter is to bring together the methodology and assumptions to be used for a valuation taking into account the purposes of that valuation.

Choosing the right approach, and explaining this choice to the users of the valuation, is a fundamental part of the process. The results of the valuation can differ materially depending on the approach adopted.

The high-level decisions in instructing an actuary to complete a valuation involve deciding:

- whether an optimistic, best estimate or prudent approach is appropriate
- the degree of optimism or prudence
- whether a deterministic or stochastic approach is appropriate
- how this is to be allowed for in the methods and assumptions.

The choice of valuation approach will be influenced by:

- the purpose of valuations – both generally …

  … and of the different types of valuation (*eg* funding, accounting, solvency)
- the objectives of the client
- scheme characteristics, *eg* investment strategy and funding position …

  … and sponsor characteristics, *eg* covenant – the key risks in integrated risk management
- financial significance (which dictates the need for accuracy)
- consistency
- external factors.

Then we will consider the level of prudence in a valuation. Finally, we will consider the valuation process.

The references used to produce the Core Reading material on the topics covered in Chapter 15, which might be useful in providing further insight, are as follows:

- **SP4 Core Reading**
- **The Pensions Regulator's 2016 Code of Practice** (on funding defined benefits)
- **TAS 100 and TAS 300.**

The topic of valuations has been examined frequently in the recent past and it is important to do many of these exam questions when revising. When attempting past papers allow for changes to the Core Reading and in particular the removal of some content specific to the UK such as material on the Statutory Funding Objective. The following questions relate to valuations in general and also specific elements of valuations (which are covered in more detail in the remaining chapters of Part 4) and would be good to attempt as part of preparation for the exam:

- October 2011, Question 2
- April 2012, Question 1
- October 2012, Question 1
- April 2013, Question 1
- April 2014, Question 2
- September 2016, Question 2
- April 2018, Question 2
- September 2018, Question 2.

1 Purpose of the valuation

The purpose of an actuarial valuation is to help stakeholders in decision making, including:

- **those responsible for the operation of the scheme (for ease, referred to as the trustees in this section, but this could be a variety of parties depending on the country);**
- **employers** – mainly in relation to the cost of benefit provision;
- **members** – in relation to the adequacy and security of benefits;
- **shareholders** – in relation to the profitability of the sponsor;
- **regulators** – in relation to statutory compliance; and
- all parties affected when liabilities are transferred from one scheme to another.

Valuations of assets, past service liabilities, and future benefits and contributions help the various parties involved in pension provision to make decisions. The values are generally not definitive answers about the future costs or the most appropriate course of action, but provide information to enable appropriate decisions to be made.

The requirements of the users and the purpose for which the valuation will be used will affect the assumptions and methods used for the valuation.

In general, the assumptions adopted for any exercise will depend on the purpose of the exercise.

The valuation itself, or the underlying calculations, may then be used for related purposes. In particular, this may include being used as a basis for the ongoing monitoring of the funding position between formal valuations, or to establish a cashflow or liability profile as a basis for investment strategy decisions.

Even for each particular type of valuation different actuaries can adopt different methods and assumptions.

Legislation may prescribe a number of circumstances in which valuations are required. Some statutory valuations will need to be carried out regularly, at prescribed intervals. Other valuations are needed only in specific situations.

However, the trustees may, on the grounds of prudent management, request valuations more frequently than is required by law, and in particular if there is an event which may have a significant financial impact on the scheme.

Typical purposes of valuations might include:

- **For a funded scheme:**
  - **as a basis for determining the contributions to be paid to the scheme; and**
  - **to set minimum (*eg* to ensure adequate funding) or maximum contribution rates (*eg* to fit in with relevant tax legislation).**
  - to determine the funding position and any adjustments to contributions to allow for the surplus or deficit.

  This is what would usually form a funding valuation and is discussed in detail in Section 2.

- **To provide an assessment of the funding position and ongoing accounting cost for an employers' accounts under the relevant accounting standard (typically, US GAAP or IAS standards).**

  Accounting valuations are discussed in detail later in the course.

- **As a measure of the security of the benefits, for example to assess how they compare with the cost of purchasing annuities to secure the liabilities.**

  This example is a solvency valuation. Discontinuance valuations are discussed in detail in Section 2.

- **To provide standardised information to a regulator or government, in some cases as a basis for determining levies on the scheme (such as for the Pensions Protection Fund (PPF) in the UK or the Pensions Benefits Guarantee Corporation (PBGC) in the US.**

- **As a part of the assessment of the purchase price if a business which runs a pension scheme is being bought or sold.**

  The choice of method and assumptions will be a matter for negotiation. Valuations as part of corporate activity are discussed later in the course.

- As part of an asset-liability modelling exercise. The assumptions required for a cashflow projection may be extensive. This is covered in detail in Chapter 16.

The rest of this section looks in detail at the types and purposes of ongoing and discontinuance valuations.

1.1 Ongoing valuations

As noted, the method by which the benefits are valued should reflect the purpose of the valuation:

- **To determine the current funding position of the scheme or when preparing figures for a company's accounts, it would usually be appropriate to value the benefits on the assumption that the scheme continues to operate on its current basis. This is often referred to as valuing the scheme's 'ongoing liabilities'.**
- **A valuation for a sponsor's accounts would also be completed on an ongoing basis but must reflect the relevant accounting standards. Such valuations are discussed in Chapter 21.**

  The purpose of values shown in a company's accounts is to give a realistic picture to the shareholders (and potential shareholders) of the profits and balance sheet of the company. Consistent valuations from year to year will also help ensure comparisons can be made and trends can be assessed. Accounting valuations and the calculation of pension costs for accounting purposes is covered in detail in Chapter 21.

- **A similar approach would usually be adopted to assess both the contribution requirements to meet future benefits earned by scheme members in a funded scheme (or for budgeting in an unfunded scheme), and any adjustment (up or down) to reflect the current funding position.**

Funding valuations form the basis for many decisions taken about the financing of a DB pension scheme.

Running a DB scheme is a partnership between the employer and trustees, for the benefit of members. The trustees' primary aim should be security of benefits, which suggests a prudent funding approach. The employer typically wants a scheme that offers attractive benefits at an acceptable cost and risk. A balance is needed between the aims of the two parties.

High contributions resulting from an overly prudent approach may make the scheme appear unaffordable in the eyes of the employer. If the employer cannot influence the level of prudence in the funding objective, there is a risk of scheme termination or benefit reduction to reduce contributions and costs.

Prudence is often applied by making adjustments to the assumptions. However, some actuaries prefer to demonstrate the prudence by making explicit loadings to values determined using 'best estimate' or 'neutral' assumptions. Prudence is discussed in Section 5.

Best estimate assumptions are those for which there is a 50% chance that experience will be more favourable and 50% chance that it will be less favourable than assumed. A margin for prudence may be built in:

- implicitly – in some or all of the elements of the method and assumptions.
- explicitly – by carrying out calculations on a best estimate basis, then adding an explicit loading to the results.

It is useful to quantify the difference between a realistic assessment of funding requirements and the funding results using the funding method and assumptions adopted. This will help the trustees to understand the level of prudence in the approach.

Question

Discuss whether funding with a prudent basis means that the scheme costs more to the sponsor.

Solution

Different assumptions will result in different advice as to the contribution requirements. It may be recommended that the employer pays more now (if prudent assumptions are adopted) resulting in lower contributions in the future when surpluses start to emerge.

However, the choice of assumptions will not directly affect the benefits paid. The basis affects the *pace* of funding but it does not directly affect the actual *cost* of the benefits.

However, there might be some indirect effects of the choice of assumptions on the cost of the scheme, for example:

- The use of optimistic assumptions may be preferred if the employer could get a better return on the money by using it in other areas of the business, thereby reducing opportunity cost.
- The use of optimistic assumptions when setting up a DB scheme might lead the employer to choose a scheme design with higher benefits.
- If prudent assumptions are consistently used to value the benefits, a surplus may arise, which may need to be used to increase benefits and therefore cost.
- Optimistic or over-prudent assumptions can lead the employer into financial difficulties, or even insolvency. Use of optimistic assumptions will eventually lead to deficits and increased contribution requirements, possibly at a time when the employer cannot afford to pay extra. Prudent assumptions result in higher contributions, which the employer might not be able to afford.

It is important to note that the choice of assumptions will directly affect the cost when liabilities are being extinguished by a payment *eg* on buy-out or bulk or individual transfer. These are discussed later in the course.

UK example

In the UK, the Statutory Funding Objective forms the framework for funding decisions for many schemes. This sets the minimum target fund as the technical provisions. The method and assumptions are set by the trustees, working with the sponsor. The approach to the valuation will be prudent, as the trustees require sufficient and appropriate assets to meet the liabilities.

In doing this the Trustees will take into account the strength of the sponsor covenant supporting the scheme. Guidance from the Pensions Regulator suggests that a weak covenant should lead to more prudent assumptions, and a higher value of technical provisions. By contrast, a strong covenant may permit a lower level of prudence.

A triennial valuation report will typically contain an assessment of the scheme on an SFO basis (which may be an ongoing or a discontinuance test) and a solvency basis.

1.2 Discontinuance valuations

This section concerns the completion of a discontinuance valuation as part of the ongoing monitoring of a DB pension scheme. The actions that might be taken when a scheme actually discontinues are covered in the discontinuance chapter, later in the course.

If completed as a part of a regular valuation exercise, these valuations work from the basis of the 'what if' scenario - that there will be no further funding available from the employers. They may also be relevant in other scenarios.

A discontinuance valuation may also form a useful basis for planning if it seems likely that a scheme will discontinue in the near future, or in setting a longer term funding target.

Trustees will need to consider the coverage of discontinuance liabilities and how this is expected to develop over time under any proposed funding plan. If the future contributions that are available are limited to the extent that the coverage of the lowest priority liabilities is expected to reduce over time, the Trustees will need to consider reducing the level of future benefit accrual or even consider winding the scheme up in order to prevent this reduction.

This assumes that it is within the Trustees' powers to reduce benefits and/or wind up the scheme whereas in practice the agreement of the employer may need to be sought. Alternatively, in the UK, the Trustees may seek guidance from TPR who in extreme circumstances may use its powers to enforce these actions.

When assessing the position should the scheme be discontinued, the benefits valued should reflect members' entitlements in these circumstances. This would often be described as a valuation of the 'discontinuance liabilities'.

Here the benefits would usually be the guaranteed benefits under the scheme, assuming that members in pensionable service leave immediately, which may mean they become deferred pensioners, receive a refund of their contributions or no benefits depending on the terms of the plan and any regulations on how benefits vest before retirement.

Special consideration should be made to any options or guarantees available at a member's option. These can have a material impact on the cost of securing benefits, particularly where the benefits are being insured (see below).

The way these benefits are valued would then reflect the method of securing the benefits.

For example, this could be through:

- **purchasing annuities from an insurance company (a 'buy-out'), or**
- **by continuing the scheme for a period (often referred to as a discontinuance valuation on a 'self-sufficiency' basis)**
- liabilities taken as the transfer value available to actives and deferred pensioners, with the cost of immediate annuities used for current pensioner liabilities. This approach may be appropriate if non-pensioners are likely to choose to take transfer values to extinguish their liabilities.

If the purpose of the discontinuance assessment is for statutory or regulatory purposes, the benefits to be valued, and the method and assumptions to be used will often be defined.

UK example

For example, in the UK if an employer ceases to participate in a scheme it would normally be required to meet its share of any shortfall assuming that the scheme discontinues and winds up.

In addition under the SFO regime in the UK an estimate of the cost of securing the benefits on winding-up as at the valuation date with an insurance company is the measure of the discontinuance liabilities usually used *ie* a solvency valuation. However, there are various other ways to assess the discontinuance liabilities of a scheme so an additional funding level using a different method may also be calculated.

Question

List four types of event which could affect the funding or solvency of a DB pension scheme.

Solution

Any four reasonable items may be included such as:

- changes affecting the status of the scheme
- changes to (or legal opinions on the interpretation of) the governing documentation or the benefits provided under them
- significant changes to the membership
- events in relation to participating employers
- events in relation to investment matters
- the exercise of a discretionary power
- events in relation to financing.

Considerations for a buy-out / solvency valuation

It may be that the scheme itself would be wound up immediately with benefits secured with an insurance company.

The liabilities are valued either as the actual cost of buying out the benefits with an insurance company or are assessed using principles likely to be adopted by insurance companies for determining buy-out costs.

In these circumstances, in the absence of a costing provided by an insurer, the assumptions would normally be based on the actuary's view of the cost of securing all benefits (note: this is not an insurer's reserving basis; it would be an insurer's premium basis) based on their knowledge of the insurance market.

When using a buy-out approach, it may not be possible to buy an insurance policy that matches the scheme exactly and so a very detailed approach is unlikely to be appropriate.

Dependants' benefits on death are a good example of benefits that are often simplified in an approximate solvency calculation. This is on the grounds that including their complexities makes little difference to the valuation results.

Question

Outline reasons why the pensioner liability might differ between the ongoing valuation and the discontinuance valuation.

Solution

Reasons include:

- The ongoing funding basis may be less prudent than the discontinuance basis.
- The cost of securing pensions with an insurance company will include an allowance for expenses and profit.
- There may be no allowance for expenses in the ongoing valuation, either implicit or explicit, *eg* if met by the employer.
- An ongoing valuation may include allowance for discretionary future increases which may be excluded from the discontinuance valuation.

Key differences from a funding basis might include:

- **The use of assumptions which are all market-consistent.**
- **A discount rate based on the insurer's investment strategy, reserving requirements and anticipated profit margin. While the insurer's investment strategy will usually be more diverse, the premiums will often be based on the yields available on a mixture of high quality bonds and government securities.**
- **Base mortality rates will typically be based on the scheme's profile but future improvements will often take a more cautious view, being based on the terms on which the insurer can reinsure mortality risk.**
- **Particular care needs to be taken in relation to options and guarantees under the scheme. An insurer will normally assess the terms on a 'worst case' scenario, for example on the assumption that all members retire at the earliest possible age where they have a right to an unreduced pension.**
- **The cost should include both an allowance for the expenses that will be incurred by the insurer (which should be built into the estimate of the cost of purchasing annuities), and the costs of winding up the scheme, including any compulsory or typical insurance taken out in such circumstances (for example, to cover any members that are missed and subsequently claim benefits, or any errors subsequently found in benefits).**

  Expenses of winding up could be significant and may be very high in the priority of asset allocation. The actuary will need to make an allowance for such expenses, which may include the expenses of an independent trustee. An actuary involved in wind ups may have an accurate idea of the costs, or can make a cautious estimate. If not, suitable research would be required.

It will often be useful for the users of the report to understand how the coverage of discontinuance liabilities is expected to develop over time under any proposed funding plan, taking into account expected contributions and investment returns.

For example, in some countries priority is given to some members benefits over others (typically pensioners, or benefits up to a certain level). If the future contributions that are available are limited to the extent that the coverage of the lowest priority liabilities is expected to reduce over time, the trustees or scheme managers may wish to insist on a higher level of contributions, or other changes to the scheme.

Considerations on a 'self-sufficient' discontinuance valuation

If the intention would be to run the scheme for a long period on a 'self-sufficiency' basis or to test out that scenario, the valuation assumptions would typically be set in a similar manner to the ongoing basis, taking into account the changes in the circumstances of the scheme.

Typically, changes may be appropriate in relation to:

- **The discount rate, which should include a consideration of the short, and long-term investment strategy.**
- **The policy on benefits. For example, unless supported by funding it may be that only those benefits that are guaranteed under the rules, or where options are cost neutral to the scheme will be provided, which may change member behaviour.**

In turn this may mean that adjustments are necessary to some of the demographic assumptions.

It is important that the actuary and the users of the report understand any margins for prudence included in the assumptions, especially if the valuation is completed in anticipation that the scheme will discontinue or is to be used as a key measure for setting investment strategy. This is because the valuation result may also affect the fundamental decision of whether or not it is feasible to continue the scheme or whether it should be wound-up.

Considerations for use of transfer values

Generally, the transfer value should be at least equal to the cost to the scheme of providing the alternative deferred benefits. A transfer value is unlikely to equal the funding valuation reserve for that individual.

Question

Explain why they are not likely to be equal.

Solution

For active members of a final salary scheme, the funding reserve may include an allowance for future salary growth, which is not included in the transfer value which is the value of the leaving service benefits.

The discount rate for the valuation may be an aggregate rate applicable for all active, deferred and current pensioner members. The discount rate underlying the transfer value calculation may reflect the type(s) of assets held to meet the individual's deferred pension.

The funding reserve may include a margin for prudence. The trustees will not want to pay this margin over to another arrangement, preferring a best estimate assessment of the value of the deferred benefits.

Using transfer values typically results in a higher assessment of the scheme's discontinuance funding level than if we assume the liabilities are bought out with an insurance company.

Question

Explain why the funding level is likely to be higher under a discontinuance valuation using transfer values as opposed to buy-out costs.

Solution

For pensioner members the value of the liabilities is the same.

For other members, the solvency valuation of the liabilities is likely to be higher than the transfer value as it:

- will include an allowance for the insurance company's expenses and profit
- may reflect the insurance company's more cautious investment strategy and / or pricing basis.

Other considerations

Expenses

When allowing for expenses, allowance should be made for:

- the capital value of all future expenses of continuing to operate the scheme, (particularly if the employer can no longer be relied on to meet these expenses)
- the cost of the eventual wind-up.

Degree of detail required

If the actuary is satisfied that the discontinuance funding level is over 100%, further detailed calculations may not be needed.

If the discontinuance funding level is less than 100%, or the trustees require detailed information to assist in decisions relating to the contribution requirements, more accurate calculations are generally needed.

1.3 Other funding objectives

It may be sufficient to monitor the level of the assets relative to the ongoing and discontinuance liabilities, and to consider sensitivities of the results to the key assumptions made. However, these may be supplemented by other liability valuations to assist in setting investment strategy or the contribution requirements. One such measure would be a 'neutral' valuation, often called a 'best estimate' valuation.

A 'neutral' valuation would use the same assumptions as used to calculate the ongoing valuation, but with any margins for prudence removed.

Question

The trustees of a final salary scheme calculate the scheme's accrued liabilities using a discount rate which includes an equity risk premium. State an example of a potential additional funding objective which may be set by the trustees.

Solution

An example additional funding objective might be: 'By 2025, to have sufficient assets to be at least 100% funded on the method and assumptions used to calculate the accrued liabilities but using a discount rate based solely on the yield on government bonds of appropriate duration.'

UK example

Many sets of trustees in the UK use the liabilities on the SFO basis as their funding target *ie* they do not have any additional funding targets or commission any other funding valuations.

This reduces the number of values that need to be calculated and communicated. However, there may be a danger that the different needs of the different parties are lost.

2 The objectives of the key stakeholders

This section looks at the impact of the objectives of the key stakeholders on the valuation approach for a valuation carried out for ongoing funding purposes.

2.1 Employers' objectives

Stability of values and, in particular, of the cash contributions required to maintain the fund may be an important objective for the funding strategy, particularly for a sponsoring employer who will often want to keep the contributions stable so that it can budget properly for this employment cost.

A pension contribution linked to payroll (for example, as a percentage of pensionable salaries) will often be convenient for this purpose. Alternatively, and particularly where a scheme is closed to new benefits or to new members, any contributions to meet a funding deficit may be expressed as fixed monetary amounts.

An employer will also want to keep the total costs low, subject to meeting its risk management objectives.

Question

Suggest reasons why an employer might prefer a funding valuation not to overstate the cost of the scheme benefits.

Solution

The company will appear less profitable if overly cautious assumptions are used. This may result in charging uncompetitive prices in order to achieve a profit target.

The company might be able to make a better return on the money by investing it in the business – if so, overall costs would increase if more than necessary were paid into the pension scheme.

The company might not be able to use a surplus in the fund to reduce future contributions. There may be pressure from the members / trustees to increase benefits.

The employer may also want to have some flexibility: potentially to pay larger contributions when there is no opportunity to earn a greater return from other projects, or as a result of positive business performance; and to pay a lower contribution when there is an advantage to using the funds to finance the business.

Such flexibility could only be available if the funds held are such that there is little danger of any minimum funding rules (such as under the SFO in the UK) **being broken.**

Accounting standards should not usually have any direct effect on the approach that is adopted to fund a scheme. However, a sponsoring employer may prefer the values and contribution requirements to be consistent with those shown in the company's accounts. The accounting standards may therefore have an indirect effect, to the extent that the sponsoring employer has an influence in the funding decision.

Parties that provide contributions (such as the employers) **will perhaps prefer not to pay more than is strictly necessary and so may have a preference for more realistic assumptions. However, to the extent that this would then risk an unexpected increase in the future level of contributions, this may not be acceptable. The preference would depend on the sponsor's attitude to financial obligations in the short, medium and long term. It will also be affected by the ability of the sponsor to reclaim or otherwise determine the use of any overpayment.**

If the risk of overpaying in the short term is viewed as being preferable to the risk of having to find extra resources in the future, there will be a preference for a slightly cautious approach to the setting of the assumptions. If the risk of overpaying is viewed as less attractive, due to a temporary or permanent loss of use of capital, a best estimate or slightly optimistic approach may be required when setting the assumptions.

In some circumstances it will be necessary to determine the amount of one-off payment from one party to another, (such as a bulk transfer for the pension scheme as the result of the sale of part of the business) **which cannot be corrected by adjustments to future payments. In such cases it is important that the actuary chooses assumptions that produce the actuary's best estimate of the future experience. Under- or over-statement will have a direct financial effect on the two parties.**

2.2 Trustees' objectives

In contrast, the primary duty of the trustees or scheme managers will usually be to ensure that the level of funding gives beneficiaries adequate security, so they may prefer higher contributions at an earlier date in response to any funding shortfall (and a higher funding target).

However, the continued prosperity of the sponsoring employer is normally critical to ensuring the scheme's long-term continuation and solvency, and is likely to lead to better outcomes for members than if an employer fails.

In view of this, the trustees will usually allow some flexibility to the employer over the timing of payments and the choice of funding method, but subject to an adequate level of security being maintained.

Agreement to the financing of a pension scheme is a balance between the trustees' desire for security and an affordable level of cost and risk for the employer.

2.3 Employees' objectives

Similarly, active members will also be interested in the sponsoring employer remaining financially healthy and in keeping their jobs, in addition to having secure pension benefits.

Different members may have different views about this issue. Members near retirement will be much more aware of their pension benefits and concerned about benefit security. On the other hand, younger members are often more interested in their jobs (which provide their current income), and, as a consequence, may be more interested in the prosperity of the employer's business than the pension scheme.

Parties that are interested in safeguarding the beneficiaries' rights and so avoiding the risk of insufficient funds (such as the employees and trustees)**, will have a preference for prudent assumptions that are expected to overstate, rather than understate, the future contribution requirements.**

3 Scheme and sponsor characteristics

This section discusses how the characteristics of the scheme and sponsor influence the valuation approach.

When setting the valuation approach, such as the **method and assumptions, it is important to take into account the characteristics of the scheme and sponsor, in particular the following:**

- **the current investment strategy (if the scheme is funded), how that will evolve and how benefits are secured at retirement**
- **the strength of the sponsoring employer**

  Sponsor covenant, investment strategy and funding are all interlinked and represent the three main risks to security for a DB pension scheme.
- **the profile of the membership (and how this will develop in the future)** in particular in relation to:
  - the **number of members;**
  - the **nature of the** sponsor's **business;**
- **generosity of benefits *eg*:**
  - **any options** and guarantees **available to members (particularly if they are valuable options),** eg on early retirement
  - **any views from the** key stakeholders, for example **sponsor on future pay increases**
  - **any views from the sponsor and trustees / scheme management committee on any cost of living increases to pensions not guaranteed in the rules.**

3.1 Investment policy

The investment policy will influence the expected investment return, and hence the choice of the discount rate assumption **(*i*).** This, in turn, is likely to be influenced by the type and size of the scheme's liabilities.

Additionally, if the investments held are not a good match for the type and size of liabilities of the scheme, there will be a greater risk. This could be allowed for by adopting more cautious assumptions, to create in effect, a mismatching reserve.

The size of such a reserve can be calculated using asset-liability modelling techniques.

As well as consideration of the current strategy, some thought should be given to how it may evolve in the short, medium and longer term. A scheme may have an agreed 'journey plan' under which the investment strategy is expected to move over a period of time (or on hitting certain triggers) to a lower risk / better matched strategy.

Question

Compare the discount rate for a closed scheme, with few active members, with that for an ongoing scheme, assuming it takes into account the current investment strategy.

Solution

A closed scheme with few active members might be more likely to adopt a policy of matching deferred pension and pensioner liabilities. In these circumstances the assets held may be mainly fixed interest and index-linked government bonds with few equities being held. The choice of the discount rate should then be based on the returns from these investments rather than equities.

A lower value for the discount rate may also be chosen as the trustees' risk appetite may reduce (given the scheme is maturing and the employer's ability and willingness to fund a closed scheme may be lower than for an ongoing scheme).

Whether the investment policy affects the choice of discount rate depends upon the valuation method chosen. Valuation methods are discussed in the next chapter.

3.2 Sponsor covenant

The sponsor covenant helps determine the level of prudence in a valuation approach and is discussed in more detail in the next section.

The strength of the sponsor covenant may also have an effect on the investment policy and the prudence of the valuation approach, for example when setting the **assumptions. All other things being equal, the trustees' appetite for risk might be higher if the covenant is strong (justifying a lower margin for prudence between the discount** rate **and assumed investment return).**

For a weak sponsor, prudent assumptions are likely to be preferred. For a strong sponsor, the impact on covenant is less straightforward. An argument can be made that the stronger sponsor can afford to take more risk, and therefore less prudence is required. However, a view could also be taken that the long-term strength of any sponsor is very difficult to predict, and therefore a more prudent approach should be adopted now if the sponsor is able to afford the resulting contributions.

3.3 Membership profile

The term of the liabilities will depend on the age profile of the membership. If the scheme is closed (no new entrants) the term of the scheme may be much shorter than for a scheme open to new entrants (where new entrants are expected).

This may affect the choice of both the funding method and the key assumptions, for example:

- **where it is expected that the membership profile will remain consistent over time (which may be a reasonable assumption if the scheme is open to new entrants), a projected unit funding method may provide a stable contribution rate between valuations and it may be appropriate to base the discount rate on the current investment strategy**

  Funding methods, such as the projected unit method, are discussed in the next chapter.

- **where the scheme is maturing (*eg* because it is closed to new entrants) it may be expected that the investments will move to lower returning / less risky assets over time, suggesting a lower, or term-dependent discount rate.**

The balance of liabilities between active members, deferred pensioners and pensioners will influence the importance of some of the assumptions.

For example, in a scheme which is relatively new, the difference between the discount rate and salary increase assumptions (*i – e*) may be the most important if the benefits are linked to salary**. If the scheme is in decline with mostly pensioners and deferred pensioners, then the difference between the discount rate and pension increase / pension revaluation assumptions (*eg i – pinc*) may be of greater importance.**

Number of members

For small schemes, broad assumptions are often necessary because of the paucity of reliable experience data.

This may involve ignoring some of the assumptions, for example withdrawals; indeed, in some cases all pre-retirement decrements. Care should be taken that such assumptions are reasonable (in particular, where an option may be generous to members) and also to take into account any insurance arrangements in place.

Any profits arising from these sources (assuming the value of the benefit is less than the actuarial reserve) will emerge as valuation profits. This may therefore represent a prudent approach.

As the overall contribution rate for a small scheme is likely to be more volatile than for a large scheme, this approach can be justified. For example, it can provide a cushion which can be used to smooth contribution requirements.

For very large schemes, detailed experience is likely to be statistically meaningful and assumptions will reflect this. If the scheme is very large, many assumptions usually considered immaterial will be more significant since their impact in nominal terms may still be large, even if small as a proportion of the total liability.

Nature of business

The nature of business is also likely to affect the withdrawal and retirement rates, and possibly the mortality rates.

It may also affect pay rises, either at a general level (if the business is successful, operating in a growth area and wishing to retain key staff it may be anticipated that employees will receive inflationary pay rises that are higher than average), or reflecting the nature of the workforce (for example, the proportion of employees who progress to senior levels).

For some types of employment, withdrawal rates may be extremely high. For example, advertising agencies and computer software companies tend to have very high turnover. For these schemes, the withdrawal assumption might be more significant because withdrawal benefits might form a major part of the total benefits payable.

Mortality rates have been shown to be dependent on the nature of the work. For example, coal miners have higher mortality than clerical workers. However:

- unexpected features are sometimes found due to the selective effects of certain work; for example, those involved in heavy labour might show a lighter mortality than office workers because such manual workers need to be physically fit (the unfit are often removed by ill-health retirement or withdrawal)
- within an industry or a particular company, different groups of employees might experience different mortality. For example, top managers might be more likely to die earlier due to stress-related illnesses. Different mortality assumptions may be chosen for, say, works, staff and executive members of the same scheme.

3.4 Member benefits, *eg* options and guarantees

The value of a member's benefits could differ materially depending on whether a member leaves service, dies in service or retires, at or after normal retirement age, or early in good health or on incapacity grounds.

In some schemes members have options as to the form in which they may take their benefits, and guaranteed terms may apply (which may not be actuarially neutral). Typically, these may include the age at which a member may retire, (in some countries) an option to take some or all of their pension as a lump sum, and possibly to surrender a part of their pension for additional pension to their spouse.

Sometimes, these options are subject to consent from the plan sponsor or the trustees. However, where they are available at a member's option, or they are usually provided by the employer / trustees, it is important to consider their effect in the valuation, particularly where the terms are generous to the member, compared to not taking the option either generally or in specific circumstances.

More complex member options and guarantees (*eg* a benefit that is based on the greater of a defined benefit formula and member contributions accumulated in line with an investment return) may need to valued using a stochastic approach. This will model the additional liability arising as a result of the existence of the option or guarantee, under a range of sets of assumptions. Within such calculations, member behaviour should be modelled to be consistent with the economic scenario in the set of assumptions for each run.

4 Other factors

Other factors to consider when setting assumptions include:

- financial significance
- consistency
- external factors

4.1 Financial significance

Accuracy

The actuary will need to consider the purpose for which the assumptions are to be used in order to judge the degree of accuracy that is required.

For example, an asset-liability modelling study requires detailed assumptions relating to the incidence of future cashflows, whereas a valuation to determine an approximate cost of a proposed benefit improvement could be performed with very broad assumptions.

The actuary should be aware of the potential financial significance of errors in the assumptions that are to be made, as this will also help in the judgment of the degree of accuracy required.

The significance will depend on the potential effect of the decisions that will be made based on the results of the valuation. It is also important to consider the type of valuation being completed *eg* funding, accounting, solvency.

Increasingly, the underlying results of a valuation are being used as a basis for cashflow forecasts, which are then used as a basis for a hedging strategy to reduce the risks to the scheme from changes in inflation expectations and/or in interest rates.

Here it is important that assumptions are realistic since the pattern of future benefits is important if the hedging strategy is to be effective. Any margins for caution or simplifying assumptions (made on the grounds of the simplification not impacting the actuarial value of the benefit) should be identified and considered.

For example, early retirement benefits may have a broadly similar value to a pension paid at normal retirement age, but the pattern of payments could differ significantly, particularly where a member also commutes a part of their pension for cash at retirement.

Sensitivity

Unless a valuation has been based on a stochastic method, the results will be captured in a single result.

As the timing and level of benefits, contributions and asset income are not certain, any assumptions made are unlikely to be borne out in practice. This uncertainty should be communicated to the client and the final point estimate values will depend on the purpose of the valuation and the degree to which risks are acceptable to the client.

The valuation itself will not change the ultimate cost of the scheme, which will reflect the actual payments made, but does affect the pace of and adequacy of funding on this journey.

A key part of most valuations will therefore be to ensure that the users of the report understand the uncertainty of the results and the effect of other plausible assumptions on those results. Indications of sensitivity of the results to key assumptions might include:

- **The assumed investment return underlying the discount rate either itself or relative to other key financial assumptions, such as the assumption for pension increases and/or pay inflation.**
- **Independently, the assumption for price inflation and the impact on pension increases.**
- **The base mortality rates and allowance for future improvements.**
- **Other demographic assumptions, for example early retirement terms, or any assumption for the proportion of benefits commuted for cash at retirement.**

Any other assumption which it is proposed should be changed from that used previously.

4.2 Consistency

The valuation approach should be reviewed for consistency, which could mean:

- consistency with the previous approach – the same approach could be taken as before, with the assumptions updated for demographic trends or changes in market conditions
- consistency between the method and assumptions – the level of prudence in the funding approach comes from a *combination* of the funding method and assumptions
- consistency in the valuation of assets and liabilities – for example, if assets are taken at market value, for consistency the liabilities should be valued using a market-related approach, *ie* mark to market, bond yields plus risk premium or asset-based discount rate
- consistency within the assumptions – it is the 'gaps' *between* the assumptions that are more important than the *absolute* value of the individual assumptions (unless a scheme holds fixed assets or pays fixed benefits), *eg* the relationship between salary growth *e* and the discount rate *i* is often more important than their absolute values of *i* and *e*.

4.3 External factors

Regulation

Any statutory requirements should be considered.

Regulation may prescribe the assumptions to be used or how they should be determined, the frequency at which the valuations are carried out, the information to be disclosed and the particular financial checks to be performed.

Several financial checks may be required, *eg* to test that funds held are sufficient, *ie* a minimum funding check but not excessive, *ie* a maximum funding check.

Market conditions

If the assets are valued at market value, the assumptions used for investment return and inflation when valuing the liabilities should reflect market conditions as at the same date.

5 Prudence

The main objective of the trustees is to ensure that the members will receive the benefits they are entitled to as they fall due. Therefore, they will generally wish to choose an approach which is prudent in order to increase the likelihood of the liabilities being met.

When determining whether a valuation approach is prudent and reasonable, it is conventional practice to consider the aggregate effect of the assumptions and methods. For example, if a degree of prudence were introduced into each assumption, the actuarial basis when taken as a whole may be far more prudent than had been intended.

5.1 Definition of prudence

The actuary should also be aware that 'prudent', as used in most actuarial valuation bases, is not 'prudent' as may be understood by the member of the pension scheme.

The member of the pension scheme may understand 'prudent' to mean that there was an almost certain chance they would receive their benefits whether or not the sponsor defaults and the scheme goes into wind up, or if it continues to support the scheme.

UK example

In comparison, the level of prudence in the typical UK ongoing valuation actually allows for a fairly high chance that the benefits will not be met and the reported ongoing funding level will often represent a misleading indicator of the benefits that the member might receive on wind up (which will depend not just on the solvency position, but the future contribution payable and the extent to which any Section 75 debt on insolvency is covered by the sponsor's assets or other contingent arrangements.)

5.2 Allowance for prudence

Any allowance for prudence could mean understating or overstating the assumption, as appropriate. For example, lower investment return assumptions are typically more prudent, but for pension increases it is higher assumptions that lead to higher liabilities and are therefore more prudent.

For completeness, it is worth noting that there is an alternative approach to providing prudence in the valuation, which is to set each assumption at a level considered broadly a best estimate, but then include in the valuation explicit additional reserves to provide a buffer against possible adverse experience. Many of the factors described below would be relevant in assessing the desirable size of such a buffer.

In deciding on a set of best estimate deterministic assumptions, an actuary is effectively trying to find the median of a probability distribution for each factor. Prudence can be introduced by taking a margin relative to the median.

It is also worth noting that, in advising on the appropriate level of prudence, the actuary may have in mind a certain probability of the assets being sufficient to meet the liabilities.

Such a framework can be achieved in an approximate manner by considering the likely variability of the assumptions and the financial significance of each assumption. However, this is not a formal probabilistic framework. **If a more formal approach is required to this question, a stochastic model can be used** that includes setting probability functions for the assumptions (where sufficient and relevant data makes this possible).

5.3 Degree of prudence

When determining the methods and **assumptions, the actuary will need to consider the degree to which the proposed assumptions should represent realistic views of future trends, and the degree to which some element of prudence is desirable.**

The factors to take into account in deciding the degree of prudence to be adopted are generally the same factors as those to think about when setting the valuation approach, and so have already been discussed in this chapter.

Key factors to take into account in deciding the degree of prudence to be adopted include:

- **The objectives of the parties involved. This is explained further below.**
- **The purpose of the calculations.**

  For example, for funding valuations, there is normally a desire (or, as is the case in the UK, a legal requirement) to ensure that the assumptions chosen overall are prudent. This is because, for the purpose of setting contributions, there is normally a desire to have more than 50% confidence that the assets and future contributions payable will meet the benefits as they fall due.

  However, for accounting purposes, in line with general accounting principles, there is usually more emphasis on choosing assumptions which are an unbiased realistic assessment of future experience.
- Scheme specifics *eg*:
  - **The reliability of the information on which the assumption is based.**

    Where the data used is not extensive or is of questionable accuracy, more prudence may be appropriate in the assumptions …

    … *eg* for a very large scheme the mortality assumptions adopted may be very close to the experience of the scheme itself, whereas for a slightly smaller scheme, while the experience may be relevant, it may also be appropriate to take a bigger margin. (For small schemes, the mortality experience of the scheme itself is likely to be of limited relevance in any event).
  - **Historic information on the extent of variation in the assumption relative to the best estimate …**

    … *eg* investment returns on equities fluctuate markedly from year to year, and it is difficult to have any confidence in the accuracy of any one best estimate for the future so a greater margin for prudence may be warranted …

    … and rates of retirement by age are often relatively stable for any given employer unless there has been a significant change in the sponsor, and so there may be more confidence in the assumption adopted.

- **The financial significance of the assumption in the overall valuation.**
- External factors, *eg* **any requirements for prudence in relevant legislation, professional standards or other formal documents or required by relevant regulators.**
- Consistency, *ie* **the extent to which other assumptions are prudent, and hence the overall prudence in the valuation basis.**

  In most cases where assumptions are used to place a capital value on future cashflows, it will not be necessary for the actuary to make a judgement about the accuracy of each assumption. Instead it will be necessary to judge that the overall value resulting from the combination of assumptions is appropriate.

  It may also be undesirable, in that such an approach could lead to an excessively prudent overall valuation (the logic for this is that the likelihood of two, for example, 1 in 10 events occurring simultaneously is significantly lower than 1 in 10).

  Nevertheless, it is not generally appropriate to allow for uncertainty in one assumption by introducing a margin in a different assumption. Where the individual cashflows are important, it will be necessary for the accuracy of each assumption to be judged.

Funding valuations

In determining the degree of prudence in the approach **for funding valuations, considerations may also include:**

Sponsor covenant

The strength of the employer covenant supporting the scheme. As explained elsewhere, a strong sponsor is more likely to be able to increase contributions if future experience is not as assumed, and this may justify lower prudence. However, there is a balance to be struck between this and ensuring that, while a sponsor is in a healthy position and can afford to pay contributions, prudence is set at an appropriate level.

Investment strategy

The level of investment risk being adopted. If the scheme invests primarily in very risky assets which are not a good match for the liabilities of the scheme, it may be appropriate to take a more prudent view of likely future returns.

Scheme characteristics

Scheme characteristics such as **the maturity of the scheme. The degree of accuracy in setting assumptions may be more of an issue for mature schemes where liabilities are of a shorter duration than for younger schemes where there may be more flexibility allowed.**

Funding position

Possibly, the current funding position. A well-funded scheme that is targeting a very low risk future strategy may choose to adopt more prudent assumptions in order to be certain that the funds can support the scheme in future, even if the experience is fairly different to that assumed. If consideration is being given in such schemes to awarding discretionary increases or benefit improvements, this may also increase the desire to ensure the funding target itself is sufficiently prudent.

6 Valuation process

6.1 Valuation

As part of any valuation process **values need to be placed on:**

- **The assets held (in a funded scheme).**
- **The future benefit payments from the scheme.** This includes benefit payments in respect of benefits already accrued and benefits that may be earned in the future.
- **The future contributions to the scheme.** These may include contributions to meet benefits that may be earned in the future, insurance premiums and expenses. They may then be adjusted to allow for any difference in the value of the assets held and the value of accrued liabilities.

The values placed on these items will then need to be compared so that a decision can be made about the appropriateness of the future level of contributions (for funding valuations) **or the level of future benefit promises. Often the valuation will separate benefits earned to date from those to be earned in the future, for which a separate budgeting cost will be determined.**

6.2 Sensitivity

A deterministic model is usually used for most valuations **and likely to be sufficient for this purpose. However, there will still remain much uncertainty and volatility. Therefore the strategy for financing the arrangement should not be finalised without consideration of scenario testing (that shows which assumptions the results are sensitive to and the extent of that sensitivity) and possibly stochastic modelling.**

A result of the many legislative, regulatory and accounting requirements relating to pension schemes is that valuation calculations are often prepared and presented on several different bases and methods, with different outcomes in the various results. This can make it difficult for those receiving the results to understand the 'true' financial position of the pension scheme although should provide a better indication of the risks associated with financing the benefits.

Sensitivity was discussed in Section 5.

6.3 Communication

A key role of the actuary is therefore to ensure that the results are communicated clearly and effectively. The report should include clear statements of the purpose and objectives, highlighting the key results with a sufficient description of what they mean, and taking a proportionate approach to matters that are less material to the results.

6.4 Reasonableness checking

A key part of every valuation should be to ensure that the results are reasonable.

For example, in many cases, valuations are completed based on computer programs or spreadsheets which are built based on core programming to reflect a pension scheme's benefits, and then maintained and updated for benefit changes. The valuation process is then a matter of ensuring the correct data is included and the assumptions are updated. At any of these stages, it is possible that errors could occur.

In considering what reasonableness checks are made, the actuary should consider the materiality of a specific feature of the valuation to the results. Key analysis would typically include:

- **The development of the funding position since the last valuation, taking into account both the key factors affecting the scheme (for example, investment returns, pay and pension increases, contributions, demographic experience, benefit payments and any transfers of benefits and/or assets into or out of the scheme), and changes in the assumptions used.**
- **Checks on the data.** These are discussed in detail in Chapter 17
- **Specific checks on the impact of any benefit changes.**
- **Ensuring the valuation of specific key benefits for large groups of members is consistent with their average age, and with the valuation at the previous valuation.**

6.5 Compliance

Finally, the actuary should ensure that the valuation complies with relevant local and international professional standards.

UK example

The UK standards TAS 100 (Principles for Technical Actuarial Work) and TAS 300 (Pensions) provide a useful framework that could be applied in other countries and should be read as a part of this chapter.

TAS 100 and TAS 300 are summarised in Chapter 5.

Chapter 15 Summary

This choice of valuation approach will be influenced by factors including:

- the purpose of the valuation
- the objectives of the key stakeholders
- the sponsor covenant
- the investment strategy
- the scheme characteristics
- the financial significance
- consistency
- external factors.

The purpose of an actuarial valuation is to help stakeholders (*eg* the sponsor, trustees and members) in decision making.

Funding valuations

The employer's objectives may include minimising cost, acceptable risk, contribution stability and flexibility and consistency with accounting standards.

The trustees' objectives will include security of benefits which may require the continued prosperity of the employer.

There is normally a desire (or, as is the case in the UK, a legal requirement) to ensure that the approach is prudent. This is because, for the purpose of setting contributions, there is normally a desire to have more than 50% confidence that the assets and future contributions payable will be sufficient to meet the benefits as they fall due.

Accounting valuations

Valuations performed for the purposes of shareholder disclosure use methods and assumptions which are to some degree prescribed by the relevant accounting standards.

In line with general accounting principles, there is usually more emphasis on choosing assumptions which are an unbiased realistic assessment of future experience.

Discontinuance valuations

As part of a regular valuation exercise, these valuations work from the basis of the 'what if' scenario – for example that there will be no further funding available from the employers.

A discontinuance valuation may also form a useful basis for planning if it seems likely that a scheme will discontinue in the near future, or in setting a longer term funding target.

Discontinuance valuations can be completed using a solvency approach, a self-sufficiency approach or a transfer value approach.

Valuation process

The valuation process involves:

- placing values on assets, benefits and contributions
- sensitivity and scenario testing
- reasonableness checking
- communication of results and decision making
- ensuring compliance with legislation, regulations and professional guidance.

Chapter 15 Practice Questions

15.1 Exam style

XYZ plc operates a defined benefit pension scheme that is currently closed to new entrants but open to accrual in relation to existing active members. It is a large scheme where experience data is generally statistically significant over an inter-valuation period.

The trustees are considering the relationship between the value of the liabilities measured on a prudent funding basis and a best estimate basis. Their view is that the funding liabilities should incorporate a margin for risk so that the scheme, when fully funded, will have sufficient assets to cover the best estimate value of liabilities in 99% of possible scenarios at all times over the three-year period following the calculation.

Discuss the suitability of this approach in providing security for the benefits payable under the scheme. [8]

15.2 Exam style

You are the actuary to a pension scheme which has a defined benefit section (which is closed to future accrual) and an open defined contribution section. The Trustees wish to provide active members with a projection facility to assist them in deciding on whether they wish to pay additional contributions into the defined contribution section. Discuss how you would design this projection system. [6]

15.3

List ten different circumstances in which a pensions actuary may be required to value assets and/or benefits. [5]

The solutions start on the next page so that you can separate the questions and solutions.

Chapter 15 Solutions

15.1 *This question is based on Subject SA4, April 2013, Question 1.*

Why this approach may be suitable

It could be regarded that 99% is a very high probability that the scheme will have sufficient assets to cover its liabilities on a best estimate basis over the next three years, and so ... [½]

... the reserves required (*ie* the extra assets over and above those needed to cover the best estimate cost) are likely to be substantial if they are to give such a high probability that the best estimate liabilities are met over the next three years ... [½]

... and this should hopefully offer a high level of security to members ... [½]

... particularly compared with if a best estimate had been used (which would result in the probability of there being sufficient assets to meet the liabilities at a given point in time being only 50%). [½]

The more assets held, the more secure the scheme. [½]

If the scheme were actually to wind-up then any salary link or escalation may be broken and this adds a further margin in the calculations. [½]

The approach taken to funding allows for the interaction of funding risk and investment risk. In that if a risky investment policy is followed more assets will need to be held to keep the probability that funds will be sufficient at 99%. [½]

This approach may encourage the employer to actually be 100% funded on the prudent funding basis … [½]

… as once the scheme is fully funded, the probability of being able to meet the best estimate liabilities is very high … [½]

… and it may be felt this level of funding should mean that little further reliance on the employer may be required. [½]

Alternatively, this approach to funding can be combined with other actions to increase security to this desired level – *eg* the scheme could be closed to future accrual and contributions redirected to paying off any deficit. [½]

Problems with this approach

There is significant scope for model and parameter error, as the size of the reserve will critically depend on the model and parameters chosen. [½]

If the scheme is less than 100% funded on the basis determined by the model, the chance of meeting the liabilities on a best estimate basis will be less than 99%. [½]

The prudent funding basis that comes from the model may be stronger or weaker than the cost of buying out the liabilities with an insurance company, as there is no direct link between the two bases. [½]

A solvency basis would be the ultimate measure of security for the accrued liabilities. [½]

However, insurers normally charge significant margins to take on pension scheme liabilities, so being fully funded on the prudent funding basis may not be sufficient to meet the buy-out cost. [½]

Being fully funded on a best estimate basis is even less likely to be sufficient to meet the buy-out cost. [½]

This would then mean that there is still a reliance on the employer:

- This may be acceptable if the scheme is ongoing and the employer is able and willing to meet the necessary contributions, or if other actions can be taken to improve security (such as guarantees, contingent assets *etc*)… [½]
- … but if the employer is unwilling or unable to pay, or becomes insolvent, then this strategy would not be suitable. [½]

  In this case of insolvency, the trustees will need to secure a reduced level of benefits with an insurance company, or otherwise enter any central discontinuance fund. [½]

  [Maximum 8]

15.2 *This question is based on Subject H, September 1996, Paper 2, Question 4.*

The system should identify the scope for members to pay contributions and the likely level of benefits that they would receive. [½]

It should therefore:

- project any defined scheme benefits to retirement [½]
- project any defined contribution funds to retirement [½]
- project any other pension benefits to retirement *eg* State pension benefits [½]
- compare the value of all pension benefits with any limits on benefits or tax breaks such as the Lifetime Allowance in the UK … [½]

  … and the value of employer and member DC contributions each year with any limits on contributions or tax breaks such as the Annual Allowance in the UK … [½]

  … to determine the maximum additional contribution that can be paid without breaching limits. [½]

The level of scope is likely to depend critically on factors such as the member's existing benefits and his/her chosen retirement age. [½]

Ideally the system should include the facility to:

- project to different retirement ages [½]
- allow for different investment strategies based on the current investment options available and allowing for how the member may change their strategy in the future [½]
- allow for the method that will be used to provide the DC benefits (*eg* annuity, income drawdown)? [½]

The basis used should be reasonably realistic, *ie* provide members with a best estimate of what their contributions will provide. [½]

Avoid excessive prudence or optimism as the contributions may prove to be excessive or insufficient respectively. [½]

The system could produce results on a range of assumptions to highlight the possible range of outcomes and highlight the sensitivity of the results to the assumptions used. [½]

An allowance for expenses needs to be considered if these are deducted from member accounts. [½]

Pre-retirement decrements should be nil … [½]

… because we are aiming to provide a fund that is adequate to purchase benefits for an individual at retirement rather than the average fund across many members. [½]

[Maximum 6]

15.3 ***Regular valuations***

- funding valuation [½]
- solvency valuation [½]
- self-sufficiency valuation [½]
- accounting valuation [½]
- valuation of additional funding objectives [½]
- interim reviews [½]
- individual pension arrangements [½]
- valuations to determine any levy payments, such as to the Pension Protection Fund in the UK (*ie* Section 179 valuation risk-based levy valuation) [½]

Other valuations

- valuations to assess compensation from or entry into compensation funds such as to the Pension Protection Fund in the UK (*ie* Section 143 valuation entry into the PPF) [½]
- calculation of any debt on the employer such as on employer insolvency [½]
- bulk transfer value [½]
- individual transfer value, possibly for the purposes of a discontinuance valuation [½]
- calculation for conversion or amendment of members' accrued benefits. [½]

[Maximum 5]