



Class: MSc Sem 4

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Chapter Name: Determining provisions

Today's Agenda

1. Introduction
2. Reasons for calculating provisions
3. Numerical calculations of provisions
4. Different basis
5. Factors affecting the choice of basis and method
6. Setting the assumptions with regard to the purpose
7. Setting the assumptions with regard to the client

1 Introduction

Provisions are the calculated amounts that need to be set aside to meet a provider's future liabilities. The value of the provisions will depend on the assumptions used to value the future expected cashflows.

For instance, provision for a with profit life insurance policy will be calculated as the present value of the future benefits, plus some profit assumption plus expenses, minus any future premium, calculated at the relevant rate.

A potential source of confusion is the term used to denote the value assigned to the liabilities. It has been the practice of accountants to use the word 'provision' to denote the value of a liability that is known or assumed to exist at the accounting date, and to confine the term 'reserve' to any amount, over and above the provisions, that is available to meet additional liabilities, either in respect of future events or in respect of past events for which the provisions may prove to be inadequate. However, among insurers, and also among actuaries, there has been a long established practice of applying the term 'reserve' to both categories.

2 Reasons for Calculating Provisions

- The need for provisions
 - to determine the liabilities to be shown in the provider's published accounts and reports
 - if separate accounts and reports are prepared for the purpose of supervision of solvency, to determine the liabilities to be shown in those accounts
 - to determine the liabilities to be shown in internal management accounts and reports of the provider
 - to value the provider for merger or acquisition
 - to determine the excess of assets over liabilities and whether any discretionary benefits can be awarded
 - to set future contributions to a benefit scheme
 - to value benefit improvements for a benefit scheme
 - to calculate discontinuance / surrender benefits
 - to influence investment strategy
 - to provide disclosure information for beneficiaries.

2 Reasons for Calculating Provisions

The provider's risk management strategy will be an important influence on the level of provision required for these additional risks. A detailed and effective risk analysis and management system, that is regularly monitored and updated, will reduce exposure to some financial and non-financial risks, and can thus justify holding a lower level of provision against these risks.

The better the risk management process, the less stringent are the provision requirements. This is because a more comprehensive risk management would ensure lesser exposure to financial and non financial risks, and hence lesser capital will needed to be held, thus enabling more capital to be utilised for other purposes.



Explain why an additional provision for mismatching would likely need to be established on a group rather than on an individual contract level.

3 Numerical Calculations for Provisions



➤ Life insurance

Here the reserves are typically calculated by discounting the cashflows or by using a formula.

A 10-year annual premium term assurance policy is issued to a group of lives aged 50 exactly. The sum assured is £20,000 and is payable at the end of the year of death. The annual premium is £100 and expenses are assumed to be zero.

Write down an expression for the reserve immediately before the seventh premium is due. Since expenses are being ignored, the reserve can be calculated as the expected present value at the end of the fifth year of the outstanding benefits less the outstanding premiums.

This gives

$$V_{56:4}^1 = 20,000A_{56:4}^1 - 100\ddot{a}_{56:4}$$

3 Numerical Calculations for Provisions



➤ General Insurance

Outstanding claim reserves are generally calculated using run-off triangles.

Claim Payments (\$'000)		Development Year			
		0	1	2	3
Accident year	X	17,500	5,000	2,250	750
	X+1	21,000	6,200	2,750	
	X+2	18,800	5,500		
	X+3	21,300			

3 Numerical Calculations for Provisions



The table above shows the claim payments on a household insurance portfolio in each development year, for accident years from year X to year $X+3$.

Estimate the outstanding claims reserve at the end of year $X+3$, in respect of accidents occurring between the start of year X and the end of year $X+3$, using the basic chain ladder method.

The procedure is to:

1. produce a table of cumulative claim payments
2. determine the development factors for successive development years
3. use the development factors to project the cumulative claim payments
4. determine the outstanding claims reserve by subtracting, for each accident year, the claims paid to date (leading diagonal figures) from the total projected claims (last column figures).

3 Numerical Calculations for Provisions



If we write the development factors over the appropriate columns, the table of cumulative claim payments looks like this:

Claim Payments (\$'000)		Development Year			
		0	1	2	3
Accident year	X	17,500	22,500	24,750	25,500
	X+1	21,000	27,200	29,950	30,858
	X+2	18,800	5,500	26,745	27,555
	X+3	21,300	27,508	30,275	31,193

3 Numerical Calculations for Provisions



The outstanding claims reserve is:

$$(25,500 - 25,500) + (30,858 - 29,950) + (27,555 - 24,300) + (31,193 - 21,300) = \$ 14.1\text{m.}$$

4 Different Basis

➤ The Best Estimate Basis

As the timing and level of benefits, contributions and asset income is not certain, an actuary can never be certain that a set of assumptions will be correct.

The actuary can consider information and apply judgement to produce a set of assumptions that they feel to be their 'best estimate' of future experience. This can be defined as the set of assumptions that has equal probability of overstating or understating the values.



- (i) List the key assumptions the actuary will need to make to value the benefits from an employer-sponsored medical benefits scheme.
- (ii) Suggest sources of information that the actuary could use to set a best estimate basis to value these benefits.

4 Different Basis

➤ Basis Other Than Best Estimate

Actual assumptions may differ from the best estimate basis, because at times a more cautious or a more optimistic view may be regarded as suitable.

Other estimates would be :

- Optimistic – a higher value is placed upon the assets and a low value on liabilities
- Cautious – it's the opposite of an optimistic approach and is highly prudent, with a high value placed on liabilities and a low value on liabilities

The definition of 'prudence' is subjective in nature and is open to different levels of interpretation. Hence the exact meaning and level of prudence needs to be clarified when communicating and making decisions.

5 Factors Affecting the Choice of Basis and Method

➤ Purpose and Client

The following factors will usually dictate the strength of the basis on which values should be produced:

- The reason a value needs to be determined – for example if the purpose of valuation is to demonstrate the company's financial strength and security, a prudent basis is preferred, whereas a best estimate basis is preferred for accounting purposes.
- The needs of the client – regulators, beneficiaries, trustees, debtors, shareholders, etc
- The requirements of any legislative or regulatory authority

In some cases, the valuation method may also be prescribed.

In many cases presentation of a range of values, or values for alternative scenarios, may be more useful to the client in making any necessary decisions.

For example, before making a long-term financial commitment a retirement benefit scheme's sponsor may wish to know the actuary's 'best estimate' of the costs and also the costs assuming a worse scenario for future experience.

5 Factors Affecting the Choice of Basis and Method

➤ Nature of the Assets

There are occasions when, to determine the value of the liabilities, it will be appropriate to take account of the nature of the assets. Examples are:

- when the liabilities are specifically linked to the underlying assets, such as a unit trust or internal investment fund
- when the covenant of the sponsor has no value, eg when a pension fund is set up by a sponsor, but the sponsor makes no commitment to provide funds to make up any shortfall should the assets held turn out to be insufficient to meet the benefits promised. In this situation the benefits paid may need to be reduced to reflect the actual assets available.
- for the market-consistent valuation of liabilities in relation to financial guarantees on life insurance contracts, since the value will depend on the volatility of returns on the assets held.

6 Setting the Assumptions with Regard to the Purpose

➤ Assumptions Used for Published Accounts (Decision by Shareholders)

Shareholders and potential shareholders make decisions using information in a company's accounts. It is, therefore, preferable for values to be included in the accounts that represent an actuary's 'best estimate' of the future experience. The use of assumptions that are more likely to overstate or understate the liabilities or assets may lead to wrong decisions being made.

The assumptions to be made in determining the liabilities to be shown in a provider's published accounts and reports should have regard to the legislation and accounting principles governing the preparation of those accounts in the country concerned. Matters to be considered include:

- whether the accounts and reports are to be prepared on a going concern basis
- whether the accounts and reports are required to show a true and fair view
- whether provisions are required to be assessed as best estimates or on some other basis, and precisely how the terms used are to be interpreted.

6 Setting the Assumptions with Regard to the Purpose

❑ Going Concern vs Break-up Basis – Insurance Companies

A going concern - The accounting basis normally required for an insurer's published accounts, that is based on the assumption that the insurer will continue to trade as normal for the long-term future.

A break-up basis - A valuation basis that assumes that the writing of new business ceases and cover on current policies is terminated. In relation to general insurance policies, current policyholders would normally be entitled to a proportionate return of the original gross premium. Deferred acquisition costs would probably have to be written off. Also known as a wind-up basis.

6 Setting the Assumptions with Regard to the Purpose

❑ Going Concern vs Break-up Basis – Benefit Schemes

Just like insurance policies, a going concern assumes the benefit scheme to continue. Funding valuations are conducted to assess:

- If the scheme has sufficient assets to cover the liabilities i.e. the benefit payments on a continuing basis
- The contribution rate for the scheme and rectify any shortfall within the scheme
- If the scheme follows a suitable investment policy, such as one which allows efficient matching of assets and liabilities

A break basis that any future benefits payable under the scheme will cease to accrue on the valuation date. Discontinuance valuation, where another company or benefit provider will buy the liabilities of the current provider, then the assets will be valued using a market value approach.

6 Setting the Assumptions with Regard to the Purpose

➤ Assumptions Used for Demonstrating Supervisory Solvency (Decisions by Regulators)

Regulators may wish to consider values that present a realistic picture of a provider's finances. Alternatively, they may wish to consider values that intentionally understate (or perhaps overstate) the financial strength of the provider.

For instance, pension schemes need to ensure that the ratio of cash to liabilities is not high, i.e. the scheme isn't used as a tax haven by the provider. This is demonstrated by carrying out a maximum funding test.

The provider may act intentionally prudent in this case, so as to underestimate the scheme's financial strength. the only way the scheme fails to match the standards, if it has far too much surplus funds, or its is religiously overfunded.

The assumptions used may be dictated by legislation or left to actuarial judgement with a requirement for disclosure of the assumptions used.

6 Setting the Assumptions with Regard to the Purpose

❑ Supervisory Solvency

Regulators are highly concerned when it comes to the providers demonstration of solvency. The key priorities when demonstrating solvency are:

- The level of prudence i.e. to what extent the provider tends to overestimate or underestimate his assets relative to his liabilities
- Prescription of methods / assumptions by the supervisory authority

Different providers have different methods of establishing provisions used to demonstrate the solvency. Some providers may use a best estimate basis with a few margins. This requires insurance companies to hold an excess of assets over liabilities known as the solvency capital.

In cases where the prudent is prudent, he may be required to hold little or no solvency capital in excess of individual policy provisions

6 Setting the Assumptions with Regard to the Purpose

If separate accounts and reports are required as part of the process of supervision of solvency, the rules governing the preparation of those separate accounts and reports may or may not be the same as those that apply to the other accounts and reports. They may, for example, be required to be prepared on a going concern basis or on a discontinuance basis.

Rules governing the preparation of these accounts and reports might concern the:

- Valuation method of assets and liabilities
- Assumptions used to value assets and liabilities
- Types of assets that can be held
- Level of global provisions to hold

Reference should be made to the rules and any guidance that may have been issued as to their interpretation.

6 Setting the Assumptions with Regard to the Purpose

➤ Assumptions Used for Internal Accounts

Directors or trustees of a pension scheme may require internal accounts to aid their decision making. These accounts may be formed using the best estimate basis.

➤ Assumptions Used for Liability Transfer

❑ Reasons for Liability Transfer

It may become necessary to transfer liabilities and assets from one provider to another.

Transfer of liabilities arises when two companies go for a merger or when one company acquires the other.

If a general insurer may cease to write motor insurance business, he may transfer any outstanding liabilities to another general insurer, along with sufficient assets to cover the expected costs.

Liabilities may also be transferred as a means for risk management

In either of these situations, the level of assets needed to cover the expected liabilities will depend on the valuation of those liabilities and hence on the method used to establish their value..

6 Setting the Assumptions with Regard to the Purpose

In such cases, the values being placed on benefits and assets have a monetary worth. It is important that both the transferring and receiving parties view the terms of the transfer as being fair.

❑ Setting the Assumptions

In many cases, the need to be fair or the need to agree with another actuary will mean that the assumptions used will be a 'best estimate' of future experience.

The best estimate basis ensures fairness for both the parties, because if actual experience is in line with the best estimate assumptions, then the cost of transfer will be neutral for both the parties.

However, it need not always be the case that a best estimate basis is used.

Where a negotiation is taking place, the agreement reached between the two sides may be influenced by the relative power of the parties for whom the actuaries are acting. For example, one party may have more desire for the transfer to go ahead than another.

6 Setting the Assumptions with Regard to the Purpose



Company A is taking over Company B and the existing liabilities (and enough assets to cover them) of Company B's pension scheme are to be transferred into Company A's scheme.
Explain which strength of basis Company A would prefer: optimistic, best estimate or prudent.

It is also possible that the two sides agree that the transfer amount should not reflect a 'best estimate' of future costs, perhaps because of recognition of a need to hold a margin to protect the security of the benefits.

Assumptions Used to Determine Whether Discretionary Benefits can be Awarded

Discretionary benefits would be paying a higher benefit amount or declaring a bonus on a with-profit policy. Here the company would use an underestimate approach in valuing the assets so as to not overestimate the surplus available and to avoid the burden of distributing the benefits.

6 Setting the Assumptions with Regard to the Purpose

- Assumptions Used in Setting Contributions to a Benefit Scheme
 - The assumptions applied depend on the goals of the parties involved.
 - The trustees would primarily be concerned with the security of members rights, hence would be of the idea of overstating future benefits, as a cautious approach. However, balance needs to be maintained, as an overly cautious basis may discourage the employer from providing the scheme because of the high contributions
 - The sponsor in turn pay contributions and hence would not want to pay more than what is necessary. However, other short, medium and long term objectives such as alternative uses of capital may exist.
 - For benefit schemes, the structure of the membership can have an effect on the assumptions used.
 - For example, a scheme that is closed to new members will have a membership that will grow older as members retire, leave or die. This will have to be taken into account in assessing future contributions.
 - Conversely, in an open scheme with a large active membership, it is likely that leavers will be replaced with new recruits, and thus that the average age of the active membership will be broadly unchanged. This assumption may generate a different future contribution rate than for the closed scheme.

6 Setting the Assumptions with Regard to the Purpose

- Assumptions Used to Calculate Discontinuance / Surrender Benefits

Applying the best estimate basis when setting surrender benefits leads to having a realistic valuation of benefits.

- Assumptions Used to Set Investment Strategy

A decision relating to financing, including any investments held to meet future liabilities, will involve the consideration of realistic and cautious values for a potentially large number of options. It is likely that a stochastic approach can add significant value in assessing the risks and values under each possible strategy.

- Communication of Information to Beneficiaries (Decisions by Individuals)

Individuals may need to make decisions about the level of benefits required, the return that they gain on contributions and the security of benefit provision.

In order to make decisions relating to their benefit and contribution needs, they will need to consider values that take account of their individual circumstances. These values may be most informative if they present a realistic picture. However, the uncertainty of the values should be communicated so that the individual is aware of the risks of under- and over- contributing.

6 Setting the Assumptions with Regard to the Purpose



Outline the risks to the individual of over-contributing.

For example, where an individual is averse to the risk of under-provision, it may be appropriate to take a cautious approach to the valuation of future contribution needs.

7 Setting the Assumptions with Regard to the client

Different clients will have different purposes for a liability valuation.

If the purpose of valuation is the same for two clients, their risk management strategy and risk appetite, will highly influence their valuation basis.

A provider's risk appetite will also influence the level of provisioning for risks. In managing the liabilities, there may be a desire to reduce the risk of the provisions set aside being insufficient to meet the benefits promised. A person or company responsible for the management of the provision may therefore wish to consider values that are cautious. The 50% probability of under-provision created by using 'best estimate' assumptions may be too great.

The 50% probability of under-provision created by using 'best estimate' assumptions may be considered too great by trustees responsible for the funding decisions under a benefit scheme, particularly if the benefits being valued are discontinuance rights.

However, trustees and beneficiaries must also note the views of the sponsor. It would not be in the interests of the beneficiaries if a cautious approach to funding led to a sponsor reducing benefits due to excessive projected cost.

A cautious approach will lead to higher recommended contributions. If the sponsor feels that this level of contributions is unaffordable, they may reduce the benefits in order to cut cost. In the extreme case they may decide to close the scheme.

7 Setting the Assumptions with Regard to the client

In the case of an employer sponsor, a cautious approach could also lead to other cuts in the business, or perhaps insolvency. These may also not be in the interests of employee beneficiaries.

The valuation basis chosen by the sponsor, will depend on several factors such as security, opportunity cost of providing the benefits, other uses of the capital, taxation etc.

An optimistic approach is reasonable if the sponsor has other alternate uses of the capital and would prefer lower contributions for the time being. He may compensate in future by adopting a more cautious basis.