The Trustee toolkit downloadable

Funding your DB scheme

Tutorial three: Calculating the liabilities

By the end of this tutorial you will better understand:

- the legal requirement to have sufficient and appropriate assets to meet the liabilities for accrued rights
- how scheme liabilities are a stream of future benefit payments
- the calculations actuaries use to work out the present value of future benefit payments
- how assumptions are used in the calculation to value liabilities

This tutorial is part of Scenario two.

Glossary

A detailed glossary of technical terms can be downloaded from the Resources tab when you log in at www.trusteetoolkit.com

The Pensions Regulator

Actuarial calculations

The scheme's liabilities are a stream of future benefit payments. The rights to some of these future payments have already been earned. They are therefore referred to as accrued rights to benefits. Other benefit payments will be earned in the future.

Legislative requirements

Pensions legislation requires that schemes have sufficient and appropriate assets to meet the liabilities for the accrued rights (the statutory funding objective), or a recovery plan for reaching that position. Trustees must also prepare a schedule of contributions which sets out the rate of contributions payable towards the scheme by employers and employees.

Calculations

The actuarial valuation looks at two sets of calculations. These determine:

- the size of the liabilities for accrued rights to benefits. This is the past service liability, also known as the technical provisions
- the size of the contribution needed to cover the cost of future benefits accruals

Future benefit payments

To work out the value of future benefit payments, the scheme actuary depends (to an extent) on a range of assumptions made about such factors as salary increases, pension increases and mortality rates.

Present value of future benefit payments

The actuary uses assumptions to establish the expected amount of benefits as they fall due in the future. The actuary then then needs to work backwards to decide how much is required in the pension fund now to ensure that sufficient funds are available when the benefits fall due. This will give the actuary the present value of those future liabilities. The size of the liabilities will also depend on the assumption he makes about the investment return on the scheme's assets between now and then. This is known as the discount rate.

Case study: Example calculations

This example illustrates how these types of calculations are made. Note that the calculations are done in two parts: one for past service and one for future service.

The aim of the example is to illustrate some of the concepts such as discounting, but in practice calculating liabilities is much more complex. For instance the actuary would need to take account of the probability of various events happening, such as the member leaving, dying or retiring early on grounds of ill health.

Iain's calculations

Iain is 40 years old. He has ten years service in the scheme and is expected to retire when he's 65. His current salary is £20,000. The scheme offers a lump sum of 1/80th of final salary for each year of service.

Past service liability

$$\frac{10}{80} \times 20{,}000 \times \left(\frac{1.04}{1.06}\right)^{25} = £1{,}553$$

Iain has 10 years of service, so the benefit which Iain has already accrued is calculated as:

- 10 x 1/80 x Iain's current annual salary of £20,000 = £2,500

The following part of the calculation is where the actuary is calculating the present value of Iain's future benefit (using an assumption for the investment return). This represents the scheme's liability which will vary according to the assumptions used. In this case, he is assuming:

- future salary increases of 4% pa (ie 0.04)
- an investment return of 6% pa (ie 0.06)

Therefore he uses the multiplication factors of 1.04 and 1.06.

Iain has 25 years until he reaches pension age. The calculation has to be done for each one of the projected 25 years of service until Iain's retirement (ie to the power of 25). This is calculated as follows:

- accrued benefit x salary increase factor / investment return factor for each of the 25 years
- £2,500 x 1.04^{25} / 1.06^{25} = £1,553

The scheme should have assets of £1,553 now to cover the past service liability for Iain's lump sum benefit when it falls due. If the scheme has less than this in respect of Iain's lump sum benefit, it is in deficit, and if it has more, it is in surplus.

Future service liability needs to be calculated for the 25 years until Iain's retirement.

Hence 25 x 1/80 x salary x the salary increase factor (1.04) divided by the investment return factor (1.06) for each of the 25 years in question.

This is calculated as follows:

- (25 x 1/80 x 20,000 x 1.0425) / (1.0625) = £3,882

Future service liability

$$\frac{25}{80} \times 20{,}000 \times \left(\frac{1.04}{1.06}\right)^{25} = £3{,}882$$

The future service liability is £3,882.

This would normally be funded by contribution payments over the period it is being earned, ie over the next 25 years. Broadly speaking this equates to an annual contribution of:

- 3,882 / (£20,000 x 25) = 0.8% of salary each year for the next 25 years

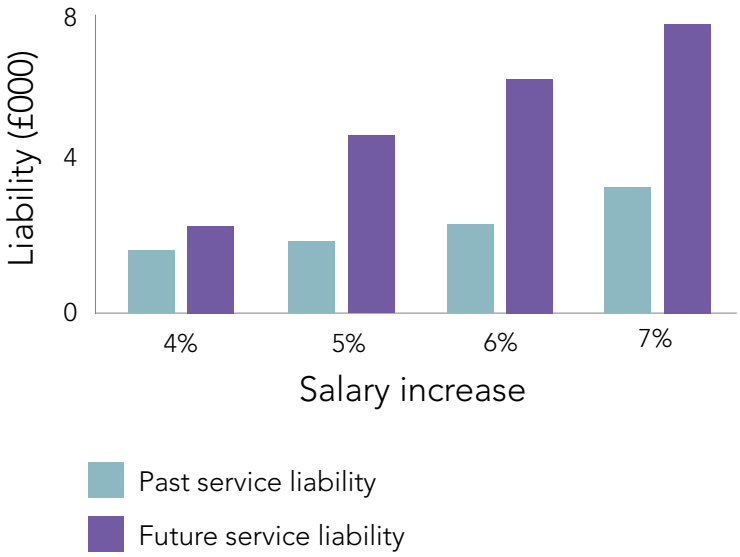
In practice, the calculation is slightly more complicated as it needs to take account of the increase in salary for each year of service.

Case study: Using different assumptions

Suppose the assumptions made for Iain are incorrect. What if, for example, his salary increases at a higher rate per annum than expected?

As previously mentioned, the aim of the examples is to illustrate some of the concepts such as discounting, but in practice calculating liabilities is much more complex (for instance the actuary would need to take account the probability of various events happening such as the member leaving, dying or retiring early on grounds of ill health).

In the original calculations the actuary assumed salary increases of 4%. This gave a past service liability of £1,533 and a future service liability of £3,882.



If Iain's salary increases 5% pa, his past service liability would be £1,973 and his future service liability would be £4,931.

If Iain's salary increased at the same rate as investment return (6% pa) his past service liability would be £2,500 and his future service liability would be £6,250.

With a salary increase of 7% pa the liability for Iain's past service would be £3,161 and the future service liability would be £7,904.

The chart shows the effect on the liability due to Iain's lump sum benefit only. When looking at the scheme as a whole, the lump sum benefit would have to be calculated for each member and they would all have to be aggregated. Even then, no allowance would yet have been made for pension benefits.

Calculating pension benefits

Using Iain's lump sum benefit as an example we've shown the effect of changing one of the assumptions. This demonstrates how much the assumptions affect the apparent size of the liabilities and how important it is to choose assumptions wisely and prudently.

Calculating the present value of pensions in payment (rather than the lump sum) is more complicated, although it follows the same pattern. We have to assume a particular level of increases in pensions in payment.

Length of retirement

You will also need to take a view on how long the scheme will be paying the pension to each member. This is much more difficult to decide and may have a much greater impact on the value of the liabilities than the level of pension increases. This factor is sometimes referred to as a mortality assumption (when the member will die) or as a longevity assumption (how long the member will live in retirement). As these can become confused, we refer to them simply as the 'length of retirement'.

How can you work out the average length of retirement at present? (eg the baseline)

You can only use the mortality experience of a particular scheme to establish the baseline if that scheme is very large. The smaller your scheme, the more likely it is that random fluctuations will make its experience an unreliable predictor of the future.

Trustees of smaller schemes should discuss the best course of action with their actuary, who may suggest using a standard table of mortality. An alternative suggestion from the actuary might be to take particular factors into account, by adjusting the mortality rates in the standard table by a percentage. These factors could include:

- the industry or occupation (some occupations are known to lengthen and some to reduce the length of retirement)
- the gender balance of the workforce
- the size of pension (the higher the income the longer the retirement)
- the geographical area or post code (as proxy indicators for health and length of retirement)

Is the baseline likely to increase in the future and, if so, by how much?

Having established the baseline length of retirement, then you must consider whether this is likely to increase in the future and if so, by how much. Currently the length of retirement is increasing markedly. Information on how to allow for mortality improvements are contained in actuarial mortality models available from the actuarial profession.

Are there other factors to take into account?

You also need to take into account:

- the historical tendency to underestimate the rate of increase in the length of retirement
- evidence which suggests that different age groups ('cohorts') have different experiences so that increases in length of retirement do not appear as a straight line on a graph (the 'cohort effect')
- the very wide variability between individuals

Other considerations

Trustees will have to make a further assumption about the number of members who will leave the scheme early or die before retirement (either of which will reduce their benefits). Just as in the case of lump sum benefits, calculations have to be made in respect of every member individually, including spouses' benefits and death in service benefits.

What does The Pensions Regulator (TPR) expect?

TPR expects assumptions to be prudent and that trustees will consider whether (and, if so, to what extent) to take account of a margin for adverse deviation. TPR also considers that for the scheme funding measure (known as the ongoing measure, technical provisions or Part 3 measure) trustees should choose individual assumptions (eg discount rate) the prudence of which is consistent with the overall level of prudence required of the technical provisions.