

# Pensions: Finance, Risk and Accounting

## Financing Pensions

This article deals with the financing of defined benefit pension schemes (*see Pensions*). The financing of defined contribution schemes is much simpler and can be summarized as follows. An amount is paid into a scheme for each member. That amount will be determined by market forces (what other companies, competing for the same workers, are paying) and by what a company can afford. Where specific benefit targets are used within defined contribution schemes, they take on some of the characteristics of defined benefit arrangements and their financing will follow, to a greater or lesser extent (depending on the type of benefit guarantee given) the principles below.

Defined benefit pensions can be financed in a number of ways. At one extreme, 'Pay As You Go' (PAYG) systems do not involve any prefunding (i.e. the accumulation of funds during employees' working lifetimes) whatsoever. At the other extreme, an immediate lump sum might be set aside, its amount being sufficient (on an appropriate set of actuarial assumptions) to meet all future pension outgo. This approach is very unlikely to be used in practice (see below.)

### *Pay As You Go*

Pay As You Go refers to an approach whereby no funds are accumulated or reserved in advance to meet future pension benefits. Instead, benefits are simply paid as they become due.

PAYG is used by many countries to finance state pensions. Each year, the state pays pensions out of its tax income and the social insurance (*see Social Security*) contributions of current workers. Thus today's workers pay the pensions of today's pensioners.

A key measure of the burden on the state system is given by the 'support ratio'. This is simply the total number of working people divided by the number of pensioners in receipt of state pensions.

Should such a ratio decline, then pension benefits will start to be supported by fewer workers, necessitating increases in tax and/or social insurance contributions.

Throughout most of the world, the support ratio is in decline. The World Bank has predicted that the United States support ratio will fall from 3.4 in 2000 to 2.1 in 2020 and to 1.7 in 2040. Similar patterns are predicted elsewhere in the developed world (UK, France, Germany, Japan), whose ratios in 2000 were already lower than that in the United States, at around 2.5. Key factors are

- increasing pensioner longevity
- falling retirement ages
- lower birth rates
- increasing unemployment

The first two factors have increased the number of pensioners, while the third has reduced the number of workers supporting them. Unemployment is, of course, an economic (rather than a demographic) factor, which is subject to cyclical changes.

Such pressures of state schemes can be counteracted by some or all of the following measures:

- An increase in state pension ages
- A reduction in state benefits
- An increase in social insurance contributions
- The encouragement of private provision

Very few private pension schemes (i.e. those sponsored by companies) anywhere in the world are financed on a PAYG basis because

- unexpected cash flows are inevitable
- no security is provided for current and prospective pensioners
- **accounting** rules and other legislation may preclude the use of PAYG
- tax rules may favor prefunding or book reserving

Were a company scheme funded on a PAYG basis, the company's cash flows could be affected significantly by, for example, the need to pay out an unexpectedly high amount of lump sum benefits within a short period. At the same time, employees would have no security whatsoever should their employer cease to exist; a simultaneous loss of both employment and pension benefits.

## 2 Pensions: Finance, Risk and Accounting

---

### *Book Reserves*

Book reserving can be viewed as a form of internal funding, i.e. notional funding within corporate accounts. Money is not paid to a fund external to the sponsoring company. Instead, a company will set up a reserve in its accounts to reflect its future pension liabilities. Assets thus remain within the company, providing the following advantages:

- Funds are retained, which may be required for future corporate expansion.
- A better return may be available by investing 'internally' (compared with investing externally, in effect, in bonds or in other companies).
- In some countries, tax advantages may improve cash flows.

The key disadvantage of book reserving affects employees. They have no security as no pool of assets exists which is separate from their employing company.

Security can be enhanced by introducing **reinsurance** to a book reserving approach. In such a scenario, employers will pay an insurance premium in return for which an insurance company will guarantee to meet some or all of the pension obligations. Clearly, the addition of reinsurance will increase employer costs. Where reinsurance is introduced in this way, the approach to funding takes on the characteristics of an advance funded arrangement using an insurance contract (see below). If benefits are fully reinsured, there is, in practice, no difference between the two approaches.

### *Advance Funding*

Where advance funding is used, rather than finance benefits as they become due (Pay As You Go) or through a notional reserve (book reserve), a separately identifiable fund of assets is set aside to meet benefits to be paid out in the future.

An extreme version of advance funding would involve the setting aside, on an employee's first day, of a lump sum equal to the present value of all his future pension benefits. In practice, such an approach is rarely, if ever, used because it would lead to very large and volatile (see **Volatility**) cash flows for companies and would increase significantly the initial costs of employing staff. In practice, advance funding

operates by spreading the cost over employees' working lifetimes, usually via periodic (often monthly) contributions to a fund.

The amount to be contributed to such a fund each year is determined on the basis of actuarial advice. A number of assumptions, financial and demographic, need to be made in advance to estimate how much money will be needed and when. These assumptions are used in conjunction with one of a number of funding methods to determine annual contribution rates. The funding status of a scheme will be assessed periodically to determine whether the funds held are sufficient and whether contribution levels need to rise or fall.

It is worth noting that the cost of a pension scheme will depend on its financial and demographic experience together with the generosity of its benefit structure. The funding method and assumptions serve merely to determine the incidence of cost, i.e. the rate at which funds are set aside to meet future benefits. To the extent that actual experience differs from that expected, schemes will develop 'surpluses' or 'deficiencies' which will be identified at their periodic funding assessments.

Advance funding benefits employees by providing security through the existence of a fund separate from the employer. Subject to the fund being maintained at an adequate level and assets being segregated from those belonging to the employer, at least some of the employees' pension benefits will remain secure irrespective of the fortunes of their employer. Legislation and scheme rules are often put in place to maintain this security, for example, by limiting the extent to which schemes may invest in the equity of the sponsoring employer.

A number of different structures may be set up to permit advance funding:

- *Self-administered/Single-employer arrangements:* A scheme (or a number of schemes) will exist for the employees of a single company or the parent group. Funds may be invested directly in bond and/or equity markets or in various pooled investment vehicles. Limits are normally imposed by legislation to restrict the extent to which funds may be invested in the stock of the sponsoring company ('self-investment'). A fully self-invested scheme would offer no more security to members than does the book reserving approach described above.

- *Multi-employer arrangements:* These exist where transfer is common among employers within the same or similar industries. The allocation of costs can vary from country to country and from industry to industry, as can the extent of the partitioning or pooling of assets.

- *Insured arrangements:* These are common in continental Europe and for small schemes in the United States, United Kingdom, and Australia. Premiums are paid to an insurance company in exchange for various levels of guarantee that benefits will be met.

The choice of funding method, assumptions, and the level of fund maintained will depend on a number of factors:

- corporate cash flow constraints,
- degree of member security desired or negotiated,
- statutory requirements.

Statutory requirements vary from country to country but, in general, their objective is to set a 'floor' and a 'ceiling' to the level of funds that may be held to meet a given benefit obligation. The floor or minimum funding level will be set to protect employees' benefit security, while the ceiling or maximum funding level will be imposed to prevent excessive contributions from building up in a favorable tax environment. Were no ceiling imposed, companies might shelter profits within their pension funds, to the detriment of the country's corporate tax revenues.

Benefits payable on death before retirement may comprise lump sums and/or dependants' pensions. Lump sums are commonly insured (i.e. the risk is passed to an insurance company in exchange for a premium) because their retention within schemes ('self-insurance') could lead to large and volatile cash outflows. Larger schemes sometimes self-insure the dependants pensions.

#### *Factors Influencing the Choice of Financing Method*

Several considerations influence the approach taken in a given circumstance:

- *Cash flow:* If benefits are not prefunded, then an obligation to pay significant lump sum benefits can lead to extremely large and volatile future levels of

outgo. This can have a major impact on a small company. Conversely, start-up operations with limited corporate cash flow may prefer to defer funding.

- *Security:* Prefunding provides a degree of security for members, especially against the situation in which an insolvent company becomes unable to meet the benefits promised. Pay As You Go is considered acceptable for state schemes, however, as it is assumed that the state will exist in perpetuity and be able to provide benefits as promised.

- *Accounting:* Companies often wish to contribute an amount similar to that charged through their accounts. This prevents the build up of balance sheet items (see the section 'Accounting for Pension Costs').

- *Taxation:* The existence of tax breaks (e.g. in the USA and UK) can provide an incentive to fund in advance. Conversely, the German tax system encourages book reserving.

- *Legislation:* In some countries, certain pension benefits must be prefunded by law (e.g. Spain and Netherlands).

- *Investment returns:* If it is believed that better returns can be achieved within a company than through an external investment vehicle (often through the investment in other companies via stock markets) then, *ceteris paribus*, book reserves will be preferred.

Lee [8] provides a more extensive description of approaches used in the funding of pension schemes.

## Funding Assumptions and Methods

### *Funding Assumptions*

It is assumed that the reader is already familiar with the principles of discounting and the term 'present value', which has already been mentioned (see **Present Values and Accumulations**).

The actuarial assumptions are fundamental to the setting of rates of contribution and the valuation of future benefit obligations. Assumptions, as used within pension schemes, can be broken down into two categories, financial and demographic. We use below expressions such as 'higher *assumed* levels of  $x$  will increase the pace of funding'. This can be taken as being synonymous with 'higher *experienced* levels of  $x$  will increase the cost of providing benefits.'

**Financial Assumptions.**

(a) *Investment return/interest rate (preretirement):* This is the level of return expected to be achieved on assets before members retire. The choice of rate will depend on the yields available from a scheme's current and expected asset mix. A starting point might be to look at risk-free yields such as those available on government bonds. Some actuaries would then argue that an allowance should be added for the extra return expected from holding riskier assets such as shares and property (the 'risk premium'), while others would ignore any such extra expected return. This has been the subject of much debate in recent times as the principles of 'financial economics' (a discipline that insists that risk premia be ignored) have become more widely embraced by the actuarial profession.

As the rate of investment is used to discount future benefits, a higher rate will lead to a lower value being placed on future benefits, hence a slower pace of funding through lower contribution rates.

(b) *Investment return/interest rate (postretirement):* This is the rate of return expected to be achieved on assets (should they be retained in an employer's fund), or the interest rate expected to underlie insurance companies' **annuity** rates when members come to retire. It is unusual for a significant risk premium (see above) to be included here because it is assumed that bonds, rather than equities, will be the principal asset type held to meet pensions in payment. A higher return will again lead to slower funding.

(c) *Price inflation:* Benefits are often linked to price **inflation** (before or after retirement), so projected benefits will depend on the level of inflation assumed for the future. In those countries where government bonds are available providing both a level and an inflation-linked income, an estimate of the market's view of future price inflation can be obtained from the difference between the yields on these securities.

A higher rate of price inflation implies higher projected benefits, hence faster funding.

(d) *Salary inflation:* This assumption will determine projected benefits, where they are linked to salary at or near the date of retirement or exit from a scheme. The assumption is likely to be based on that used for price inflation, with an addition of perhaps 1% or 2% p.a. to reflect historical experience. Any such addition, will vary from country to country and from industry to industry.

A higher rate of salary inflation implies higher projected benefits, hence faster funding.

**Demographic Assumptions.**

(a) *Mortality:* Mortality assumptions are required both before and after retirement. Scheme sponsors need to know how many people from a given population are likely to reach retirement age in order to assess the eventual level of pensions likely to be required. Equally, to capitalize the value of pensions once in payment, mortality after retirement needs to be assessed. Most schemes will use published actuarial tables (*see Life Table*) as the source of their mortality assumptions. Very large and long-established schemes may refer to their own experience. Sometimes adjustments will be made according to occupation, for example, clerical and managerial staff are often expected to experience lighter mortality (i.e. live longer) than manual workers.

Generally, the assumption of lighter mortality implies that more pensions will be paid and these will be paid for longer, thus increasing the pace of funding.

Mortality studies over the years have shown a consistent trend of improved longevity. To reflect this trend, an allowance for future improvements (i.e. lightening) in mortality is often incorporated in the assumptions used.

(b) *Withdrawal rates:* Schemes often expect to profit from members' leaving service. This will occur wherever leavers' benefits fall short of those funded for within a scheme. This situation might occur where leavers' benefit were subject to revaluation with price inflation while normal retirement benefits were subject to (higher) salary inflation. Where such profits are expected to result, a scheme may anticipate them by incorporating withdrawal rates. These will normally reflect industry experience and are invariably higher at younger than at older ages.

The inclusion of withdrawal rates normally reduces the pace of funding.

(c) *Proportions married (or cohabiting):* Where spouses' (or partners') benefits are provided, an assumption is normally made regarding the proportion of members who will be married/cohabiting at retirement, leaving, or death.

Higher proportions imply faster funding but the impact of this assumption is rarely significant.

(d) *Ill-health early retirement (IHER)*: Where enhanced benefits are payable on IHER, an assumption will be required to assess the amounts of IHER benefits to be paid. IHER pensioners will normally be expected to experience heavier mortality than 'normal' pensioners.

Higher assumed IHER rates will normally increase the pace of funding, although the impact is offset through the assumption of heavier mortality.

(e) *Early retirement*: If members may retire early on favorable terms (e.g. where any reduction in benefit for retiring early does not negate the extra cost) then an assumption will be required for proportions retiring early. This will normally reflect corporate experience, scheme rules, and the availability and level of state pensions.

Higher levels of assumed early retirement will increase the pace of funding.

#### *Funding Methods*

The reader should refer to [3] for a more detailed description of funding methods.

#### **Definitions.**

(a) *Actuarial liability*: The present value of benefits payable in the future to all members. The terms *past service reserve*, *future service reserve* and *total service reserve* are often used to describe respectively, the liabilities in respect of service already completed at the valuation date, service still to be completed, and total service. For active members (i.e. current employees for whom benefits continue to accrue), the actuarial liability will vary according to the funding method used (see below.) For deferred and current pensioners, all methods place the same value on the liability, viz. the present value of all future pensions in respect of these members.

(b) *Standard contribution rate*: The rate, under a particular funding method, required to fund accruing benefits, irrespective of the existence of any actuarial surplus or deficiency.

(c) *Actuarial surplus/deficiency*: The difference between the actuarial value of assets and liabilities.

(d) *Funding ratio*: The ratio of assets to liabilities.

(e) *Control period*: The period over which the standard contribution rate has been calculated to remain constant (typically 1 to 10 years)

**Accrued Benefits Funding Methods.** These methods focus on benefits accrued at the valuation date, commonly those benefits based on the period of each member's membership up to that date.

The standard contribution rate (SCR) is normally expressed as a proportion of current salaries (strictly, the pensionable part of current payroll) and is calculated as follows:

$V_0$ : the actuarial liability, at the valuation date, in respect of service up to that date

$V_1$ : the actuarial liability, at the valuation date, in respect of service up to the end of the control period

$B$ : the present value, at the valuation date, of expected benefits payable during the control period

$S$ : present value, at the valuation date, of pensionable pay (see **Pensions**) during the control period

$SCR = (V_1 - V_0 + B)/S$

(a) *Projected unit method*: The actuarial liability for active members is calculated as the present value of benefits in respect of past service, allowing for salary inflation up to the assumed date of retirement, leaving or death.

(b) *Current unit method*: The actuarial liability is calculated in the same way as under the projected unit method, except that salary inflation is projected only up to the end of the control period. Thereafter, increases are applied, which are applicable (under legislation or scheme rules) to deferred pensions. Such increases might be at the rate of price inflation, sometimes subject to a ceiling.

(c) *Defined accrued benefit method*: The actuarial liability for active members either at the valuation date or at the end of the control period is based on the assumption that the scheme will then be discontinued. Allowance may be made for discretionary increases to discontinuance benefits.

**Prospective Benefits Funding Methods.** Unlike accrued methods (which focus on benefits in respect of past service only), prospective methods focus on total benefits expected to be accrued. The actuarial liability is based on both past and future service. Similarly, salaries (for the purpose of calculating the SCR

are projected up to the expected date of retirement, leaving, or death).

The SCR is calculated as follows:

$V$ : the actuarial liability at the valuation date

$B$ : the present value, at the valuation date, of total benefits expected to be payable

$S$ : the present value, at the valuation date, of expected future pensionable pay (up to retirement, leaving or death) in respect of active members

$$SCR = (B - V)/S$$

(a) *Entry age method*: The SCR is the rate which, if payable for a group of new entrants, would provide for their total benefits. Actual or assumed entry ages may be used.

(b) *Attained age method*: The SCR is the rate which, if paid over the expected future membership of active members, would provide for their expected benefits arising from their future service (i.e. total benefits less benefits in respect of past service). The actuarial liability (although not the SCR) will be identical to that produced by the projected unit method.

(c) *Aggregate method*: No SCR is calculated. Instead, a contribution rate is calculated being the amount which, if paid over the expected future membership of active members, would be sufficient to provide for all benefits after making allowance for the value of assets currently held.

**Surplus.** Where the actuarial value of scheme assets exceeds that of the liabilities in respect of service up to the valuation date (the ‘past service reserve’) a surplus is said to exist. A deficiency (negative surplus) exists where liabilities exceed assets. Such a surplus may be available to offset future contributions. Equally, a deficiency may have to be made good over time through the injection of extra funds. The extent to which a surplus can offset contributions will depend on scheme rules and local legislation, either of which may demand that some or all of the surplus is used to enhance members’ benefits.

To the extent that a surplus can be used to offset contributions, or a deficiency made good, a modified contribution rate will be calculated, being the SCR, adjusted to reflect the existence of the surplus or deficiency. The elimination of surpluses is normally spread over time i.e. it is assumed that

a surplus will be exhausted, or a deficiency made good, over a number of years. The adjustment to the SCR will, therefore, reflect the part of surplus or deficiency assumed to be eliminated during each year of the spreading period. The choice of time period will depend on the reconciliation of corporate cash-flow requirements with the desire to provide secure funding of benefits and any restrictions imposed by local jurisdictions. A popular spreading period is ‘the expected future working lifetime of current active members’. It is worth noting that, where this spreading period is used, the aggregate and attained age methods will produce the same contribution rate.

**Actuarial Value of Assets.** While it is now common simply to value assets at market value, other approaches exist.

One method, the rationale for which is a desire to avoid very volatile results, simply smooths market values over time. Thus, the ‘actuarial value’ may reflect average asset prices over, say, the 12 months prior to the valuation date.

Another method, once universal in the United Kingdom but less popular elsewhere, is the ‘dividend discount model’. Long-term assumptions are selected to value liabilities and then these same assumptions are used to place a present value on the income stream expected to flow from the assets.

Head et al. [5] describe in detail the trend away from these nonmarket methods.

**Funding Methods Reviewed.** O’Regan and Weeder [10] offer a detailed analysis of funding methods and their appropriateness under different circumstances while McLeish and Stewart [9] make a case for the defined accrued benefit method.

(a) *Projected unit method*: This method allows for future salary increases, identifies the cost of benefits accruing during the following year and spreads forward any surplus. As a result, it is popular as a method for accounting purposes (see the section ‘Accounting for Pension Costs’), and is prescribed under the US accounting standard FAS 87, international standard IAS 19 and UK standard FRS 17. The contribution rate will be stable only if the average age of scheme members stays broadly stable. As a result, this method is not appropriate for schemes closed to new entrants (whose membership will, de facto, age.)

(b) *Current unit method*: If used without a control period exceeding one year, this method includes no allowance for salary increases. As a result, it produces low initial rates that rise dramatically with age (as they have to provide for the previous year's salary increase on ever increasing past service benefits). Accordingly, the method is rarely used where benefits are salary-related, but is common where benefits are fixed in monetary terms.

(c) *Defined accrued benefit method*: Similar to the current unit method and principally popular where discontinuance funding is required (i.e. where it is deemed appropriate to assume a scheme will terminate at the end of any control period.)

(d) *Entry age method*: This method is prescribed for calculating German book reserves and can be suitable for schemes with a high membership turnover. A drawback, which reduces its popularity elsewhere, is that it does not generate past service figures and thus cannot be used for accounting figures or **solvency** ratios.

(e) *Attained age method*: This allows for future salary increases and produces a past service reserve. It is thus suitable for calculating solvency ratios and for accounting figures (although the projected unit method now dominates for the latter purpose). By allowing for all future benefits, this method automatically allows for the ageing of scheme members. It is therefore appropriate for closed schemes but may tend to fund more quickly than necessary in open schemes in which the admission of new entrants serves to keep the average age broadly stable.

(f) *Aggregate method*: This is similar to the attained age method except that it does not generate a liability specifically in respect of past service and so does not produce solvency and surplus figures.

## Funding: Some International Comparisons

Approaches to funding are influenced by tradition, taxation, the types of schemes provided, and the extent of prescription within the relevant local legislation. While a more extensive description of the approaches used around the world is given in [11], we give below a few examples to illustrate the variety of methods in use.

### USA

Tax relief on contributions and investment returns is granted in return for satisfying significant regulatory restrictions on benefit provision and funding. Advance funding is mandatory for tax-qualified plans. Minimum and maximum funding levels are prescribed, providing a floor and a ceiling. Insolvency insurance is required for defined benefit plans. Annual actuarial valuations are required and actuarial assumptions must fall within a narrow range. The projected unit method is popular.

More flexibility is available for nonqualified plans (i.e. those not receiving tax breaks) and book reserving is commonly used here.

### UK

As in the United States, tax-relieved plans must satisfy many complex legislative requirements, although the government's intention is to simplify pensions legislation, which has long been recognized as being excessively complicated. Tax-approved plans are established under trust law and must satisfy minimum and maximum funding standards. Triennial valuations are required and, while methods and assumptions for the minimum and maximum funding limits are tightly prescribed, discretion may be used provided neither of these levels is breached. The most commonly used funding methods are the projected unit and the attained age method.

Unapproved plans may be funded or unfunded.

### Australia

Pensions (known as 'superannuation') are governed by Federal legislation. Retirement plans are set up under trust. Minimum solvency standards apply to most plans and these are subject to actuarial certification. Entry age, aggregate, projected unit and attained age methods are all used. Valuations are triennial and a free choice of assumptions is allowed.

### Germany

Under book reserved plans, the methods and assumptions for calculating the reserve are tightly prescribed. Similar assumptions are prescribed for premiums under Pensionskassen (captive insurers). Under direct insurances, individual premiums are calculated using

tables prescribed by the insurance supervisory authorities. Pensionskassen are funded using an individual premium, an average premium or, less commonly, an aggregate premium method. Book reserved plans and Pensionskassen require annual valuations for tax, accounting and insolvency purposes, while support funds require valuations only for accounting purposes.

### Japan

The traditional method of providing retirement benefits has been via the severance lump sum plans. These were rarely funded, and used instead a book reserving approach. Assets need not be earmarked to support such reserves, nor is insolvency insurance required.

More recently, funded arrangements (tax qualified pension plans and employees' pension funds) have become popular. These are normally funded using the entry age method and with tightly prescribed assumptions. Valuations are required every five years. No solvency requirements exist. Surpluses must be returned to employees.

### France

Defined benefit arrangements are normally funded on a Pay As You Go basis (or on a partial PAYG basis). The 'partial' basis entails the holding of reserves (to cover a projected period of up to 10 years). These reserves allow for timing differences between receipts and contributions, benefit improvements, and changing population growth. A relatively straightforward projection (involving expected contribution income and benefit outgo) is carried out every six months.

## Risks and Who Bears Them

### Pension Fund Risks

By 'risk' we mean the possibility that the assumptions underlying the provision of pension benefits (see 'Funding Assumptions and Methods') are not borne out in practice. Of course, the result of actual experience differing from that assumed can be positive or negative – leading to 'upside risk' or 'downside risk'.

Pension fund risks include the following:

- *Investment risk (preretirement)*: Where returns exceed or fall short of those expected, funds built

up will, *ceteris paribus*, exceed or fall short of those required to provide benefits.

- *Investment risk (postretirement)*: The cost of providing benefits after retirement will depend on the returns then achievable on monies invested, on bond markets at retirement, or those implicit in the insurers' annuity rates. Higher annuity costs or lower returns mean that a larger than expected fund will be required per unit of pension and vice versa.

- *Mortality risk (preretirement)*: In a group scheme, some members will be expected to die before retirement. Should more survive than expected, the ensuing pension benefits to be provided will exceed those anticipated. If a scheme self-insures (i.e. provides from its own resources) preretirement death benefits, then a partially offsetting cost saving will result from experienced mortality proving to be lighter than that anticipated.

- *Mortality risk (postretirement)*: Should longevity exceed expectations, as has happened consistently over the last 50 years, pensions will have to be paid for longer than was originally anticipated.

- *Salary risk*: If benefits are linked to salary at or close to retirement then 'excess' salary increases will lead to pensions required exceeding the level anticipated. This risk can be increased by executive pay levels being deliberately raised close to retirement.

- *Inflation risk*: Where pensions increase with price inflation (pre- or postretirement) excess inflation will lead to pensions required exceeding the level anticipated.

- *Other demographic risks*: These are linked to the other assumptions described in the section 'Funding Assumptions and Methods'. For example, if more members than expected are married at retirement then any spouses' pensions will exceed expectations, leading to an increase in costs.

- *Discontinuance risk*: Should a scheme discontinue, through the insolvency of the sponsoring employer or its decision simply to abandon the scheme, a number of risks arises. When a scheme discontinues, benefits lose any link to future salaries. Current pensioners retain their pension entitlements (subject to assets being sufficient), while working members become entitled to leavers' benefits. Such leavers' benefits normally fall short of final salary benefits. If

the discontinuance is unplanned (as is often the case), the scheme assets may not be sufficient to meet in full even these (lower) leavers' benefits.

#### *Defined Contribution Arrangements*

These are described in some detail in '**Pensions**'. In essence, contributions from either or both employers and employees build up in an individual fund. The fund at retirement will depend on amounts paid in and on investment returns achieved. The pension payable at retirement will depend on the size of this fund and on annuity rates available from insurance companies.

In a 'pure' defined contribution arrangement, the employer makes no guarantee (except regarding its level of contribution), and so all risks (financial and demographic) up to retirement remain with the employee. After retirement, if an annuity is purchased, risks are transferred to the insurance company in exchange for the purchase price.

On discontinuance, members should receive their full accrued entitlements (subject to contributions having been paid and monies invested securely.)

#### *Defined Benefit Arrangements*

These often provide benefits based on salary at or near retirement or on revalued career average salary. They can also provide fixed monetary amounts.

A common approach to funding involves the employee paying a fixed percentage (which may be nil) of salary each year with the employer meeting the balance of cost. All risks associated with financial and demographic assumptions, upside and downside, thus remain with the employer. If legislation or scheme rules require that some or all of any surplus is shared with employees, the employer's upside risk will be reduced or eliminated.

On discontinuance, members will lose their final salary link. Should the scheme be insolvent (i.e. assets insufficient to meet in full the leavers' benefits), then members may receive less than their full entitlements. Where legislation is in place to ensure that any asset shortfall on discontinuance is made good, this risk can be transferred, in part at least, to the sponsoring employer. If the employer is insolvent, however, little or no protection may be afforded to members by such legislation.

Schemes (and the legislation governing them) often incorporate 'priority rules' to be applied on discontinuance. These tend to favor current pensioners

over current employees by allocating assets first to pensions already in payment.

Even where a scheme is solvent, and whether or not it is discontinuing, members who opt to take a 'transfer value' (see **Pensions**) will, by so doing, assume the pre- and postretirement investment risk, both upside and downside. To the extent that, in calculating a transfer value, a basis less generous than that used for funding purposes is used to capitalize the alternative, preserved pension, members may face an immediate reduction in their expected benefit. Any such difference in calculation basis, together with the loss inherent in taking a leaver's benefit (see above) means that individuals often see their benefits reduced on transferring from one employer to another.

#### *Individual Arrangements*

Risk considerations are identical to those described for defined contribution arrangements (see above.)

#### *Hybrid Arrangements*

A number of hybrid arrangements exists. Such arrangements cannot be described either as pure defined benefit or pure defined contribution. By their nature, some of these involve a sharing of risk between the employer and the employee. An exception is schemes with an 'underpin'. These can take the form of 'defined benefit schemes with a defined contribution underpin' or the converse. Employees will receive the better of the two types of benefit. Examples might include a scheme providing 1/80 of final salary each year, subject to an underpin of the benefit provided by an annual contribution of  $x\%$  of salary. Such schemes leave all the risk with the employer and, in fact, the introduction of an underpin increases the employer's downside risk by giving employees an option to 'select against' the pension scheme, opting for the defined benefit pension after periods of low returns, and the defined contribution pension after periods of high returns. The extent of this increase will depend on the value of the underpin (i.e. the likelihood that it will 'bite' and the associated costs thereof). As a result, such underpins are often set at a very low level. In theory, the same techniques used to value stock options could be used to value such underpins. In practice, particularly where underpins are set at a low level, more approximate approaches tend to be used.

Schemes in which risk is shared include those schemes providing a multiple of salary as a lump sum at retirement. This lump sum is then converted into pension. In these schemes, the employer takes all the risks (investment, salary, demographic) prior to retirement, but then transfers them to the employee at the point of retirement.

'Cash Balance Plans' (*see Pensions*) are akin to defined contribution arrangements, but with some of the downside investment risk prior to retirement retained by the employer. The extent of this retained risk will depend on the level of return guaranteed.

### *Risks, Trends, and the Future*

While pension arrangements can differ significantly from country to country, a number of trends have become apparent over the last few decades.

Many companies, seeking higher returns (hence lower costs) moved from insured to self-administered arrangements to take advantage of the greater freedom of investment. At the same time, new layers of legislation were introduced, most of them intended to protect scheme members. They increased for companies the costs of operating their schemes (by, for example, improving leavers' benefits or increasing administrative burdens and reporting requirements). Poor global stockmarket performances in the early years of the new millennium, combined with new and more transparent accounting practices (see below) and improvements in longevity brought into higher relief than ever before the true extent of the risks faced by companies operating defined benefit schemes. The result has been a global trend away from defined benefit arrangements and towards defined contribution plans. In general, contributions are paid into defined contribution plans at rates lower than those required to finance their defined benefit predecessors. The inevitable result is that today's workers may expect, on average, to live longer and receive lower pensions than the generation that preceded them.

## **Accounting for Pension Costs**

### *Why the Accounting Approach is Important*

Pensions can often represent a significant corporate expense. This expense needs to be reflected in companies' accounts. Differences (between countries or

between companies) in the treatment of this expense can lead to distortions in the valuation of companies.

Historically, companies 'booked' their pension costs on a 'cash basis', that is, they charged through their accounts simply the monies paid in a particular year. This led to misleading statements of the true cost of providing pensions. For example, a company taking a contribution holiday (funded out of surplus) might show a zero pension cost, implying (falsely) that it faced no ongoing financial commitment to provide retirement benefits.

### *Objectives of Accounting Standards*

The principal objective is to show a realistic cost of pension benefits over the period during which companies benefit from their employees' services. Accounts should show an understandable and comparable (between companies) measure of the financial effect of their undertaking to provide pension benefits.

### *Basic Principles*

'Materiality' is an accounting concept. Auditors will require less detailed calculations where pension benefits represent only a small cost in comparison with the total corporate costs and revenues. Defined contribution plans face a straightforward treatment; contributions paid equal (by definition) employer costs, and this is the amount that must be reflected in corporate accounts. For defined benefit schemes, an accounting cost is calculated and, should actual payments exceed or fall short of this cost, a 'prepayment' or 'accrual' respectively, will be entered on the balance sheet.

The treatment of any surplus differs from country to country. Some standards treat surplus as belonging entirely to the employer while others require an analysis to be carried out to determine whether any limitations exist.

### *Accounting versus Funding*

Two schools of thought exist regarding the basis to be used for accounting purposes. One school supports an 'actuarial' approach, using long-term funding assumptions. The other prefers a 'market' basis, using current economic assumptions.

Approaches differ from country to country. Germany and Japan, for example, lean towards an

actuarial basis (as did the UK prior to the introduction of a new standard, FRS 17). The US standard, FAS 87, leans towards a market basis.

Carr [2] provides more information on the development over time of pension accounting standards.

### *International Convergence*

The introduction in the United Kingdom of the market-based standard, FRS 17, brings the UK approach closer to that used in the United States. At the same time, the European Union has stated that it would like the international standard (IAS 19) to be used by all members. This convergence has implications for an international merger and acquisition activity because, while different local GAAPs (Generally Accepted Accounting Principles) exist, financial statements require to be ‘translated’ by consultants to allow a potential purchaser to make an informed decision.

For more detailed information, the reader is referred to the texts of the Standards SSAP 24 [6], FRS 17 [1], FAS 87 [4], IAS 19 [7] and to Carr [2].

### *Impact on Pension Provision*

Accounting standards are intended to be dispassionate recording mechanisms. Their purpose is to allow financial analysts to assess properly corporate pension commitments. Yet, they can be the subject of heated debate. Some pension professionals have expressed concern that standards that use volatile (and, they assert, occasionally overconservative) valuation assumptions to assess pension costs may cause companies to reduce the benefits provided under their defined benefit arrangements or to abolish them altogether. Others insist that to use anything other than

a (necessarily volatile) market-driven basis will lead to the systematic misstatement of costs. Agreement seems unlikely to be imminent.

### *References*

- [1] Accounting Standards Board (2000). *Retirement Benefits: FRS17. Financial Reporting Standard 17*.
- [2] Carr, R.W. (1990). Accounting standards for pension costs in corporate accounts – the present and the future, in *12th International Association of Consulting Actuaries – Conference*, Vol. 2.
- [3] Faculty and Institute of Actuaries, *Pension Fund Terminology*, Guidance Note 26.
- [4] Financial Accounting Standards Board, *Employers’ Accounting for Pensions (FAS 87) 1985*.
- [5] Head, S.J. et al. (2000). Pension fund valuations and market values, *British Actuarial Journal* 6(1), 55–141.
- [6] Institute of Chartered Accountants of England and Wales. (1988). *Accounting for Pension Costs: Statement of Standard Accounting Practice No. 24 (SSAP 24)*.
- [7] International Accounting Standards Committee. (2001). *International Accounting Standards 2001. The Full Text of All International Accounting Standards and SIC Interpretation Extant at 1 January 2001*.
- [8] Lee, E.M. (1986). *An Introduction to Pension Schemes*.
- [9] McLeish, D.J. & Stewart, C.M. (1985–87). Objectives and methods of funding defined benefit pension schemes, *Transactions of the Faculty of Actuaries* 40, 338–424.
- [10] O’Regan, W. & Weeder, J. (1990). A dissection of pensions funding, *Journal of the Students’ society* 32, 71–115.
- [11] Pensions Management Institute Tuition Service, *Diploma in International Benefits, Tuition Manuals 1 & 2*.

(See also **Accounting; Pensions; Pension Fund Mathematics**)

ROGER MACNICOL