The Actuarial Profession
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Actuaries and Discount Rates

A discussion paper

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The UK Actuarial Profession is undertaking a thought leadership cross-practice research project on discount rates. The timing for this research is particularly appropriate as there is a convergence of interest in discount rates from within and outside of the Profession. Discount rates are the heart of most actuarial calculations and therefore are also of significant public interest. In order to be able to continue to speak clearly and with authority in future debates about discount rates, the Profession needs to have a clear and common understanding of the issues surrounding the different discount rates used today across practice areas and to help in the development of frameworks for the future that will support actuaries in communicating impartially and effectively.

A small cross-practice steering committee chaired by Charles Cowling has been set up to drive the project. The Discount Rate Steering Committee identified five packets of research that needed to be undertaken to achieve the project's overall objectives:

1. A survey of current practices
2. A survey of existing research and debate
3. Developing a common language for communicating discount rates and risk
4. Developing a common framework for the future where appropriate
5. Considering the impact of any changes

Chinu Patel and Chris Daykin were commissioned to undertake the first three packets and this report "Actuaries and Discount Rates" is the result of their initial research into past and current practice in the setting of discount rates in the UK, and a survey of existing research and debate. The report covers some initial steps towards developing a common language whilst acknowledging further work is needed on the most appropriate classification and ways of describing the concepts involved. The report has been gratefully received by the Discount Rate Steering Committee who are now pressing ahead with the rest of the project.

The Steering Committee will now engage with each of the main practice areas within the Profession and externally to finalise the project. Open and effective communication will be key to the success of the project, and the committee believe that Chinu and Chris have given the Profession a most useful platform from which to launch our efforts to both explain and enhance the contribution that actuaries can make to this important topic.

1 Overview of principal findings

Overview

1.1 Using discount rates may not always be the most helpful way of answering many of the questions which actuaries and others have to deal with in respect of the analysis of future cash-flows. In an ideal world discount rates might not be necessary at all. However, in practice, despite all the sophisticated tools available in the financial markets, asset and liability cash-flows rarely balance exactly over all periods of time and actuaries and other financial sector professionals regularly use discount rates as a tool to condense complicated cash-flow information into more manageable present value numbers.

1.2 The debate on the appropriate discount rate to use has exercised the actuarial profession, and others, for decades and will continue to do so for many more. Our examination of current practices across the principal areas of actuarial work reveals a wide variety of applications for which calculations involving discount rates are necessary. We identified a number of different methodologies for setting discount rates employed by actuaries, company management, regulators, government economists, pension fund trustees, accountants and other finance professionals. In almost every case we found that the purpose of the calculation and the context were the principal drivers of the particular approach selected; of how the relevant factors were brought together; whether it was considered appropriate to decompose the underlying constituents of the discount rate and, if so, to what degree of detail.

1.3 We would expect, therefore, that individual preparers of calculations - and their 'clients' - might be quite comfortable about the suitability and limitations of the discount rates employed in individual calculations. One question for the Steering Group is whether this is sufficient, given the current high profile of pensions; the increasing convergence between insurance and pensions; the ongoing debate on differences between solvency, funding and accounting; and the strategic direction that the profession is taking to create opportunities for re-deploying actuarial skills in ERM. To a considerable extent the approaches which are required to be used are out of the profession's hands, and in the hands of regulators and accounting standard-setters, who often address issues from very different perspectives. But this also presents the profession with an opportunity to increase its influence by taking steps to improve the communication of the nature of discount rates for different purposes and how the differences can be reconciled, or at least rationally explained.

1.4 On a cross-practice comparison, we identified some potential for improvements in communication. We have made below some suggestions, principally directed at achieving greater consistency in the language used to communicate discount rates (or the associated liabilities), which we found to be confusing and with potential to mislead; better disclosure of the risk embedded in discount rates and more education on the reasons for the different approaches. We have also identified a number of

emerging issues which could be used, possibly with further thought and development, to engage with various stakeholders.

1.5 A general observation is that actuaries in banking, insurance and pensions each operate in a different 'risk space', where their outlook on risk is often determined by the nature of their business. In traditional areas of banking, for example, asset and liability cash flows are generally not very well matched but interest rates and loan terms can be changed to adapt to market conditions; in life insurance the long-term nature of the liabilities requires more attention to be paid to asset-liability matching considerations but policyholder participation arrangements and the long-term perspective potentially make it possible to take more risk; in pensions the risk appetite may be determined less by the characteristics of the liabilities than by other considerations such as the strength of the sponsor covenant. Accordingly the detailed methods and techniques, thought and innovation between these groups may out of necessity focus on different areas of the risk spectrum, something which external observers may not readily appreciate.

1.6 We found that, without exception, the different calculations we examined could be rationalised in terms of the nature and degree of risk embedded in the discount rate. Whilst the purpose and context of the calculation may determine the appropriate level of risk retained, we felt that there was merit in finding some way of communicating this, as a way of promoting communication between actuaries in different areas of work, and also for communications with other stakeholders. We would therefore recommend that the Steering Group examine the merits of a framework which enables each discount rate to be expressed in terms of its embedded risk. We have given one rationalisation below to explain existing practices, with two reference categories representing different ends of a spectrum of risk.

Matched calculations

1.7 The principal calculations we examined in the areas of insurance, pensions, finance and investment and enterprise risk management could be grouped into two broad families.

1.8 The first is the family of *'matched calculations'*, which value the liability by reference to market instruments (or models to simulate market instruments) which seek to *match the characteristics of the liability cash-flows*. The discount rates used in such calculations are those implicit in the market prices of the matching market instruments, if readily traded in a deep, liquid and transparent market, or a reasoned best estimate of what its market value would have been if such a market had existed. These calculations are particularly appropriate for transactional work and are indeed tailored for that purpose.

1.9 In this category we would expect to see not only calculations used for hedging purposes but also all those commonly described as 'market-consistent' or 'mark to

market' or 'mark to model'. In practice there are many variants, each addressing in a particular way the practical difficulties associated with the complexities of pension and insurance cash-flows which often make it impossible to find an exact matching portfolio of assets, thus requiring departures from the application of strict principles of financial economics. Although calculations in this category are always referenced to appropriate market instruments (or closely replicating portfolios), there is nevertheless generally some judgement involved and therefore varying elements of risk built into the discount rate.

1.10 Certain regulatory calculations might aim for consistency and comparability through further rules, but often the purpose of the calculation involves selectively retaining or rejecting certain characteristics, with the resulting discount rate ceasing to satisfy the criteria for theoretical risk-free rates. However, the main characteristic of MC calculations is that there is an intention that the discount rate should incorporate a low level of risk. Within this family there will be variants defined by characteristics such as the least risk reference point used; whether and how the full term structure of rates has been allowed for; whether the risk of credit defaults and downgrades is factored into the discount rate and whether credit has been taken for an illiquidity premium.

Budgeting calculations

1.11 The second family is that of *'budgeting calculations',* where the measurement of the liability is approached from the viewpoint of *how it is going to be financed*, and consequently expected returns from a pre-determined investment strategy (or rates set by reference to some other external financing criteria) are implicit in the discount rate. These calculations are particularly useful in planning and budgeting, where the need to navigate all the complications of an actual market may not be so important. In budgeting calculations, the concept of matching the liability cash flows is either non-existent or only evident in a broad sense indirectly through the actual asset portfolio held. The discount rate usually retains a much larger element of embedded risk, often incorporating credit for an equity risk premium, or making an implicit allowance for the riskiness of the future cash flows, or using a 'hurdle' rate, which assumes high returns to compensate for higher risk.

1.12 In the family of *budgeting* calculations we would expect to see not just the calculations where the discount rate is based on the expected rate of return from a portfolio of assets, but also calculations where the discount rate is determined by other external criteria and may for presentation purposes appear as an arbitrarily fixed rate. Examples of the latter are discount rates used by economists and others for 'fundamental value' analyses and the government's calculations using the 'social time preference rate' (see section 9). The distinguishing feature of all *budgeting* calculations is that they are capable of being re-expressed in terms of an excess amount (or *out-performance*) over a 'least risk' market based discount rate. (The least risk rate could just be a suitable reference rate or derived by applying matching principles, and

the risk adjustment can at times be negative, for example, if the portfolio is invested in put options).

Risk content of discount rates

1.13 What determines whether and how much risk is included in the discount rate? Our analysis suggests that the purpose and context generally determine the most appropriate calculation approach. Often there are requirements from legislation, regulators or professional guidance to steer the actuary in a particular direction. The principal calculations we examined could be allocated towards the MC or BC ends of the risk spectrum as follows.

Finance, investment and banking

1.14 In finance, investment and the market-making side of banking, calculations are usually for the purpose of transactions and therefore it is important to take account of what the markets are saying and to manage volatility. Calculations can be long- or short-term in nature but do not usually involve social aspects or use of discretion to treat the customer fairly. Hence there is a strong focus on market consistency and we would expect 'least risk' discount rates, following the matching concept, to be the norm. The exceptions might be in asset-liability management (ALM) calculations where the aim is to assess the likely impacts of particular strategies, which are of a budgeting nature.

Enterprise risk management

1.15 In Enterprise Risk Management, calculations for the purposes of hedging and managing short-term financial risks usually have a similar purpose and need to be market-consistent. However, longer-term strategic ERM may have more of a *budgeting* flavour, albeit associated with extensive analysis to quantify uncertainty and risk. Here, as in ALM, the impact of investment risk usually needs to be separated from 'risk neutral' calculations in order to allocate the risks and rewards along functional lines; therefore 'real world' calculations (using *budgeting* type discount rates) generally co-exist with least risk discount rates.

Insurance

1.16 In life assurance the regulatory and accounting requirements usually steer the actuary towards a *matching*, or *near-matching*, approach but elements of *budgeting* may be present in embedded value assessments for shareholders and in realistic valuations for with-profits business (for example in Peak 2 of the FSA's twin peak regime).

1.17 The discount rate for statutory reserves is set out in the FSA's guidelines as the weighted average of the running yield on the assets held to back the liabilities, with the credit risk stripped out from the bond portfolio, an illiquidity premium permitted but future capital growth on equities and property excluded. This resulting discount rate is

in effect of a budgeting nature, since it is determined from the actual assets held rather than from a theoretical replicating portfolio. However, in practice it has similarities to *matching*, since investment policy for life company portfolios has traditionally had a strong bias towards government and corporate bonds, with bond cash flows closely matched to liability cash flows, at least in respect of liabilities for non-participating contracts.

1.18 Asset portfolios backing with-profits business may contain equities and property, and the statutory requirement here is to take credit only for the running yield (in the case of equities, the average of the dividend and earnings yields). Advance credit for future capital growth is not permitted. In addition, an enhanced capital requirement might be necessary to ensure terminal bonuses can be paid which are consistent with the company's duty to treat customers fairly and with their expressed intentions regarding bonus policy. On balance, the discount rate appears to follow a *budgeting* process.

1.19 Insurance companies need to hold capital requirements in addition to technical provisions, for which separate calculations are required. Under the current ICA regime, the regulatory requirement is for assets to be marked to market, and technical provisions should be a best estimate, reflecting their economic substance. Unlike for statutory reserves, therefore, discount rates are driven by the characteristics of the liability, with the actual asset strategy being irrelevant for this purpose, and as a result these calculations would fall in the *matching* family. Discount rates for technical provisions are usually based on swap rates and it is possible to capitalise a portion of the spread as being due to illiquidity rather than credit risk.

1.20 The Solvency II regime, which will replace ICAs from 2013, is similar in structure but there is an ongoing debate about how the least risk reference yield curve should be defined and whether it is appropriate for an illiquidity premium to be taken into account in the discount rate. In other words, the deliberations here are more in the nature of defining more precisely what constitutes *matching* for the purposes of the market-consistency approach of Solvency II.

1.21 Insurance companies also carry out embedded value (EV) calculations for management purposes, as well as for reporting to shareholders. These effectively quantify the value of in-force business by projecting forward shareholder cash flows from surpluses declared under the constraints of statutory reserving. There are two types of calculation. The traditional EV approach is normally based on a single deterministic projection incorporating best estimate 'real world' assumptions about future investment returns, involving risk premia for equities and properties depending on the actual asset strategy. For corporate bonds, the credit spread would normally be adjusted for defaults/downgrades and credit taken for an illiquidity premium. The projected shareholder cash flows are then discounted at what appears to be an arbitrary rate of 10% to 15% a year to reflect the risk to shareholders. We classify this within the *budgeting* family.

1.22 A more recent development has been market-consistent embedded values (MCEV) which employ stochastic techniques to take account of financial options and guarantees. Liabilities are valued to be independent of the actual assets held, using guidelines prepared by the CFO Forum. The discount rate was originally prescribed by the CFO Forum as the swap yield curve but the October 2009 guidelines now permit credit to be taken for an illiquidity premium. We classify this under the *matching* family, even though there are still considerable variations in practice.

1.23 Accounting for an insurer's core liabilities is currently aligned with the statutory reserving requirements and is therefore in the *budgeting* family. However, the pension obligations to their own employees are accounted under IAS19, where technical provisions are calculated using the market yield on high quality (usually AA) corporate bonds, with an implicit allowance for an illiquidity premium but no requirement to adjust the yield for credit default/downgrade (on balance a *matching* calculation – see paragraph 1.33). There therefore appears to be some inconsistency between the measurement of technical provisions of an insurer's annuity book and the measurement of its own staff pension obligations.

1.24 In general insurance, discounting is not much used except for liabilities of more than four years duration (and then only by some firms). Where technical provisions are not discounted, often the implicit assumption is that the interest income is providing some offset against inflation of claim settlement amounts. These calculations therefore have the characteristics of *budgeting*. However, Solvency II will require use of discounting using the same principles as for life assurance.

1.25 The current International Accounting Standard (IFRS 4) for insurance contracts permits continuation of some valuation approaches which do not follow the characteristics of matching calculations. However, this is expected to change under the revised IFRS 4, which is under development and for which an Exposure Draft is expected in June 2010. This will point to a *matching* approach, most likely based on fulfilment value (the cost to the entity of fulfilling the contracts). However, current indications are that the standard itself will not provide any guidance on the method of arriving at the appropriate discount rates (for example how the reference rate should be determined and whether an illiquidity premium should be permitted). This may be left as a challenge for the international actuarial profession to address through an appropriate International Actuarial Standard of Practice.

Occupational Pensions (DB)

1.26 For funding occupational pension schemes, regulatory guidance allows the use of approaches for setting technical provisions which are based on the characteristics of the liabilities or of the assets backing the liabilities. Information collected by the Regulator suggests that, in practice, technical provisions usually reflect some element of expected out-performance from the scheme's assets, and in particular from equities

and property, relative to government bonds, and are, therefore, generally in the *budgeting* family.

1.27 In practice the derivation of discount rates might reflect liability matching considerations built into the scheme's investment strategy, for example, broadly matching with bonds the near-term cash flows for some or all of the pensioners. The investment risk in pension funds has historically been greater than in insurance portfolios and returns submitted to the Regulator by pension schemes suggest median levels of expected out-performance included in typical discount rates to be of the order of 100-150 bps in excess of gilts ('gilts +' is just a way of re-expressing the discount rates, their derivation may have no connection with gilts). Consequently, pension actuaries may be spending less time than life insurance actuaries thinking about what might to them be second order adjustments for the term structure, credit risk (except sponsor's own credit risk) and illiquidity premiums.

1.28 Unlike insurance companies, pension schemes do not have the benefit of explicit solvency capital to protect members' accrued benefits. Historically this was just accepted as part of the 'deal' but in recent years this has changed, due to a combination of many pension funds now being in run-off mode and the impact of legislation in 2003 which made it impossible for employers voluntarily to walk away from their obligations without paying an exit price sufficient to bring the scheme's funding level up to insurance buy-out levels.

1.29 In essence the funding process now boils down to capturing an equity risk premium over time with the support of the employer's covenant, but at the same time managing the risk to members. The regulator's pragmatic approach to managing the sponsor's credit risk involves increasing the technical provisions when covenants weaken, in effect reducing the reliance on the equity risk premium, but allowing some flexibility with the recovery plan if affordability is an issue. These are examples of how different regulatory tools for managing credit risk can have an effect on the underlying discount rates.

1.30 Discount rates for the purposes of recovery plans, and for future contributions for any future accrual of benefits, do not have to follow those used in technical provisions and can be set on their own merits, for example as best estimates of the yields expected on the assets actually held. The available statistics show that existing asset strategies may be playing a greater role here for many schemes, with discount rates significantly higher on average than those used for technical provisions, i.e. are *budgeting* in nature.

1.31 Calculations for the purposes of the debt on the employer in the event of a voluntary exit by the sponsor are clearly of a *matching* nature and in practice calculated by following the same principles as would be applied by an insurance company to price a bulk annuity buy-out. Solvency disclosures in actuarial reports should follow similar principles but, because they are only a disclosure item, some approximations appear

appropriate (GN9 even provides a simple proxy, which is probably unrepresentative of what is currently happening in the markets).

1.32 Calculations for the purposes of asset-liability modelling in pension schemes should follow the same thinking as similar calculations in risk management, and are of a *budgeting* nature. For setting investment strategy, some simplified models might be used (compared with, say, the models that might be used by insurance companies and banks for hedging and risk pricing) but no new principles arise, except that assumptions might also be simplified to suit the purpose

1.33 Transfer values raise a particularly important point. They arise from the exercise of a member option but, unlike other member options, this one was imposed on pension schemes through overriding legislation in the mid-1980s. From the member's perspective there is a strong argument for the transfer values to reflect what it would cost the member to replace the benefit through a contract with an external third party, i.e. they should be following *matching* characteristics. However, current legislation is more sympathetic to sponsors and requires transfer values to be based on the 'expected cost to the scheme', i.e. they are of a *budgeting* nature. A rational explanation of this may be that social policy can create irrational consequences.

1.34 Calculations for the purposes of disclosing directors' accrued pensions in company accounts have a transactional flavour since the purpose is to provide a figure that can be compared with the cash emoluments. The appropriate regulations require these disclosures to show the transfer value of the accrued benefits, which arguably is not the market cost of the benefits. A similar problem arises with respect to pension sharing on divorce, where again the transfer value is used as the yardstick, even though a *matching* measure might be more appropriate for that purpose.

1.35 The current treatment of pension liabilities in the sponsor's accounts is a mixture of *matching* and *budgeting*. The discount rate is prescribed to be the yield on high quality (AA) corporate bonds (without an adjustment for default risk) but the liability definition goes beyond accrued liabilities and requires an allowance for future salary increases. On balance, the calculation is of a *matching* nature because it is independent of the actual assets and it is supposed to be based on the liability characteristics (but with the accounting standards then interpreting the credit risk of all pension sponsors as being the same as that of issuers of high quality corporate bonds).

1.36 There is no formal requirement for pension funds to hold solvency capital in excess of technical provisions but there has been some debate within the European Commission and CEIOPS on this matter in recent years. A Green Paper on pensions is expected in the next few months which will try to take the debate forward. If it does, then the main issues on convergence between insurance and pensions should boil down to how pension liabilities are measured and how members should be protected against the

risks taken (either via insurance- and banking-style capital requirements or something else), with consequences for how discount rates are determined.

Improving communication of discount rates

1.37 Good and clear communication to users is vital, even though it may not always be possible to present it as simply as users might prefer. Without this, any decisions taken may be sub-optimal and the value actuaries seek to deliver questionable. We set out below some observations and ideas which the Steering Group might wish to consider further.

Better language

1.38 We detect a fair amount of confusion between the different discount rates which are used, fostered by terminology which means different things to different people. This is due partly to the transposition of ideas and concepts from other areas where these are well developed and adapted in ways acceptable for their particular usage, but then re-adapted for use in actuarial work without the labels having being changed.

1.39 One possibility would be for a comprehensive glossary of terms and definitions to be developed, including an explanation of how external stakeholders might use the same or similar expressions to mean different things. Our Section (in the main report) on 'concepts' provides a start but it is by no means comprehensive and further discussion is needed on the most appropriate classification and ways of describing the concepts.

Better disclosure of risk

1.40 The debate between market-consistent approaches and others can, we believe, be better understood and reconciled in terms of how risk has been accommodated. A further question that could be examined is how the risk embedded in the discount rate in any particular methodology is or should be communicated to the different stakeholders and whether they (especially members of pension schemes and policyholders of insurance companies) understand the consequences.

1.41 Amongst other things this raises further questions about supplementary information that could be provided to address reasonable questions that are always out there amongst the wider stakeholder community – on solvency, risks, implications for beneficiaries and implications for shareholders. The exact form of the disclosures and who should take responsibility for them are separate issues.

Better education

1.42 It is argued that market-consistent accounting is only seeking to put a realistic value on assets and liabilities, in other words that it is only concerned with measuring what is already happening. However, it also changes behaviour, not necessarily in an appropriate way, by turning long-term financing considerations into short-term measurement issues. Is this an undesirable consequence, or should actuaries be learning to manage the short and the long simultaneously, perhaps by utilising a combination of different approaches?

1.43 Market-consistent valuations are often portrayed as being objective. In practice, this objectivity is not easily achieved. Instruments which the financial markets deem to be risk-free can in fact be highly risky when held to back certain liabilities. Examples are where pension cash flows are linked to inflation with caps and floors, or to longevity. Other examples are where the liability cash-flows can be influenced by the behaviour of members who have the right to exercise various options, and where the assessment of such behaviour is highly subjective. Replicating portfolios are a useful theoretical concept but generally do not exist for most real-world liability portfolios. Therefore, even within the family of 'market consistent' valuations, actuaries have to make judgements which might be perceived as being subjective or inconsistent.

1.44 Insurance actuaries and regulators have devoted considerable effort to defining in a very precise and objective way the nominal yield curve that should be employed for regulatory purposes, and to decomposing credit spreads. For pension liabilities the real yield curve is usually more important, with further complications from LPI caps and floors. There may be a danger here of people beginning to believe that the problem of measuring cash-flows for long-term liabilities on a market-consistent basis has been solved, whereas the process has probably only just begun.

Communication with other stakeholders

1.45 Some other emerging issues which the Steering Committee might wish to consider further are:

i. FSA's approach to taking into account the returns from equities in relation to with-profits portfolios is quite different from the tPR's approach in pensions. Are they inconsistent or can they be reconciled?

ii. There are at present a number of inconsistencies in accounting treatment between insurance and pensions.

iii. The treatment of sponsor covenant risk in pensions is different from how an insurer's credit risk might be dealt with in insurance liabilities. This may be a

reflection of two very different starting points. Or it might be a statement about the social element in pensions.

iv. For pensions, IAS19 assumes a uniform credit risk for all sponsors at the AA rating level. This is of course the opposite of what tPR is doing for pensions from a regulatory perspective, where a weak employer covenant is expected to be interpreted as a signal for trustees to adopt a lower discount rate and hence higher technical provisions. Is there a rationale here?

v. How is volatility dealt with under the different approaches (and its impact on discount rates) – insurance, banking, pensions, accounting?

vi. The concept of the 'social time preference rate', as used by HMT, and other economists, could be interpreted to mean that the social element makes inter-generational cross-subsidies acceptable. Managers of participating insurance portfolios would probably take a different view, since for them equity between generations of policyholders is paramount. Pension schemes claim to have a social element, so they might take an intermediate view.

vii. The discount rate can be a vehicle for allowing for the riskiness of the cash-flows, as appears to be emerging as one of the options under IFRS 4 (revised). This is quite normal in the use of discount rates by economists in cost-benefit analysis, and in corporate finance for evaluating capital projects. From an actuarial perspective a more explicit allowance for the riskiness of the cash-flows might be preferable.

2 Introduction and scope

2.1 Discount rates play a central role in most actuarial work. Within the actuarial profession frameworks for setting discount rates have evolved in different ways in different areas of application. A current snapshot can be expected to reveal diverse practices, from those rooted in historical developments, through others based on traditional actuarial and economic theory and practice, to those involving the application of ideas from modern financial economics. Some applications might be constrained by legislative requirements or standards for international financial reporting.

2.2 Outside the traditional areas of actuarial work, discount rates are used in many different applications, often using very different criteria. Understanding the differences between these diverse practices, and developing a common language to reconcile them, is vital for today's actuarial profession, both from the viewpoint of communication within the profession as well as in improving clarity of communications with external stakeholders.

2.3 Risk is central to everything actuaries do, and discount rates may implicitly reflect some but not (always) all of the underlying risk. However, explicit explanations or quantification of risk are often lacking (for example in financial reporting standards). Economists sometimes use discount rates as a way of directly incorporating considerations of future risk or as a way to express time preferences. Accountants and others have sought to separate the risk element from a risk-free discount rate concept.

2.4 The Actuarial Profession has appropriately identified this vital piece of the jigsaw for further examination at a time when there is a need for increasing convergence (or at least the need for a more transparent linkage) between discount rates used in pricing of products, in capital assessments, in reserving, in statutory calculations, in funding and collateral arrangements and in financial reporting.

2.5 We feel privileged to have been asked to contribute this paper as the first stage of a longer process. The scope of the work was limited to what was achievable in the available time, and confined mainly to calculations in actuarial and other work which together were considered to represent an appropriate variety of uses. We are grateful to the members of the Discount Rate Steering Committee for their direction and challenge, and to many others within and outside the actuarial profession, including the participants of the forum held to discuss our initial findings, for providing information and ideas and sharing their experiences. Finally we wish to thank Muhammad Abid, Charchit Agrawal, Ambrose Doran, Loic Dumas, Dermot Greally, Agam Jain and James Mwaniki for assimilating all necessary data from numerous sources and presenting it to us in a form that made it easier for us to work with.

3 Historical development of thinking on discount rates

3.1 Concepts of interest probably developed initially in the context of lending, where an amount advanced to the borrower fell to be repaid at some future date at an enhanced amount, representing return of capital plus interest. The formal mathematical concepts of compound interest were developed by Richard Witt in a paper published in 1613 (Witt, 1613), although this was not the first paper on the topic of interest (for example see Trenchant, 1558).

3.2 Discount rates, combined with probabilities of occurrence, were applied to the valuation of future cash-flows by the Dutch mathematician and politician Johan de Witt in 1671 and by Edmund Halley in 1693 in their respective papers on annuities. These were the first known instances of the actuarial approach being used, with probabilities being ascribed to future cash-flows and discount rates being used to arrive at a present value. Halley also published other work on the algebraic solution of compound interest problems (Sherwin et al, 1705).

3.3 In these early papers, and for many years afterwards, the rate of interest was not directly defined in terms of particular investments or investment strategies, although available returns on government bonds were probably relatively stable at the time and may have given a broad indicator of an appropriate rate of interest. The yield actually being obtained on the existing funds was also a relevant indicator.

3.4 However, in many contexts, such as the valuation rate of interest used in valuing life insurance company liabilities, the rate of interest adopted was deliberately very low, in anticipation that in practice the returns on investment would be much higher and that this would emerge as surplus, which could then be distributed to policyholders through bonus declarations, most business in effect participating in profits. This was implemented through use of a net premium valuation at an artificially low rate of interest, combined with book (purchase) value for the assets, preventing the early capitalisation of bonus loadings in the premiums and allowing surplus to emerge in an orderly way over the lifetime of the policies.

3.5 A similar approach was also used by friendly societies, and in both defined benefit and defined contribution pension schemes, with any surpluses which emerged at the actuarial valuation being available to provide additions to benefits. DB pension schemes were designed with no post-award pension increases (and no revaluation of accrued rights of early leavers, to the extent that benefits vested before retirement age), so that the funding approach corresponded to the environment of keeping guarantees low and allowing discretion in the actuarial management of the emerging surplus.

3.6 Up until the 1960s the funds of both life insurance companies and pension funds were mostly invested in bonds and deposits. Diversification of pension fund investments into equities and property become more popular in the 1960s, originally promoted by George Ross-Goobey, the investment manager of Imperial Tobacco Pension Fund, who considered the upside potential from equity investment to outweigh the downside

risk and found support for this view amongst pension advisers and trustees. However, pension funds continued to use book value of assets (possibly written down if market value had fallen below the purchase price), together with an artificially low rate of interest, until the end of the 1960s.

3.7 In the standard actuarial textbook on pensions in the 1950s (Porteous, 1946) there was only one paragraph on determining the rate of interest, which read as follows:

". . . the rate of interest. . . has to be decided with reference to (i) the yield of the existing fund, (ii) the relative size of the annual sums which will have to be invested in the future, and (iii) the probable yield on these future investments. It must also not be overlooked that the rate adopted involves the assumptions that it will be realized over a very long period in the future and in these circumstances, some margin must be retained in relation to the rate actually yielded by the existing fund."

3.8 Puckridge (1948) argued that one should not worry too much about the first two of Porteous' three relevant aspects but that "A much simpler plan is to value assets (including existing investments) and liabilities at the rate of interest which it is anticipated can be earned on future investments." Rationalising with hindsight, this could be said to reflect the need to value future cash-flows in and out of the fund in a consistent way, with the critical factor being the yield which would be obtained on the investment of future excesses of income over outgo and the yield prevailing when assets came to be realised in order to meet future excesses of outgo over income.

3.9 Although Puckridge's views were not accepted by some of those taking part in the discussion of the paper, over time they came to be viewed as an appropriate approach. Heywood and Lander (1961) acknowledge Puckridge's contribution and concluded as follows:

"However, in the light of the accumulated experience of some fourteen years since the date of his (Puckridge's) paper, we have reached the conclusion that it is essentially a sound method of approach. In other words we are of the opinion that the rate of interest to be used in the valuation of a pension fund should be the rate at which new money can be invested over a long period in the future. There is an important proviso to this conclusion, which is that the assets must be brought in on the basis of the same rate of interest, and this aspect of the problem is examined in the next section of this paper."

3.10 Heywood and Lander went on to discuss the valuation of assets, which at that time was usually based on the lower of book value and market value, for both pension funds and life insurance companies. This approach had been questioned some years earlier by Coutts (1925) in his paper on Life Office Investments, in which he commented:

"The adequacy, therefore, of the assets to meet these liabilities does not depend on their realizable capital value at the time the balance is struck. It is the interest-earning power of the assets which determines their value for this purpose. It follows, therefore, from this argument that the proper method of valuing the assets in a Life Assurance Balance Sheet, so far as they represent deferred liabilities calculated on an interest basis, is to value these assets also on an interest basis, i.e. on the basis of the income which they produce, taking into account, of course, in the case of redeemable securities, the basis on which they will be ultimately paid off."

3.11 Heywood and Lander concluded that assets should be valued on a discounted cash flow basis, in a similar way to the liabilities, expressed in the following way:

"This discussion leads to the conclusion that the value placed upon the assets of the fund must be consistent with that placed upon the liabilities and that book or market values are of little relevance. Again, since the process of valuation is to estimate the future income and outgo of the fund and then to discount such income and outgo at the valuation rate, there seems to be no reason why the interest income should be treated on any other basis. This thought leads immediately to the method of valuing the assets on a compound interest basis."

3.12 The principle enunciated by Heywood and Lander became the guiding principle for pension fund valuation in the 1960s and 1970s. Further papers followed along similar lines, such as Day and McKelvey (1964) and Daykin (1976, 1987). There were no regulatory requirements or accounting standards restrictions which impacted on the valuation of pension funds at the time, so the actuarial profession had a free hand to develop methods which were deemed to be most appropriate for the long-term funding proposition which a pension fund represented, with the current value of the assets having little if any relevance.

3.13 Some equivalent thoughts were occasionally expressed in relation to life offices, even as early as 1925, as already mentioned (Coutts, 1925). O'Brien (1960) argued that the only sort of valuation which gave any real indication of the true position of the office was one in which the assets and liabilities were valued on a similar basis. However, the regulations required assets to be valued at book value, or market value if lower, so this prevented the development of discounted cash-flow valuation methods for assets in order to achieve consistency with liabilities.

3.14 There were no valuation of liabilities regulations and so the choice of the rate of interest was left to the actuary. Since with-profits business predominated, the use of a conservative rate of interest was the normal approach for published valuations, which were designed to introduce prudence at every stage, there being no requirement for an explicit solvency margin to be held.

3.15 Notwithstanding the prevailing paradigm for the published valuations of life offices, concepts of matching assets and liabilities were discussed and applied and valuations based on consistent discounting of assets and liabilities were used for internal management purposes. Redington (1952) proposed a generalisation of the matching concept, based on the idea of immunising the liabilities by investing in such a way that a change in the value of the assets can be reflected by an exactly similar change in the value of the liabilities, in other words that, on an economic basis and subject to certain assumptions, the balance of the value of the assets and the liabilities is immune to modest changes in interest rates.

3.16 In the early 1970s the insurance companies' regulations still did not require assets to be valued at market value, although the market value was generally to be regarded as the upper bound (Stewart, 1972). As a result most companies still used the lower of book value and market value and, when book value was held, market value was not generally disclosed.

3.17 Requirements were introduced in 1976 for assets to be valued at market value (The Insurance Companies (Valuation of Assets) Regulations 1976 (SI 1976 No. 87)) and determination of liabilities regulations followed in 1981 (The Insurance Companies Regulations 1981 (SI 1981 No. 1654)).

3.18 For the first time regulations now laid down some constraints on the assumptions which the Appointed Actuary of an insurance company was permitted to make, among other things, for the valuation rate of interest. Whilst in practice the actuary retained considerable freedom, the valuation had to produce liabilities no lower than those on a more closely defined minimum valuation, for which the rate of interest had to meet certain requirements. For the minimum valuation the rate of interest had to have regard to yields on existing assets backing the long-term business and, to the extent appropriate, to the yield which it was expected would be obtained on sums to be invested in future.

3.19 The yield on existing fixed interest assets was subject to an adjustment for risk and an overall reduction of 7.5 per cent of the yield. Only the running yield on equities and properties could be brought into account and an upper limit of the yield on Consols also applied. For sums to be invested in future the regulations laid down a maximum assumption of 7.2 per cent a year for any investment to be made more than three years after the valuation date (before any adjustment for the effect of taxation).

3.20 There were no explicit restrictions on investment policy, although the effect of the valuation of assets regulations was to discourage concentrations of assets and investment in asset classes deemed to be more risky (and hence not allowed to be taken credit for in the asset valuation, or only to a limited extent). Asset-liability management was, however, practised by company actuaries (and encouraged through the Guidance Note GN1 for Appointed Actuaries), with assets being at least notionally

attributed to different parts of the liability portfolio. Equities and property were generally only held as backing for liabilities which participated in profits, particularly to generate future bonuses.

3.21 The cautious approach to allowing for returns on real assets was often combined with retaining investment reserves and not using the full market value of assets in determining surplus for distribution. Reversionary bonuses were awarded with caution, as they had the effect of building up the level of guarantees. Terminal bonuses became more and more popular as a way of distributing accrued surpluses only on exit, with no reserves being required in advance for future terminal bonus allocations.

3.22 These requirements persisted until after the Financial Services Authority (FSA) took full responsibility for the supervision of insurance companies (and for a little while thereafter). The Insurance Companies Regulations 1994 had made a few changes, in particular placing the onus on the actuary to make a prudent assumption as to rates of interest, but on the other hand reducing the yield reduction to 2.5 per cent of the yield. The yield permitted to be assumed on investments made more than three years after the valuation was now not to exceed the lowest of:

(i) the long term gilt yield current on the valuation date; or

(ii) 6 per cent a year, increased by one quarter of the excess, if any, of the long term gilt yield current on the valuation date over 6 per cent a year; or

(iii) 7.5 per cent a year.

3.23 It is worth mentioning that the regulators also made use of regulation 75 (of ICR 1994 – previously regulation 55 of ICR 1981), which required the actuary, for the purposes of the minimum valuation, to set aside provisions against the effects of possible future changes in the value of the assets on—

(a) the ability of the company to meet its obligations arising under contracts for long term business as they arise, and

(b) the adequacy of the assets to meet the liabilities as determined in accordance with regulations 65 to 74 above.

3.24 This regulation was supplemented by advice from the Government Actuary (in Dear Appointed Actuary letters) indicating the range of changed market circumstances which the Government Actuary's Department woul expect to take into account in reviewing the so-called *resilience tests* carried out by Appointed Actuaries. The first such DAA letter on resilience testing was issued in November 1985 and there were a number of later revisions. The thrust of this guidance was that companies should be able to demonstrate that their reserves were sufficient for them to continue to comply with all the other determination of liabilities regulations after one of a series of shock scenarios affecting the value of the assets. These hypothetical scenarios included a sudden fall of

25% in the value of equity investments (and a similar fall in the value of property) and a significant movement in gilt yields, either up and down.

3.25 These resilience tests were designed to compensate for the lack of market consistency between asset and liability valuations under the solvency assessment. Assets were shown at market value but liabilities were established on a basis which was only loosely connected to the market. Changes in market conditions could lead to deficits (or surpluses) arising on the minimum valuation basis. Moreover, it was clear that the prudent net premium valuation approach, with the resilience testing overlay, was designed as a valuation to assure solvency, and did not provide useful information about the sustainability of bonus policy or give a realistic assessment of the balance sheet. It was never intended to do so, the question of bonus distribution policy being regarded explicitly as a responsibility of the Appointed Actuary and less of a concern for the regulator.

3.26 Following the various reports into the closure to new business of Equitable Life, and the concerns expressed that the regulator should be able to monitor more actively the way in which insurers were fulfilling policyholder reasonable expectations, the FSA introduced the current two peaks approach to valuation, which is described in Section 6, together with other more recent developments in discount rates for life insurance, including the introduction of Individual Capital Assessment (ICA).

3.27 Regulation of pension fund valuations came much later in the UK and the actuary retained a great deal of discretion over assumptions and also the method of valuing the assets. For pension fund valuation purposes the net rates of return, net of earnings growth and net of future pension increases, were increasingly regarded by actuaries as much more important than the nominal rate of return and the nominal assumptions for price increases and earnings increases.

3.28 In 1981 the government introduced index-linked government securities (ILGs), initially only for the use of occupational pension schemes. This meant that there was a market measure which could be interpreted as being a risk-free real rate of return net of increases in the Retail Prices Index. However, few actuaries used this as the rate of interest net of price increases for valuation purposes, since the yields on ILGs were widely regarded as distorted because of the low volumes of the securities issued relative to potential demand from pension funds and because, once the market was opened up more widely, the stocks were very attractive to higher rate tax payers. The market yields on ILGs were not therefore considered to be an unbiased estimate of the risk-free real rate of return and there remained a strong belief that higher real returns could be obtained by investing in equities and a diversified portfolio, without taking on a commensurate level of additional risk.

3.29 Specific requirements for the discount rate for pensions were introduced first, not by the regulator, but by the Inland Revenue, with the 1986 Finance Act and the resulting

rules for the maximum value of assets which a pension scheme could hold relative to its liabilities before becoming subject to tax on the surplus. The Pension Scheme Surpluses (Valuation) Regulations 1987 (SI 1987 No. 412) laid down a statutory basis for carrying out valuations for the purpose of determining a "surplus". The main economic assumptions were a nominal rate of return of 8½% a year, a real rate of return over general salary increases of 1.5% a year and a minimum net yield post retirement of 3% a year (2% a year if pensions were guaranteed to receive RPI increases). Demographic assumptions were not laid down but had to be consistent with previous valuations.

3.30 A valuation in accordance with the Surplus Regulations was to be included as part of all triennial pension scheme valuations from 6 April 1987 and surplus was to be determined using the Projected Accrued Benefit Method. The Regulations required the excess of assets over liabilities to be reported to the Inland Revenue where it exceeded 5% and tax was then payable on the excess.

3.31 On the pensions regulatory front the Minimum Funding Requirement was introduced by the Pensions Act 1995 and came into force in 1997 by means of The Occupational Pension Schemes (Minimum Funding Requirement and Actuarial Valuations) Regulations 1996. (SI 1996 No.1536). The Actuarial Profession issued guidance in the form of GN27 (Retirement Benefit Schemes – Minimum Funding Requirement), to be effective from April 1997. GN27 v1.0 required the scheme actuary to use specified assumptions for calculating the MFR. The current gilt yields to be used for valuing pensioner liabilities were required to be the gross redemption yield on the FT-Actuaries Fixed Interest 15 year Medium Coupon Index or the FT-Actuaries Index-linked Over 5 years (5% inflation) Index, as appropriate. Long-term financial assumptions were also specified, with an effective return on gilts of 8% a year and an equity premium (in excess of gilts) of 1% a year before pension age and 2% a year after pension age. Inflation was to be assumed to be 4% a year in the long term. There was also a specified market value adjustment (MVA) to adjust the basis to current market conditions.

3.32 Whilst this did not force the scheme actuary to make any particular assumptions regarding discount rates for the actual funding basis adopted, it did introduce a defined underpin to the value of past service liabilities. However, the folly of managing a short term measure with rigid parameters dictated by longer-term thinking soon became clear and the government was eventually persuaded to abandon the MFR for a scheme specific approach from 2005.

3.33 Exley, Mehta and Smith (1997) reminded the actuarial profession of how modern finance theory had radically changed the way financial markets operated and how techniques developed by financial economists for measurement of profit and risk were increasingly being applied in modern business and investment management. They showed how defined benefit pensions could be viewed from this perspective, and

proposed a blueprint for a market-based valuation approach for assets and liabilities using conventions adopted successfully by banks. The traditional approaches, compared with this new approach, apparently contained some contradictory messages. Their key conclusion was that traditional actuarial techniques for measuring liabilities allowing for equity out-performance in discount rates were flawed as a means of calculating economic value, and should at best be viewed as 'budgeting' calculations.

3.34 Chapman, Gordon and Speed (2001) considered the implications of this distinction further, and in particular whether it was possible to reconcile the 'long-term' view with the short-term economic value approach. The former, involving advance credit for some or all of the expected returns from equities, omitted explicit consideration of risks attaching to the investment. They described a model whereby the interests of all stakeholders could be examined separately and gains and losses from decisions relating to funding levels and investment strategy quantified in a market-consistent way.

3.35 Cowling, Gordon and Speed (2004) put the case for the Actuarial Profession to tighten its standards on actuarial funding advice in relation to UK occupational pension schemes. In particular, they advocated that funding targets should be clearly and unambiguously related to scheme solvency since any other measure, including an arbitrary allowance for default or possible future investment out-performance, has the potential to mislead.

3.36 Only with the establishment of The Pensions Regulator (tPR) did it become mandatory for the assets to be valued at market value and aggregate funding methods were banned, in favour of methods which produce a separate value for the past service liabilities at the valuation date. There are still no specific requirements regarding the rate of interest to be used (nominal or real) but the trustees are now responsible for making the decision, normally with the employer's agreement, about the method and assumptions for calculating the technical provisions and they are required to take a prudent view. The tPR has made it clear that this does not require the use of a risk-free discount rate but that a prudent allowance for additional expected returns in excess of risk-free yields is acceptable.

3.37 It is often argued that DB schemes involve a 'social contract' between the sponsor and members which translates to a risk-sharing arrangement. The argument is that the sponsor did not set out to provide guaranteed benefits but that the promise was more in the nature of a 'best endeavour' which enabled an investment risk to be taken by the sponsor in the hope of being able to provide better benefits but where members clearly understood that there was some risk to their benefits not being delivered. In practice successive legislative measures have removed the headroom for flexibility in this area, in particular the early leaver legislation in the mid-1980s, statutory LPI indexation of pensions in payment (1997), the removal of dividend tax credits for pension funds (1997) and the requirement (from April 2003) for employers who want to 'walk away'

from the pension scheme to first settle a debt that would bring the scheme's funding level up to buy-out solvency level.

3.38 Accounting in the sponsoring employer's financial statements for the contingent liabilities in respect of a defined benefit pension plan has also been subject to more and more constraints in recent years. SSAP24, the standard issued in 1988 by the UK Accounting Standards Board was not very prescriptive and permitted the actuary to recommend long-term funding methodologies and assumptions, and for the impact of the pension scheme to be shown only in the notes to the accounts. The cumulative effect of the smoothing mechanisms built into this standard soon became counter-intuitive.

3.39 FRS17 was promulgated (as an exposure draft) towards the end of 2000 and introduced a whole new world to pension accounting in the UK for accounting periods beginning on or after 1 January 2005. Once fully implemented (after a transitional period when the disclosures were confined to the footnotes and did not show in the profit statement or the balance sheet), pension liabilities became more prominent on the face of the accounts, based on market value of assets, projected unit method for the liabilities and the discount rate constrained to the yield at the assessment date on AA rated corporate bonds. Its hallmarks were market consistency and transparency and for the first time the volatile effect of a risky investment strategy appeared explicitly on the sponsoring company's balance sheet. This was soon tested by the three year bear market in the early part of this decade, with a greater focus subsequently on risk management (and there are those who attribute the subsequent decline in DB provision to this).

3.40 The International Accounting Standards Board (IASB), persuaded by the merits of FRS17, followed a similar approach in the revised IAS19 standard which became obligatory from 2005 for all companies listed on an European stock exchange (although this requires the discount rate to be the yield on high quality corporate bonds, and retains some smoothing which is now a matter of further debate – see Section 10). In the US, the Federal Accounting Standards Board (FASB) has been slower to reject smoothing mechanisms although they are currently working on a programme of convergence with the IASB.

3.41 A working party of the Actuarial Profession (Pemberton et al (2000)) examined the application of discount rates in the context of Economic Value Added (EVA) calculation. They concluded that there were a wide variety of discounted cash flow models in use by actuaries and across the finance area employing discount rates with varying degrees of risk

4 Concepts associated with discounting

Money and financial markets

4.1 Money has two important characteristics: it is a universally recognised medium of exchange and a store of value. As a medium of exchange it allows an exchange of goods and services to be disaggregated into multiple transactions. It is a store of value because people rarely obtain money from one source and spend it immediately; the greater the time lag between acquiring and spending, the more money is being used as a store of value. This time dimension is referred to as the '*time value of money*'. Since most people's utility preferences would suggest that consumption now is worth more than consumption later, the nominal value of money declines with time, which is equivalent to paying a positive interest rate on money in store (except in deflationary times).

4.2 The concept of a *present value* allows the time dimension to be compressed by thinking in terms of the amount of money to be set aside now which, when compounded with interest, will be sufficient to settle a given future payment. In practice it is more complicated, as we shall see later, because of the need to take account of the uncertainty associated with future payments – for example, the payments themselves may be uncertain, the borrower may not be able to honour his or her commitment when the time comes, or a single interest rate may not prevail throughout the period in question.

4.3 These simple concepts are, of course, the foundations of the financial markets and financial mathematics. They create for the owner of a particular product the flexibility to transform it into something else via the medium of money. Thus the owner now has the freedom to acquire a range of alternative and more desirable products and the flexibility to deal with a number of different counterparties (*diversification*). The owner also has the flexibility of using money as the medium to transform into goods and services for immediate enjoyment (*immediate consumption*), as a temporary store until the right counterparties with the right products and terms appear (*deferred consumption*) or as a more permanent store of wealth (*savings*).

4.4 A desirable characteristic of financial markets is '*liquidity*'. If a market for a particular asset is liquid, then owners of that asset should feel confident that there are enough potential buyers around for them to be able to sell it at will and move quickly into a more flexible medium (money). For this privilege sellers in financial markets pay a premium – the liquidity premium – which is implicitly factored into the market price of the asset.

4.5 Another desirable feature is that markets should be '*deep*', meaning that there should be a sizeable volume of business transacted regularly in the particular product for the price to be reliable and not capable of being moved by one or two large trades. A definition used by CEIOPS (the Committee of European Insurance and Occupational

Pension Supervisors) is 'markets where participants can rapidly execute large-volume transactions with little impact on prices'.

4.6 An investor exercising a preference for deferred consumption takes a *credit risk* with the counterparty. The credit risk varies with the nature of the counterparty and should be reflected in the price of the trade. Thus, for example, in normal conditions we should expect to see corporate bonds issued by UK companies yielding more than identical government bonds (gilts) and there to be a further hierarchy amongst corporate debt, depending on the credit quality of the issuer.

4.7 The credit risk (and its associated premium) can be further decomposed between, amongst other components, the risks of default by the issuer and potential downgrade, both in relation to the individual issuer and more generally for the asset class. Other risks such as volatility, illiquidity and lack of comprehensive coverage of the yield curve may also affect the spread between yields on corporate bonds and gilts and may be difficult to disentangle from the credit risks (see section 10).

Interest and discount

4.8 The concept of interest first arose with lending transactions, where the amount lent would have to be returned with interest after a given period (and the interest payable often reached penal rates if the repayment schedule was not met). This sort of transaction does not require any assumption about what was to be done with the money borrowed. If an amount X is lent for a period with interest at i_1 for the period, then clearly the amount to be returned would be $X \bullet (1+i_1)$. If the loan is rolled over and the amount $X \bullet (1+i_1)$ is borrowed for a further period of the same length with a different interest rate i_2, then the amount owing at the end of the second period would be $X \bullet (1+i_1) \bullet (1+i_2)$. The simplest situation is where a single rate of interest is used for each period, in which case the amount due for repayment after n periods at rate of interest of i for each period would be $X \bullet (1+i)^n$.

4.9 Discounting describes the inverse of this process, namely the amount that needs to be set aside today in order to correspond to a payment later. This is described as the present value of the future payment. The present value of a payment of Y after n periods at rate of interest i per period is given by $Y/(1+i)^n$.

4.10 From this simple thought a whole framework of compound interest functions was developed, involving either accumulation over time or discounting back to the present (or to some other point). The rate of interest can be defined as different rates for each future period, described as a term structure of interest rates, which in some circumstances might be defined as a continuous function, or generated by a stochastic process.

4.11 Actuaries and other practitioners often use the terms *interest rate* and *discount rate* interchangeably and the context usually makes clear whether an accumulation process is envisaged (for example cash-flow projections) or the inverse process of discounting to present values in order to facilitate an easier comparison of non-identical cash flows. Theoretically a rate of discount is not quite the same thing as a rate of interest. Compound interest text-books define the rate of discount d as being related to the corresponding rate of interest i and the continuous force of interest δ by the formula

$$1 - d = 1/(1+i) = e^{-\delta}$$

4.12 The terms of reference for this project also use *interest rate* and *discount rate* interchangeably and we have done the same.

Evaluating future cash-flows

4.13 Typical actuarial problems require an estimate of the quantum of future cash flows and a present value to be placed on them. A cash flow at time t can be expressed as the product of three elements: the probability (P) that the payment will be made, the amount of the payment (S) and the discount factor (D) to give the present value of the payment. P and S may be anything from fixed numbers to complicated functions which could depend on time t and also on a variety of other factors (such as, in the case of P, age, retirement, occurrence of an accident, whether or not an index has gone above a certain level, etc., and likewise for S).

4.14 If we assume that the required present value is set aside at time t_0 as money on deposit with the interest rate fixed at i, then the accumulation will be at i and the discount factor D will be $1/(1+i)^{t-t_0}$, where i is the interest rate for a period and t-t_0 represents the number of periods. More sophisticated calculations can be carried out allowing for i to vary over time, either in discrete steps or as a continuous function.

4.15 The most difficult question in practice is usually what rate of interest to assume. In general there will not be a guaranteed rate of interest payable in future on money deposited from time t_0 to time t, so an assumption has to be made about what interest rates to allow for over the period.

4.16 In earlier times actuaries approached this problem in the context of an insurance company or pension fund by considering the yield which was being earned on their existing funds, on the assumption that this was not going to change rapidly and that the current experience provided an objective measure.

Actuarial discounted cash-flow valuations

4.17 As can be seen from the historical review section of this paper, pension actuaries in particular became disenchanted with an approach based on current earned yields and argued that the assets currently held were not in fact the key factor in the discounting

problem. The assets held would generate inward cash-flows in future years and there would also be outward cash-flows in respect of payments to beneficiaries, expenses of administration and so on. These inward and outward cash-flows would largely offset each other, so that the importance of the current assets was in relation to the extent to which the resulting cash-flows would meet liability cash-flows. There would also be positive cash-flows from contributions payable in future by the sponsoring employer and by active members.

4.18 By projecting all of these cash-flows the actuary could determine the net amount which was estimated to be available for investment in each future period. In some future periods there might be a projected shortfall of income relative to expenditure, which might suggest the need to sell some assets at that time in order to bridge the gap. The market conditions under which future net incoming cash-flows could be invested, or assets could be disinvested to meet future net outward cash-flows, would the most relevant consideration for determining the discount rate.

4.19 An important principle was to be consistent between discounting the assets and the liabilities. If a portfolio of liabilities was matched exactly by a portfolio of assets in every sense, then the discount rate should be irrelevant (and, as demonstrated by Redington (1952), if the cash-flows are immunised the first order impact on surplus of small changes in interest rates is benign). In practice this is rarely the case and discount rates serve as a simple tool to communicate complicated cash-flows by condensing the time dimension. Discounting becomes more relevant the larger the mismatch between assets and liabilities.

4.20 Providing the same discount factor is used for all cash-flows at any particular duration, a coherent discounting framework can be established. This would be consistent with using a single discount rate for all durations, or assuming a term structure of interest rates which has a unique discounting factor in respect of each duration to which discounting is applied. If the income flows from assets are discounted in the same way as outgo from liabilities in each successive period, the result is a coherent method of comparing future cash-flows in terms of present values.

4.21 Assets which generate a well-defined set of future cash-flows (e.g. government bonds) make the process more straightforward. However, if the asset cash-flows are not known in advance, e.g. in respect of equity investments, property or many alternative investments, or the amount is known but there is a non-zero probability that the issuer may default on the payments, then the model must introduce other elements, such as expected future growth in equity dividends or property rental income, default probabilities and even a stochastic model to project future asset values. Of course, a number of assumptions are likewise required for the liability outflows.

4.22 This sort of approach was used for pension fund valuations for many years. Setting the assumptions involved actuarial judgement. The main objective was to determine an

appropriate level of future contributions and the focus was therefore more on the financial control process (for example, budgeting and planning) than on the absolute level of the values of liabilities and assets produced along the way.

4.23 A perceived disadvantage of the method was that the values placed on the assets for the purposes of the valuation were often different from current market values, which would also usually need to be disclosed for accounting purposes and for monitoring the performance of investments. Typically bonds would be valued somewhat below market value and equities and property somewhat above. One of the criticisms of the discounted cash-flow method was that the actuary appeared to be second-guessing the market and that using relative values of different asset classes which differed from the market values could skew investment strategy decisions, as well as being potentially confusing to clients.

4.24 A possible solution to this is to replace the discounted cash flow value of the assets by their market value, or equivalent estimated value where market value is not available or not reliable. However, this raises a new set of issues as to how to identify the implicit discount rate in order to be able to value the liability cash-flows consistently. We explore this problem further in subsequent sections.

Price and value

4.25 The *price* of a financial instrument or product is the amount for which ownership changes hands between a willing buyer and a willing seller. At any one time there will only be the one price in a liquid market (ignoring transaction costs and bid-offer spreads) and this will incorporate a number of features of the market (supply, demand, liquidity, depth of market, etc) as well as economic conditions and characteristics of typical buyers and sellers (e.g. tax considerations and other utility preferences). In less liquid markets price can be affected by supply and demand and by the absence of willing buyers or willing sellers. Trades may take place infrequently, with potential for significant distortion and uncertainty about the true 'price'.

4.26 The *value* of an existing investment or product is the utility it provides to the recipient. It can therefore be defined differently for different purposes. There will usually be some subjective elements in its quantification and, even if these are clearly stated, it is possible that another independent party could reasonably take a different view. At the extreme, something may be extremely valuable to one party and worth nothing at all to another, for whom it provides no utility. Therefore 'value' can be open to many interpretations and needs to be considered within its context. The framework within which value is determined should be suitably described and disclosed.

4.27 For example, a trade on the stock market involves a single price (ignoring frictional costs) with the buyer intrinsically ascribing a higher value and the seller a lower value reflecting their respective preferences. The price is the point at which both feel they

are getting a reasonable deal, relative to their own perception of value and interest in carrying out the trade and hence their ability to increase expected utility.

4.28 When 'value' is expressed in *monetary terms* and it is immediate in nature, people might expect it to correspond to the amount of money that would need to be exchanged to buy or sell the item. However, this may well not be the case.

4.29 *Price* is determined by marginal transactions, since at any one time only a small proportion of the owners of a particular type of asset are interested in selling and only a small proportion of the potential purchasers are interested in buying. The fact that not everyone wants to sell at the same time (possibly with exceptions in crisis situations) reflects the fact that different players in the market have (a) different perceptions of what their asset is worth (the value/utility of the asset to them), (b) different considerations regarding how the characteristics of different assets fit into their portfolio construction (e.g. because of asset/liability issues), (c) different investment timescales, (d) different tax positions, and (e) different views of what the future may hold. If people did not have different ideas about many of these things, there would not be a market with active trading.

4.30 There may be some conflict between these differences of value which investors ascribe to financial instruments and other investments and the theoretical concept of *no arbitrage*, which suggests that there must be complete *fungibility* (or inter-changeability between any two separate units) between different assets, as the market finds its own level. In practice the behavioural aspects of investment are important and do not necessarily imply irrational behaviour. Investment decisions are dependent in a complex way on many background factors and the values that some investors place on an asset can differ from the price at which marginal trades are taking place between willing buyers and willing sellers. It is too early to assess the impact that the study of behavioural finance will ultimately have on some of the axioms of traditional financial economics.

Discount rates which do not depend on assets

4.31 Discount rates arise in other contexts where there is no direct consideration of investment. In cost-benefit analysis a discount rate is used to compare the present value of future expenditures with the present value of future benefits or services. The discount rate serves to weight the estimated costs and benefits in future periods and reflects the *social time preference*, i.e. the perceived virtue of having a benefit or service sooner rather than later, the proverbial 'bird in the hand'. However, care needs to be taken not to make unconscious intergenerational wealth transfers through discounting the future excessively.

4.32 In capital appraisal, the discount rate may also be used to encapsulate the riskiness of future payments, since income streams become increasingly uncertain the further

ahead one looks, and a higher discount rate ensures that less weight is placed on those more distant future receipts.

4.33 The government also uses discount rates to assess the present value of future commitments. For example, the Long-term Public Finance Report published with the March 2008 budget stated that "A discount/debt interest rate assumption is required to assess the long-term sustainability of the public finances. This is necessary either to calculate the present discounted value of future spending and revenue flows or to project debt into the future. A discount rate can be derived from data on long-term real interest rates based on index-linked gilts….The discount/debt interest rate assumptions are higher than the real interest rates for UK government bonds with five- and ten-year maturities have been since the end of the 1990s…."

4.34 In this case the government is not assuming any underlying investment process, or that it will finance the future excess of spending over future revenue flows by issuing more index-linked gilts (or for that matter other gilts). It is simply making assumptions about the appropriate realistic level of long-term real returns, having regard to growth of taxable capacity in the economy, in order to find a realistic way of summing expenditures in different future time periods.

Discount rates which depend on the underlying investments

4.35 A situation at the opposite extreme is where one is concerned to estimate the amount to which a sum of money will accumulate when invested in specific assets or instruments. In that case different assumptions might be used according to one's expectations of return on different financial instruments or other assets. Since the outcome will usually be quite uncertain, the estimation might involve stochastic processes or distributions of possible outcomes of asset behaviour. Corresponding discount rates might be derived to express the present value of future cash-flows in terms which directly reflect the underlying assets and expectations about the corresponding returns.

4.36 Putting this approach into practice should also involve careful analysis of the respective risk and other characteristics, such as liquidity, of both assets and liabilities. We will return to some of the issues associated with this after discussing market consistency and the concept of a risk-free rate of return.

4.37 The determination of contracted-out rebates might be regarded as a situation where an attempt is being made to reconcile the government's long-term view on financing with a need to arrive at a result which is satisfactory for employers and pension funds operating in an environment with real investments. However, it has to be remembered that the actual contracted-out rebate decision is political, rather than a purely technical actuarial issue.

4.38 In the most recent review of the contracted-out rebates by the Government Actuary (GAD, 2006), the assumed real rate of interest for the period after retirement was 2% a year. For the pre-retirement period it was considered appropriate to assume that the typical investment portfolio for the contracted-out worker would be broadly bond-based approaching state pension age, with increasing proportions of the portfolio in equity investments at younger ages. Taking into account the available evidence on the equity risk premium, the Government Actuary recommended a real rate of return before retirement relative to prices starting at 2% a year (for those near pension age) and rising to 4% a year (for each year to pension age) for those more than 30 years from pension age (these figures were assumed to be net of investment management expenses).

Market-consistency

4.39 Market-consistency is a catch-all term to describe how, in financial practice, people take account of 'what the markets have to say'. The common denominators of market-consistency are money and the immediate nature of the exchange implied by the market. Bankers use the expression *mark-to-market* to signify the same. The accountants' concept of *fair value* has similar connotations, although at the detailed level there are some differences and there are a number of different views of what *fair value* means *(Kemp (2009)*).

4.40 A commonly held definition of a market-consistent value of an asset or liability is its market value if readily traded in a deep, liquid and transparent market, or a reasoned best estimate of what its market value would have been if such a market existed (*Kemp (2009)*). Discount rates consistent with such a valuation are referred to as market-consistent discount rates. Another way of defining market-consistency is that the measure of the value of a liability is the market value of an asset which replicates the cash flows corresponding to the liability.

4.41 In practice the definition of market-consistency is not unique. Postulating how a hypothetical market might operate is open to interpretation and even where a market exists, concepts like deep and liquid are not uniquely defined. Kemp (2009) suggests some principles to limit this subjectivity but accepts that it cannot be entirely eliminated. Practitioners need to explain the judgements involved and users need to be aware of their limitations. Market instruments have become more and more diverse, but still it is difficult in practice to identify financial instruments which have precisely the same characteristics as a liability, in terms not only of duration, expected return and volatility but also credit risk, liquidity, inflation dependence and so on. And of course the cash-flows of pension and life insurance liabilities are also dependent on mortality and longevity risks for which deep, liquid and transparent markets have yet to emerge.

4.42 A market-consistent approach seems particularly appropriate, and even essential, in cases where a real time transaction is to take place in the market, which involves a sale or purchase, a surrender or buy-out. It can be argued that such an approach is the correct way to deal with evaluation of solvency or asset adequacy – comparing assets with accumulated liabilities as at a particular date.

4.43 More controversial is whether a market-consistent approach is appropriate for ongoing financing of liabilities which are still accruing and developing, since the influence of future economic and market conditions may be at least as important as the current market situation.

4.44 Accounting for liabilities falls somewhere in between the extremes, since it has relevance for current market transactions but it is also trying to represent an ongoing situation. It is argued that market-consistent accounting is only trying to put a realistic value on assets and liabilities, in other words that it is only concerned with measuring what is already happening, but it also changes behaviour, not necessarily in an appropriate way, by turning long-term financing considerations into short-term measurement issues. In practice the situation has been made rather more confusing (for pension accounting) because the sponsor's ability to take credit in the profit statement for the *expected* return on the pension scheme's assets.

4.45 A Note on Financial Economics issued by the International Actuarial Association (IAA, 2008) suggested a number of advantages of using market-consistent valuations, even in actuarial work involving funding and projection considerations:

a) In theory, market-consistent valuations should be objective, enabling valuations to be compared. In practice, this objectivity is not easy as the valuations may involve options and guarantees, for example, which are unique and assessment of whose behaviour is highly subjective.

b) Using market-consistent discount rates separates the tasks of valuing liabilities and formulating investment policy.

c) They also enable better understanding of a company's share price in the case of an insurance company or the sponsor of a defined benefit pension. For example, comparing market-consistent embedded or appraisal values for life insurance companies makes explicit the consideration of choice of various strategies to management. This enables management to understand the effects of changing the underlying factors affecting cash-flows and leads to more informed management.

d) They should allow the entity to clearly consider how and whether risks should be closed out. For example, if the solvency of a defined benefit fund is very sensitive to equity market performance, and may threaten the solvency of an entity in certain circumstances, then alterations to the investment policy need to be considered. This is

more difficult if these alterations affect the liability value through use of a now lower discount rate.

4.46 Some people use market data where it is available and practical, and use so-called 'real world' or 'more realistic' approaches for everything else. In effect they attempt to quantify the real world likelihood of some risk materialising over a given timeframe.

4.47 By contrast, advocates of true market-consistency would limit their models to risk-neutral projections, thus separating the tasks of valuing liabilities from formulating or monitoring investment policy in order that the consequences of mismatching and the need for capital support due to adverse price movements can be better understood.

4.48 Replicating portfolios are one manifestation of market-consistent valuations. However, it is often impossible to replicate precisely all of the characteristics of the liabilities in a suitable replicating portfolio of assets.

How different people use discount rates

4.49 The purpose of the valuation is probably the single most important factor in determining what type of calculation is appropriate (whether market-consistent or something different), as well as the detail and sophistication that should be employed.

4.50 Market-consistency appears important where there is an *immediate* need to resort to the financial markets in order to deploy all the advantages that a market offers. For example, if a cash-flow is traded between a willing buyer and a willing seller in a financial market, then the rules of the market require the cash-flow to be transformed into the medium of exchange used by that market (money). It therefore makes sense for the price to be struck by reference to prevailing yields on instruments readily available in the market which have similar characteristics to the cash flow (term, currency, quality etc). This way the market is seen to be preserving fairness between the buyer and seller, which is one of its functions (thus ensuring that the buyer can, if he so desires, use the proceeds of the sale to transfer the liability he has just acquired to a third party without being out of pocket).

4.51 Where the immediate need for an exchange in the financial markets is not present, then applying the principles of market discipline to the discount rate may be less important or even unnecessary. There are many areas outside actuarial work where this appears to be the case and discount rates are set by reference to criteria that might not satisfy principles of market-consistency.

4.52 An example would be the real discount rate employed by the government when assessing the viability of capital projects. It may be natural to think that discount rates used for such appraisals should be linked to the rate at which the government can raise money in the markets by the issuance of gilts. In practice the logic adopted appears to be that the bulk of government expenditure is financed from other means, and since

many of these projects are of an infrastructure and environmental nature, they also involve social preferences on behalf future generations who will also be benefitting. Consequently, discount rates are set by reference to other criteria, with assumed long-term rates of return involving a social element being more appropriate than current market yields on what is after all only a marginal financing tool for government.

4.53 Economists usually adjust the discount rate they use in cost benefit analyses, using a higher discount rate for riskier projects. However, for very long term infrastructure and environmental projects, a social preference may also be implicit, similar to that in the previous paragraph, to ensure that high capital cost projects can be appraised over long pay-back periods which also recognise their economic value to future generations.

4.54 Another example is in the field of corporate finance when businesses are valued for merger and acquisition (M&A) purposes using discount rates set by reference to what providers of capital are seeking rather than those implicit in the valuation of the company by the stock market.

4.55 Similarly, investment analysts when making their buy/hold/sell decisions need to form a view that is different from what the market is saying and may use discount rates decided by criteria other than market prices of the investments on which they are commenting.

4.56 In profit-testing new products in insurance and similar portfolios the appropriate discount rate to be applied to the capital demands and profit stream is usually the rate of return expected by the shareholders on their capital. This will be different from the best estimate of investment returns generated within the product and probably different again from the discount rates used to determine statutory reserves within the profit test.

4.57 Discount rates are sometimes employed as a management tool and as a financial control mechanism. For example, in participating (with-profits) insurance business artificially low discount rates were used to control emergence of surplus, so as to permit an equitable development of accruing bonus. A similar process using artificially low valuation rates was used in the past to produce a steady emergence of surplus at successive defined benefit pension fund valuations, in order to permit the orderly award of pension increases to pensions in payment.

4.58 In calculations for the purposes of funding pension liabilities, advance credit is sometimes taken for some of the expected outperformance from the equity investments in order to smooth out future contribution cash-flows, or to set a more realistic recovery plan. Calculations made by courts for assessing compensation to personal injury victims also employ discount rates for calculating the cost of future periodic loss (such as earnings or pension) or of new additional expense as a result of the accident (such as cost of future care). The discount rate is supposed be a ‘risk-free’ real rate referenced to the yield on index-linked gilts (following the judgment by the House of

Lords in *Wells v Wells* in 1999[1]), but in practice it is prescribed in legislation and the present rate of 2.5% a year has remained unchanged since 2001.

Board for Actuarial Standards Conceptual Framework

4.59 The question of discounting was examined in 2007 by the Value Working *Group of the* Board of Actuarial Standards (BAS), which identified a number of different purposes for which calculations requiring discount rates might be required in pensions and insurance work. The BAS's 'Conceptual Framework for Technical Actuarial Standards (2008) identifies two different contexts in which discounting may arise:

- Where the calculation is prepared for the purpose of applying in a transaction, or in a formal document. Examples given are regulatory returns, statutory accounts, appraisal values for purchase or sale of a business, and transfer values or surrender values paid to individuals

- Where the purpose of the calculation is to arrive at a provisional amount for planning or target-setting. Examples given are funding assessments for pension schemes, developing a bonus distribution strategy in a with-profits life fund or reviewing the adequacy of general insurance premiums

This is a different classification from the one we suggest in this report.

General approaches to discount rates in actuarial work

4.60 In actuarial work approaches to setting discounting rates generally fall into one of two categories:

- Those that start by considering a notional asset strategy that would deliver the liability on a 'least risk' basis, and allowing the prices of appropriate assets and instruments in the financial markets within such a notional strategy to inform their decisions about discount rates. If the actual asset strategy being pursued is different from the 'least risk' strategy, then the difference is considered to be a separate investment decision, which can be appraised in relation to risk and expected return.

- Those that start by considering the actual asset strategy being pursued to deliver the liability, and allowing the prices of those assets in the financial markets and other information on related instruments to inform their discount rate decisions. Where actual assets involve equity and similar investments then additional judgements are usually necessary about how these investments will perform over the duration of the liability.

[1] *Wells v Wells [1999] 1 A.C. 345*

4.61 The term market-consistent is used for the former, although the latter could also claim to be market-consistent. Both require subjective judgements, and the level of subjectivity employed in the former may be argued to be less than that in the latter. We prefer a distinction based on risk, since the latter clearly has more risk embedded into the discount rate (and hence in the emerging liability measure) than the former.

4.62 In actuarial work there are many instances where either approach may be appropriate and also instances when regulations or other requirements direct the actuary towards one or the other. These are explored in detail in later Sections.

4.63 From a communication viewpoint, a particularly difficult dilemma for actuaries is when multiple purposes come together, some requiring market-consistency but then needing to be reconciled with other approaches where generally accepted practices follow different principles.

Conceptual frameworks for discounting

4.64 As described in paragraph 4.12, the conceptual framework for valuing future cash-flows involves a combination of a function describing the amount of payment, a function describing probability of occurrence and a function involving a discount rate which converts the cash-flow to a present value. Where relevant, an adjustment would be appropriate for tax, either in the discount rate itself, where the return on investments is directly subject to tax, or in the cash flow payments to be discounted, or by a separate process.

4.65 At the simplest level the discount rate may be a single rate averaged over the full term of the liability. Where there is a term structure to the discount rate then a valuation employing the whole yield curve to value each year's cash-flows separately would seem more appropriate, unless the uncertainties in the cash-flows outweighed this level of sophistication.

4.66 Sometimes a long-term rate of interest may be assumed, with specific separate assumptions for the short term, or one rate of interest may be used up to a certain watershed point, such as retirement age in the context of a pension fund or the deferment date in a deferred annuity, and another rate thereafter.

4.67 Where cash-flows are also dependent on other economic variables (such as earnings increases and price inflation) these may be modelled separately from the discount rate or incorporated into a 'net' discount rate or net yield curve, the level of sophistication depending on the purpose. If the shape of each yield curve is significantly different, then the net yield curve approach would again seem more robust.

4.68 In practice each of the three functions which need to be multiplied together to obtain the value of a future cash-flow will have a probability distribution of its own. The simplicity of a deterministic approach would most likely entail significant loss of

information on the uncertain nature of the key variables and how they interact with each other at different points in time as well as in different financial and other circumstances. Stochastic projections attempt to overcome some of these shortcomings through more sophisticated modelling but the model and parameters add considerable complexity and usually require much interpretation. Depending on the purpose, the stochastic model and parameters may be calibrated on market-consistent principles.

4.69 A fully market-consistent framework will use a term structure of interest rates derived from yields on government bonds or from swap rates. However, opinions differ as to whether an additional yield should be assumed to take into account the illiquidity of the liabilities (or the assets held to back the liabilities in some frameworks) or, in the case of pension funds, to take into account superior expected risk-free returns as a result of diversification of investments and the assumed very long-term investment horizon.

4.70 We should also distinguish in a conceptual framework between the various purposes for which discounting is required. For this purpose we can distinguish at least the following:

a) pricing for immediate market transactions

b) valuation of assets and accrued liabilities for the purposes of monitoring solvency and asset adequacy

c) accounting for financial institutions and for pension plan sponsors on a going concern basis

d) aggregate funding of liabilities, e.g. for an open pension fund

e) transactions involving mutuality (e.g. so-called collective DC plans operating in a way akin to participating insurance contracts)

4.71 For the first two of these, market-consistency seems essential, for the third it is debateable, although the IASB is pursuing a version of market-consistency. For the last two categories, long-term considerations prevail and market-consistency may be a hindrance rather than a help.

5 Characteristics and risk structure of discount rates

Risk and term structure

5.1 Interest rates have a risk structure, which explains why different bonds with the same maturity date have different yields. The reasons may be traced back to the quality of the underlying risk and different underlying factors affecting particular securities. Allied to this is also a *term structure of interest rates* which shows how interest rates vary with the term to maturity. There are various theories in finance textbooks to explain this but the characteristics of the market in which the risk is traded (for example more or less liquidity at different durations) and the characteristics of the investors in the market (for example tax and other positions influencing demand and supply at particular durations) are important. Clearly investors have expectations of how interest rates will move in the future, preferences in the light of this for being locked in to longer-term investments, and resulting differences in the expected yields according to duration.

5.2 In many markets the term structure of interest rates is quite difficult to construct from government or other bonds even if the markets are deep and liquid, because there may only be a limited number of bond maturities, and long maturity bonds may be completely absent. Some bonds also have significant technical bias affecting their yields, for example because they are used for benchmarks or reference rates in particular circumstances, or because of excess demand by financial institutions such as pension funds and insurance companies to match particular liability patterns. This is certainly the case with the UK gilt yield curve, even though there is a wide spread of maturities, going out to around 50 years. The recent *quantitative easing* policy of the Bank of England has also undoubtedly caused technical bias across the whole term structure of interest rates on UK government bonds.

5.3 In practice it is necessary to model the yield curve based on certain assumptions, which might include giving less weight to points which may be more distorted, interpolating where there are gaps in the term structure of gilts and extrapolating for longer terms to maturity than are represented by issued gilts with a deep and liquid market. These points have been considered in some depth in the CEIOPS consultation papers during the course of the development of Solvency II (see Section 10).

'Risk-free' rates

5.4 The term *risk-free* is often encountered in connection with market-consistent valuations. In practice it means different things to different people and should really be used with a suitable qualifier or not used at all. Examples at the very short end might be Treasury bills, although money market traders might prefer LIBOR since these reflect their opportunity cost of capital (although see discussion in Section 10 as to whether LIBOR is risk-free). Others might consider gilts as the obvious candidates and many would argue that swap rates are a more representative proxy.

5.5 Investors in other jurisdictions may prefer structures more representative of their own markets. Of course none of these are altogether free of risk (even governments are restricted in the tools available for raising finance, as many Europeans are now being reminded). Default on sovereign debt is not unknown and the possibility of such default is certainly priced into market yields for government bonds, resulting in significant spreads, even within the Eurozone. Purpose is once again very important and the risks embedded in the chosen proxy need to be understood – these will generally be connected with the term, currency, counterparties, liquidity, transparency and design with respect to the chosen reference structure.

5.6 The risk-free rate is a theoretical concept in financial economics. It is clearly intended to exclude additional yield which may be compensation in particular for credit risk, but they may also exclude other elements of yield which are risk-free, depending on how they are defined in any particular situation. Damodaran (2008) sets out two conditions which need to be met for an investment to be genuinely risk-free. The first is that there can be no risk of default associated with its cash flows and the second is that there should be no re-investment risk. In practice there is hardly any investment that meets these conditions.

5.7 Furthermore the concept of risk-free is not usually aligned with the liabilities, so that a risk-free asset may be a risky asset in the context of investing to hedge a particular liability. For example, fixed interest government bonds are often regarded as defining the risk-free yield, but they are rather risky assets to back a portfolio of inflation-linked pensions. In the proper context of the liabilities the risk-free asset is an asset which hedges the liability, perhaps a replicating portfolio. This is not what is usually meant when people speak of the risk-free rate.

5.8 Practical ways of applying market-consistent discounting were described by Creedon et al (2008). They showed various techniques for deriving what can at best described as 'least risk' term structure for interest rates, using a comprehensive range of reference curves with, in each case, an excellent account of the risk characteristics; the main contenders being:

- to use yields on government bonds and to adjust these upwards to offset any technical bias which the gilt yields are deemed to incorporate, for example because of the yields being used as a reference rate, giving rise to artificially high demand against controlled supply; and

- to use yields derived from swap rates, adjusted downwards to allow for any credit risk which may be deemed to be presented in relation to counterparties or because of systemic banking sector risk carried within the measure used for the floating leg of any swap (such as LIBOR, EURIBOR, SONIA, EONIA or Repos (see Section 10 for definitions and discussion of these different measures).

5.9 Further details can be found in the presentations by Kemp and Smith at the Current Issues in Pensions Seminar (November 2008). Despite the 'risk-free' label, none of these are of course free of all risk and it is important to understand the characteristics of the underlying data used to understand the risk that remains embedded in the resulting curve.

5.10 Creedon et al (2008) suggest that *reference interest rate* (or curve) is a better description. We agree, since this gives the clear message that there is no unique reference and it instils the discipline in all users to at least ask what the underlying reference is and its characteristics and whether any of the alternatives might suit their purpose better. It also avoids the implication that the rate is necessarily risk-free relative to the liabilities.

5.11 Further discussion on this debate is included in Section 10 in relation to Solvency II. In this context most of the supervisory authorities have been in favour of the government bond yields approach, whereas the insurance industry has generally favoured the use of swap rates, particularly when this gives higher rates. The Groupe Consultatif argued on behalf of the actuarial profession that there were advantages in having regard to both swaps and government bond markets, with some flexibility to vary relative emphasis over time having regard to the technical situation in the market, including relative liquidity. In general swaps exhibit greater liquidity than government bonds and this is an important characteristic in the determination of a reference rate, which could easily become subject to artificially high demand in order for institutions to match the risk-free rate.

5.12 The liabilities of defined benefit pension schemes in the UK are generally index-linked (with caps and floors). Inflation also has term characteristics, and in recent years there has been a pronounced term structure. The term structure of 'real' interest rates is therefore more relevant for measuring pension cash-flows.

Own credit risk

5.13 The yield on corporate bonds can be expected to be higher than the yield on government bonds, to reflect the credit risk of the issuer, namely the probability that the interest payments, and more particularly the maturity payment, under the bond will not be paid because of default by the issuer. The so-called *spread* will depend on the perceived risk of default, and also on the perceived risk that the credit rating of the issuer may be downgraded.

5.14 Whilst the phenomenon of credit spreads is well-known and well-researched in relation to assets, controversy surrounds whether there is an equivalent principle for liabilities. One view is that the market-consistent valuation of liabilities should reflect the credit risk of the entity, i.e. the probability that they will be able to meet the liabilities. Whilst this would bring the valuation of liabilities into line with the value of assets

from a credit risk point of view, the unfortunate and counter-intuitive consequence is that a firm's liabilities shrink as its financial strength weakens, so that insolvency is staved off by writing down the value of the liabilities. Whilst this may be the formal position from the perspective of the shareholders, and is consistent with the accounting approach for some non-insurance liabilities, regulators consider that such an approach would be contrary to the public interest and unacceptable as a principle.

5.15 As a result, for most purposes it seems unlikely that own credit risk will be taken into account in valuing the liabilities. The International Accounting Standards Board (IASB) have discussed the possibility that own credit risk might be required to be taken into account in the revision of the insurance contracts accounting standard IFRS4, but the current working draft does not have this feature (see IFRS 4 section of Section 10).

Long-term versus short-term perspective

5.16 Many of the differences of view over the appropriate approach to discounting arise from a different time-frame or perspective. Clearly where immediate market considerations are in question and money will change hands in the near term as a result of the discounting calculation, the current market situation is relevant and a market-consistent approach is necessary. However, when it comes to determining a long-term funding strategy for a defined benefit pension plan, or managing the bonus strategy of a with-profits life insurer, there is no obvious reason why the current market value of assets or liabilities should be assumed to have any particular relevance.

5.17 Accounting for assets and liabilities falls somewhere in between, as it is not in itself a prerequisite for a market transaction, but it could have an impact on market transactions. Unfortunately the format of accounts does have an inevitable impact on Board decision-taking, so that market-consistent approaches for accounting can have significant consequences, which may not be appropriate for the true underlying nature of the liabilities.

5.18 One solution may be to use market-consistent approaches where they are appropriate and relevant but to assume that market-consistency becomes less relevant the further ahead that one's time horizon becomes.

5.19 Another is to accept that for insurance companies and pension funds, the reality is that they need to manage their longer term strategy simultaneously with short-term volatility.

Components of discount rates

5.20 Summarising the main components of potentially market-consistent discount rates, we have potential additions to the risk-free rate (or reference rate) for the following:

- Credit risk – this includes the risk of default and the risk of widening spreads as a result of increased perceived risk of future default. The credit risk might be further split between default, downgrade, liquidity, convenience etc (as in Seamus et al (2008) and CEIOPS(2010))

- Liquidity risk – credit for additional yield arising from less marketable/liquid investments or in respect of liabilities deemed to be illiquid (see Section 10).

- Equity risk premium – additional yield obtainable on a risk-free basis from investing in equities as compared to government bonds, bearing in mind the long-term character of the investment and the absence of any need to realise investments.

- Diversification premium – in a portfolio of investments, because the investments are not perfectly correlated to each other, the return from the portfolio should be higher than the sum total of the components. This term is also sometimes used as an extension of the equity risk premium concept, but taking into account that the additional yield is derived from investing in a diversified portfolio of assets other than government bonds, and not just equities.

6 Current practice: Life Assurance

6.1 The key liability calculations involving discount rates within life insurance practice can be divided into the following areas:

- **Regulatory requirements**
  - reserving (twin peaks approach)
  - capital requirements on top of reserves
- **Accounting requirements** (UK SORP, FRS and IFRS/IAS)
- **Other reporting for shareholders**, e.g. embedded value calculations
- **Pricing**
  - setting premiums for individual and group business
  - pension buyout pricing
- **Individual policyholder calculations**, e.g. surrender values and paid-up policies

Regulatory requirements

Brief background to life insurance regulatory environment in the UK

6.2 Life insurance companies operating in the UK are regulated by the Financial Services Authority (FSA). By analogy with banking regulatory requirements arising from the Basel accord, the system is described in terms of three pillars. The Pillar 1 capital requirements are determined by reference to a "twin peaks approach". This was first proposed in FSA Consultation Paper CP143, published in July 2002. Previous consultation papers (in particular CP97) had proposed introducing a requirement for additional reserves in respect of future bonuses.

6.3 The new proposal was for firms with participating business to carry out a second valuation of their with-profits business on a realistic basis, including provision for future bonuses. This was to identify whether any capital was required, in addition to the mathematical reserves, in order to make adequate provision for future discretionary benefits in accordance with the reasonable expectations of policyholders.

6.4 Pillar 2 involves firms in making their own assessment of the appropriate level of capital requirements, having specific regard to the business of the firm and its risk characteristics. This is discussed further below under Individual Capital Assessment.

6.5 For regulatory assessments the assets are taken at current market value. However, admissible asset rules limit the extent to which certain more risky assets can be taken into account (in some cases requiring zero value to be placed on certain assets),

particularly to take into account concentrations of risk, thereby introducing an element of conservatism into the valuation.

6.6 Life insurance companies typically do not invest in equities or property, except 1) in unit-linked funds where the liabilities depend directly on the value of the investments in the fund, 2) to back with-profits (participating) business and 3) in respect of part of the solvency margin and 3) investment in subsidiaries. Investment strategy differs a good deal between insurers according to the profile of their liabilities, since insurers attempt to match non-participating liabilities closely with appropriate assets, whilst adopting a more diversified strategy as backing for participating liabilities and their free assets.

6.7 The twin peaks approach for Pillar 1 requires larger firms to carry out two separate liability calculations in respect of their with-profits funds and to hold sufficient capital to cover whichever calculation proves more onerous. Insurers without any participating business (and smaller insurers with such business) only have to carry out the Peak 1 calculations, which are based on the solvency margin requirements of the First Life Directive (79/267/EEC) and the requirements for valuation of assets and liabilities, set out originally in the Insurance Companies Regulations 1981 (and then developed further in the Insurance Companies Regulations 1994).

Peak 1

6.8 The statutory reserves / Peak 1 reserve calculation methods and assumptions are set by requirements in the FSA rule-book (the Prudential Sourcebook for Insurers), which replaced formal regulations approved by Parliament after the FSA took over responsibility for supervision of the industry from HM Treasury. Calculations are based on traditional deterministic methods.

6.9 The regulatory reserves are calculated using a prospective valuation method and policies are valued on an individual basis. The method adopted is generally to take the difference between the present value of future premiums and the present value of future policy payments and expenses using a single prudent interest rate.

6.10 The FSA requirements for the Peak 1 assessment of technical provisions are contained in the Prudential Sourcebook for Insurers (INSPRU) and particularly in Chapters 1 and 3 thereof. Further details of the specific requirements are set out in the reserving section of Appendix A. The technical provisions are made up of the mathematical reserves, which form the major part, and liabilities in respect of contracts which have fallen due for payment. The mathematical reserves are also sometimes referred to as statutory reserves or regulatory reserves.

6.11 The interest rate for fixed interest holdings is set by reference to gross redemption yields in the market on the valuation date on assets held to back the liabilities. Actual

yields should be risk-adjusted, i.e. reduced to eliminate any premium in the yield which is compensation for credit risk, based on historic default rates. However, it is regarded as acceptable for the adopted rates to be higher than a reference rate derived from gilts or swaps, which might be justified on grounds of lack of marketability of assets held to meet less liquid liabilities (the so-called *illiquidity premium*).

6.12 The valuation rate of interest must not exceed 97.5% of the risk-adjusted yields on assets held to back the liabilities, the reinvestment of the proceeds of those assets and the investment of future premium receipts.

6.13 Return on equities is derived from recently experienced running yields based on dividends, although, if the earnings yield is higher than the dividend yield, a running yield half way between the two may be used. No credit can be taken in advance for future growth in the yields

6.14 Return on properties is based on current rental yields with no allowance for future capital gains or growth in rental income.

6.15 The maximum interest rate for which credit can be taken on future investment and re-investment (more than three years after the valuation date) is defined in INSPRU 3.1.45 to be not greater than 6.5% a year or the long-term gilt yield if lower. The full formulation is more complex than this and includes reference to the forwards gilts yield and the forward rate on sterling interest rate swaps, if they are higher than the long-term gilt yield (see Appendix A for the detailed provisions).

Peak 2

6.16 Realistic reserves (or Peak 2 reserve calculations) are required for realistic basis life firms. A realistic basis life firm is defined in GENPRU 2.1.19 R as an insurer having with-profits liabilities in excess of £500m (unless it is a non-directive mutual). Insurers which are excluded under this definition may voluntarily opt to be treated as realistic basis life firms.

6.17 Peak 2 reserve calculations are to test whether it would be appropriate for higher technical provisions to be held by a company with participating business than would be provided for under the normal Peak 1 rules. The mathematical reserves, even for a realistic basis life firm, are not required to include provision for future annual bonuses or terminal bonuses. The idea of the Enhanced Capital Requirement (ECR) under Peak 2 is that resources in addition to the mathematical reserves may be required to ensure that terminal bonuses can be paid in such a way as to pay due regard to the interests of policyholders and treat them fairly.

6.18 The calculation of the realistic value of liabilities must reflect the firm's duty to treat customers fairly and be consistent with its Principles and Practices of Financial

Management (PPFM), which sets out how the firm describes what it is seeking to achieve with its financial management and, in particular, its bonus distribution policy.

6.19 Based on a range of scenarios for market risk, credit risk and persistency risk, a risk capital margin has to be calculated. Various market risk scenarios must be tested, including a rise or fall in yields on all fixed interest securities of up to 17.5% of the long-term gilt yield and assumptions about the widening of credit spreads.

6.20 In order to calculate the cost of any guarantees, options or smoothing, firms may use deterministic scenarios with allocated probabilities, a stochastic approach using a market-consistent asset model or the market costs of hedging the guarantee or option. Either market-consistent risk-neutral or deflator models are acceptable.

6.21 A stochastic approach requires an appropriate market-consistent asset model for projections of asset prices and yields, together with a dynamic model incorporating the corresponding value of liabilities and the impact of any foreseeable actions to be taken by management.

6.22 There are no specific requirements laid down in the Prudential Sourcebook for assumptions, except that they should generally be realistic and include market-consistent valuation of options and guarantees. GN45: Determining the *With-Profits Insurance Capital Component*, adopted and amended by the Board for Actuarial Standards, provides some further guidance, for example in relation to the assumptions for determining the Present Value of Future Profits for Non-Profits insurance business, including the application of a liquidity premium.

Capital requirements in addition to technical provisions

6.23 Prior to the EU Directives on insurance, the main responsibility for ensuring capital adequacy of life insurers rested with the company actuary. There were no explicit requirements for an explicit solvency margin and many of the margins held were in hidden reserves and undervaluation of assets (e.g. holding assets at cost).

6.24 The First EU Life Directive (79/267/EEC) established requirements for explicit solvency margins, although part of the margin could be met by implicit items, such as the present value of future profits. This Directive was implemented into UK legislation in the Insurance Companies Act 1981 and the Insurance Companies Regulations 1981.

6.25 The required solvency margin for life insurers was basically 4% of technical reserves and 3‰ of the sums at risk (excess of sums assured over technical reserves held)

6.26 Although these requirements were based on risk theoretical analysis in the 1950s and 1960s (the Campagne reports), they reflected the risks of a typical multiline insurance

company with the types of business which were prevalent at that time and did not have any specific regard to the actual risk characteristics of each individual insurer.

6.27 There was no direct link between risk and capital requirements, so that an insurer could adopt more risky strategies without any penalty in terms of capital requirements.

6.28 Although the First EU Directive requirements remain (until such time as the provisions of the Solvency II Directive come into force), the FSA has recently made enhancements to the solvency regime in the UK, expected to smooth the path towards the eventual Solvency II regime.

6.29 Following the closure to new business of Equitable Life and the combination of falling equity markets and lower interest rates, the FSA carried out a general review of with-profits business in 2001-02. FSA Consultation Paper 97 (CP97), published in June 2001, consulted on the Integrated Prudential Sourcebook (what has now become INSPRU) and proposed new prudential requirements for life insurance business. The intention was to move towards a regime which focused more on the risks to which individual insurers were exposed and included the suggestion that with-profits insurers should reserve explicitly for policyholders' reasonable expectations including final bonuses. It also proposed the introduction of a requirement for firms to conduct stress and scenario-testing to assess the overall adequacy of their financial resources in the light of a range of possible outcomes.

6.30 The requirement for an Individual Capital Assessment is seen as a separate requirement from the general stress-test requirement in GENPRU 1.2.42, since it is focused on the firm's own assessment, including other forms of capital on which the firm may be relying which are not taken into account for the purposes of meeting the minimum capital resources requirement.

6.31 Under the ICA requirement the firm has to model the future behaviour of the portfolio in a variety of circumstances. The focus of both of these exercises is on projecting forward and testing what current level of capital is needed to ensure with a sufficiently high level of probability that the resources will prove adequate in the stress scenarios. There is no requirement to discount the cash-flows back to the assessment date and therefore the exercise is not one which makes use of discount rates as such, although the economic and market scenarios used to project forward are the accumulation equivalent of discounting, so there is still an underlying interest rate model.

6.32 The value of the assets should be marked to market and the valuation of assets and liabilities should reflect their economic substance, be realistic and not contain explicit margins for risk or bias towards optimism. The valuation of liabilities should be consistent with the valuation of assets - in other words a market-consistent basis.

6.33 Further recommendations (but not mandatory standards) are contained in:

GN46: Individual Capital Assessment; and

GN47: Stochastic Modelling of Economic Risks in Life Insurance.

These GNs, originally drafted by the profession, have been adopted by the Board for Actuarial Standards. GN47 asserts that it is equally appropriate to use a risk-neutral probability measure, discounting at risk-free rates, or any other measure (including 'real world' measures), discounting using consistent deflators. In other words, the actuary is not constrained to any particular approach, provided that the overall structure of the model is market-consistent.

Accounting requirements

6.34 The accounting requirements for life insurance are set out in Schedule 3 of The Large and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008 (SI 2008 No.410), (the "accounting regulations"). In regard to life insurance the regulations refer to the actuarial principles for technical provisions set out in Article 20 of the EU Life Assurance Accounts Directive (Directive 2002/83/EC of the European Parliament and of the Council of 5 November 2002 concerning life assurance - Official Journal L 345, 19/12/2002 P. 0001 – 0051). This sets out principles regarding the rate of interest to be used, which, in the case of member states requiring assets to be held at market value, are described in Article 20.1 B (a) (ii) as follows:

"However, when the assets of the assurance undertaking are not valued at their purchase price, a Member State may stipulate that one or more maximum rates may be calculated taking into account the yield on the corresponding assets currently held, minus a prudential margin and, in particular for contracts with periodic premiums, furthermore taking into account the anticipated yield on future assets. The prudential margin and the maximum rate or rates of interest applied to the anticipated yield on future assets shall be fixed by the competent authority of the home Member State."

6.35 This requirement is currently put into effect through the provisions of INSPRU 3.1.28 R to 3.1.47 R. This means that the calculation of technical provisions for accounting purposes is in line with the regulatory requirements for Peak 1 of the FSA's twin peak approach. In circumstances where an additional ECR is required under Peak 2 of the FSA regime, this carries through into the technical provisions for general purpose accounting, so that the Peak 2 provision takes the place of the Peak 1 provision.

6.36 Further guidance on accounting for insurance business is given in the ABI Statement of Recommended Practice on Accounting for Insurance Business (SORP) December 2005 (as amended in December 2006). Accounting for technical provisions is dealt with in paragraphs 178 to 192 of the SORP, which are set out in full in the Appendix to this Section. As already noted, there is no difference between the accounting

requirements and the corresponding requirements for technical provisions for regulatory purposes.

6.37 Following the publication of the report by Lord Penrose on Equitable Life, the Government asked the Accounting Standards Board to review accounting for with-profits life assurance companies. In December 2004 the ASB issued FRS27, which came into effect at the December 2005 year-end. The main effect of this was to require firms with with-profits life funds falling within the scope of the FSA realistic capital regime to state the liabilities to policyholders arising from with-profits life assurance business at the amount of the realistic value of liabilities, adjusted to exclude the shareholders' share of projected future bonuses. The key relevant paragraphs from FRS27, and the paragraphs from the amended SORP when FRS27 was taken into account, are included in Appendix A.

6.38 IFRS 4 is the relevant international accounting standard dealing with insurance contracts and covers both life and non-life insurance. The current version is intended only to be an interim standard and permits the continuation of many existing practices. In general, for life insurance accounting by UK domiciled companies, IFRS 4 did not make very much difference to existing accounting requirements.

6.39 There are significant inconsistencies in IFRS 4 and, as a result, the International Accounting Standard Board (IASB) is currently working on a framework for a standard that will replace IFRS 4 and will provide a consistent basis of accounting for insurance contracts going forward. An Exposure Draft of a revised IFRS 4 is expected to be issued in June 2010 (see Section 10 for discussion of current emerging thinking in the IASB regarding key concepts for the revised IFRS 4)

Other reporting for shareholders, e.g. embedded value calculations

6.40 Embedded value is the quantification of the value of in-force business. It has traditionally been used in merger and acquisition (M&A) situations, where an appraisal value for the insurance business is determined by adding the value of future business to the embedded value for in-force business. Insurance companies also began to calculate embedded values for internal management and reporting purposes, since it gave a more realistic value of the business against which to measure management performance and hence as a driver for management remuneration considerations.

6.41 However, it has now become good practice for insurance companies to publish embedded value (EV) in the notes to the statutory financial statements, as this is regarded as valuable information for shareholders – possibly more valuable than the financial statements according to current accounting standards or indeed the returns to the regulator.

6.42 The traditional EV approach involves calculating the present value of projected shareholder cash-flows arising from surpluses declared under the constraints of statutory reserving. It would normally be based on a single deterministic projection, which would incorporate best estimate 'real-world' assumptions about future investment returns. So, for example, the estimated return on equities and property would be the risk-free rate plus an equity risk premium (or diversification premium) to reflect the assumed additional return which can be generated from long-term investment in equities and other assets, netting off the additional return which is deemed to be compensation for the additional risks. The assumed return on corporate bonds would similarly be the risk-free rate plus the spread for credit risk and the illiquidity premium but netting off the additional return which is compensation for expected default. It can be argued that this creates a potential bias towards investing in riskier assets, as this increases the expected return.

6.43 These projected shareholder profit flows are then discounted at a risk discount rate of some 10 to 15% a year, intended to reflect the risk to shareholders that the expected cash flows may not emerge. There is clearly significant subjectivity in choosing the risk discount rate but this would be among the key assumptions disclosed with the EV result.

6.44 Recently there has been a steady trend towards market-consistent embedded value (MCEV) techniques. These take account of financial options and guarantees using stochastic techniques. Liabilities are valued so as to be independent of the assets held, using a risk-free rate (or the returns on swaps as an estimate of the risk-free rate), which may be increased to allow for an illiquidity premium. Profit emergence is still evaluated against the statutory reserving methodologies in successive years, as with traditional EV. In practice MCEV approaches have not always been strictly market-consistent, with the market conditions at the end of 2008 in particular leading to some variation in practice.

6.45 In June 2008 the CFO Forum published Market Consistent Embedded Value ('MCEV') Principles© in June 2008, in order to bring greater consistency and improved disclosure to the European insurance industry's Embedded Value disclosures. Specifically, the MCEV Principles were designed to bring:

- a shareholder's perspective on value, being the present value of future cash flows available to the shareholder, adjusted for the risks of those cash flows.
- a market-consistent approach to financial risk.
- a greater focus on disclosing cash emerging from covered business.
- disclosure of combined Group MCEV information.

6.46 In October 2009, the CFO Forum published an amendment to the Market Consistent Embedded Value ('MCEV') Principles© to reflect the inclusion of a liquidity premium. This is consistent with the stance being adopted by the CFO Forum in relation to

Solvency II (see Section 10). The changes also affirmed that the reference rate to be applied under MCEV should include both the swap yield curve appropriate to the currency of the cash flows and a liquidity premium.

Pricing

6.47 In the UK market there are no formal regulatory or professional requirements regarding the discount rate (or other) assumptions to be made for pricing new business. These are commercially sensitive assumptions and there is generally little information available publicly about the assumptions adopted. Internal controls within companies would normally necessitate sign-off of pricing of new products or of changes in products by the actuarial function-holder, in order to ensure that the pricing is expected to generate returns in line with the company hurdle rate for profit-testing and that the risks have been adequately identified and mitigated.

6.48 Pricing of single premium business would be expected to be based on market-consistent approaches, especially for investment business (other than unit-linked), in view of competition with other financial instruments and the need to write business profitably in current market conditions. However, for longer-term regular premium policies the current market conditions are only partly relevant, since the key issue will be how future premiums can be invested (although it is of course possible to derive market-implied forward rates from current yields on bonds etc which could inform product pricing).

6.49 For non-participating business the market-derived term structure of interest rates can be used to develop market-consistent assumptions for the investment of future premiums. For participating business, it was traditional to use a conservative low rate of interest for pricing the guaranteed element of the product and emerging surpluses were used to generate future bonus distributions. Now market-consistent option pricing techniques are also commonly used for pricing the guarantees inherent in this type of product.

6.50 Pricing calculations for pension buy-outs are one particular example of the need for market-consistent pricing, and one where there is an obvious connection between the world of life insurance and the world of pensions. Traditionally the pricing basis was based on gilt yields minus a basis points margin. Currently, however, the pricing basis appears to be based on gilt yields plus a basis points margin. In reality, many insurers are most probably pricing buy-out business relative to swaps and corporate bonds as opposed to purely gilts and making due allowance for an illiquidity premium and possibly for some credit spread which is regarded as not offset by the true level of credit risk.

6.51 Pricing bases for individual insurers are quite volatile and depend on a number of factors, including market conditions, competition, the company's tax position and desire to attract new business, and the size of the pension scheme being bought out.

6.52 Unlike most other EU countries, the UK does not have any statutory requirements regarding surrender values, although the fairness of surrender value scales is one of the factors monitored by the FSA under their requirement for insurance firms to 'treat the customers fairly'. Surrender values are usually established on scales which are entirely at the discretion of the firm, based on the advice of their actuaries, are only loosely based on market conditions and are changed relatively infrequently, although for some contracts they may have a form of market adjustment.

6.53 Pension liabilities assumed from self-administered occupational pension schemes under buy-out contracts are priced on an individual basis according to market conditions, including pricing in the risks of insuring a portfolio against longevity risk and the cost of servicing any additional capital which may be needed to meet regulatory requirements.

7 Current practice: General Insurance

7.1 The key calculations involving discount rates within the general insurance practice area can be divided into the following areas:

- **Regulatory requirements**
  - reserving
  - capital requirements on top of reserves
- **Accounting requirements** (UK SORP and IFRS/IAS)
- **Other reporting for shareholders**, e.g. embedded value calculations
- **Pricing**
  - setting premiums for individual and group business
  - reinsurance treaties

7.2 There are few specific requirements relating to discounting in General Insurance (GI) practice in the UK. GI Guidance Notes issued by the Actuarial Profession and the Board for Actuarial Standards do not prescribe the discount rates to be used – the only guidance is that, if you have discounted, you should document what you have done.

Regulatory requirements

Technical provisions for general insurance

7.3 General insurance companies operating in the UK are regulated by the Financial Services Authority (FSA). As in the case of life insurers, the regulatory system consists of three pillars. Pillar 1 requires a prudent valuation of assets and liabilities. Pillar 2 involves firms in making their own assessment of the appropriate level of capital requirements, having specific regard to the business of the firm and its risk characteristics. This is discussed further below under Individual Capital Assessment. Pillar 3 refers to the active supervisory process by the FSA.

7.4 Historically, *technical provisions* in general insurance were calculated without discounting for the time value of money, although it was not unusual for there to be some offsetting of future inflation in claim settlement amounts against interest income. Interest on invested provisions was taken into account, often in somewhat crude ways, in premium rating, with the result that the outturn frequently showed an underwriting loss, offset in the income and expenditure account by investment income.

7.5 Nowadays discounting is acceptable (although still not necessarily common) for outstanding claim provisions in respect of longer tail classes of business. This derives from the EU Insurance Accounts Directive (originally passed by the EU in 1992),

which permits discounting of outstanding claims for business of average term more than four years for the purpose of drawing up the financial statements of a GI company. The current regulations which relate to this are The Large and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008 (SI 2008 No.410), (the "*accounting regulations*") of which the relevant paragraphs from Schedule 3 are reproduced in Appendix B, where there is also a quote from GIM2180 on the HMRC website, referring to similar issues in relation to taxation of GI companies.

7.6 This is confirmed by the ABI Statement of Recommended Practice for Insurance Business (SORP) December 2005 (as amended in December 2006), which details the above-mentioned average term of four years and some other points on the use of discount rates in practice. The relevant paragraphs have been included in Appendix B.

7.7 The FSA has not issued any guidance to general insurance companies on how to discount. Discounting is still not widely practised for setting technical provisions, since the Companies Act discounting provisions are permissive rather than mandatory.

7.8 There were no separate *determination of liabilities* regulations for general insurance under the previous Insurance Companies Regulations and the FSA has not sought to introduce any additional requirements in respect of general insurance technical provisions.

7.9 Regulation 54(1)(e) of the *accounting regulations* requires the rate of interest adopted for discounting to be no greater than a rate justified by the performance of relevant assets over the preceding five years, or a rate similarly justified but just over the year preceding the balance sheet date. In either case relevant assets would be an appropriate portfolio of assets of a suitable amount and nature, hypothecated from the company's assets to cover the technical provisions for claims that are being discounted.

7.10 Since in practice the hypothecated assets are likely to be bonds, we understand that the FSA expectation is that the prudent rate of interest selected would correspond to a current risk-free yield, as it would not be prudent to take advance credit for superior yields on corporate bonds that are only justified as compensation for additional credit risk. The FSA would challenge the use of more adventurous discounting assumptions. However, the regulations suggest that the rate should be based on past experience rather than on a prospective yield.

7.11 There has been no discussion in the general insurance context of different approaches to calculating the risk-free rate or any demands such as are discussed in relation to life insurance for an *illiquidity premium*.

Capital requirements in addition to technical provisions

7.12 The First EU Non-life Directive (73/239/EEC) established requirements for explicit solvency margins to be held by insurers in respect of general insurance business. This Directive was implemented into UK legislation when the UK joined the European Economic Community (EEC) (originally in the European Communities Act and subsequently incorporated into the Insurance Companies Acts and regulations).

7.13 The required solvency margin for general insurers was calculated as 18% of net premium up to 10 million euros of premium income, and 16% of premium income above that level. An alternative basis of calculation involving 26% of net incurred claims up to 7 million euros, and 23% of claims above that level, applied if it yielded a higher result.

7.14 Although these requirements were based on risk theoretical analysis in the 1950s and 1960s (the Campagne reports), they reflected the risks of a typical multiline insurance company with the types of business which were prevalent at that time and did not have any specific regard to the actual risk characteristics of each individual insurer. In practice the EU Directive was the result of political compromise, since the working group which made the recommendations for the Directive in fact proposed an explicit solvency margin which could be expressed as 24% of written premiums, 34% of incurred claims or 19% of gross technical reserves and this level was deemed at the political level to be too high.

7.15 There was no direct link between the risks of a particular company and the capital requirements, so an insurer could adopt more risky underwriting or investment strategies without any penalty in terms of capital requirements.

7.16 Although the First EU Directive requirements remain in force (until such time as they are replaced by the provisions of the Solvency II Directive), the FSA has recently made enhancements to the solvency regime in the UK, expected to smooth the path towards the eventual Solvency II regime, with the requirements for Individual Capital Assessment (ICA) and an Enhanced Capital Requirement (ECR).

7.17 The requirement for an ICA is a separate requirement from the general stress-test requirement in GENPRU 1.2.42, since it is focused on the firm's own assessment, including other forms of capital on which the firm may be relying which are not taken into account for the purposes of meeting the minimum capital resources requirement.

7.18 Under the ICA requirement the firm is expected to model the future behaviour of the portfolio in a variety of circumstances. The focus of both of these exercises is on projecting forward and testing what current level of capital is needed to ensure with a sufficiently high level of probability that the resources will prove adequate in the stress scenarios. There is no requirement to discount the cash-flows back to the assessment

date and therefore the exercise is not one which makes use of discount rates as such, although the economic and market scenarios used to project forward are the accumulation equivalent of discounting, so there is still an underlying interest rate model.

7.19 The value of the assets should be marked to market and the valuation of assets and liabilities should reflect their economic substance, be realistic and not contain explicit margins for risk or bias towards optimism. The valuation of liabilities should be consistent with the valuation of assets, in other words it should be a market-consistent basis.

7.20 The actuarial guidance on ICA (GN46: Individual Capital Assessment) relates only to ICA for life insurance. There is no actuarial guidance for carrying out an ICA for a general insurance company.

7.21 The ECR for a general insurance company (INSPRU 1.1.72C) is the sum of:

- the *asset-related capital requirement* (INSPRU 2.2.10 to 2.2.16)
- the *insurance-related capital requirement* (INSPRU 1.1.76 to 1.1.79); less
- the firm's *equalisation provision* (INSPRU 1.4.1 to 1.4.51)

7.22 The *asset-related capital requirement* specifies various capital charges in respect of particular categories of assets and does not involve any discount rate considerations.

7.23 The *insurance-related capital requirement* is a measure of the capital that a firm should hold against the risk of:

- an adverse movement in the value of a firm's liabilities, to recognise that there may be substantial volatility in *claims* and other *technical provisions* made by the firm. Such variations may be due to inflationary increases, interest rate changes, movements in the underlying provisions themselves, changes in expense costs, inadequate rate pricing or *premium* collections (or both) from intermediaries differing from projected assumptions; and

- the *premiums* a firm charges in respect of particular business not being adequate to fund future liabilities arising from that business.

7.24 The *insurance-related capital requirement* does not require any specific actuarial calculations, but only the application of specified capital charge factors to the net written premiums and technical provisions according to particular classes of business.

7.25 Similarly the equalisation provision does not involve any calculations which require discounting.

Accounting requirements

7.26 The accounting requirements for general insurance are set out in Schedule 3 of The Large and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008 (SI 2008 No.410), (the "accounting regulations") and the ABI Statement of Recommended Practice on Accounting for Insurance Business (SORP) December 2005 (as amended in December 2006). Discounting of technical provisions is dealt with in paragraphs 104 to 113 of the SORP, which are set out in full in the Appendix to this Section. There is no difference between the accounting requirements and the corresponding requirements for technical provisions for regulatory purposes, since the latter is based on generally accepted accounting principles.

7.27 IFRS 4 is the current relevant international accounting standard dealing with insurance contracts and covers both life and non-life insurance. The current version is intended only to be an interim standard and an Exposure Draft of a revised IFRS 4 is expected to be issued in June 2010.

7.28 The current IFRS 4 permits the continuation of many existing practices, for example general insurers are permitted to measure liabilities on an undiscounted basis. However, it prohibits the introduction of certain practices, so it would not be permitted to *introduce* accounting policies which measure general insurance liabilities on undiscounted basis.

7.29 Paragraph 126 of the Basis for Conclusions for IFRS 4 states: "In the Board's view, discounting of insurance liabilities results in financial statements that are more relevant and reliable. However, because the Board will not address discount rates and the basis for risk adjustments until phase II, the Board concluded that it could not require discounting in phase I. Nevertheless, the IFRS prohibits a change from an accounting policy that involves discounting to one that does not involve discounting"

7.30 Therefore, there are significant inconsistencies in the IFRS 4 standard and, as a result, the International Accounting Standard Board (IASB) is currently working on a framework for a standard that will replace IFRS 4 and will provide a consistent basis for accounting of insurance contracts going forward.

Other reporting for shareholders, e.g. embedded value calculations

7.31 As described in paragraphs 6.38 to 6.41, embedded value calculations involve quantification of the value of the in-force business. Embedded values were first used in M&A situations and for internal company management purposes. However, it has now become good practice for insurance companies to publish embedded value (EV) in the notes to the statutory financial statements, as this is regarded as valuable information for shareholders.

7.32 However, unlike life insurance, there are fewer margins contained within the technical provisions for general insurance business, since these are generally set on a best estimate basis, except for the absence of discounting.

Pricing

7.33 Pricing in the general insurance market is highly commercial and is only loosely based on actuarial calculations, even where an actuary is involved. Actuarial support for pricing would take into discounting considerations, but there are no standards or requirements for this, so it would be entirely at the discretion of the individual actuary.

7.34 Discounting is particularly important for longer-tail lines of business, but these usually also entail significant uncertainty about future claim patterns and about future inflation affecting claims, so the discount rate will only be a small part of the evaluation. Discounting is used more actively in pricing reinsurance treaties.

8 Current practice: Pensions

8.1 The key liability calculations involving discount rates in the management of defined benefit pension schemes are:

(a) For funding and reserving

i. Technical provisions

ii. Future service contribution rates

iii. Recovery plans

iv. Solvency estimates

(b) In setting investment strategy, in risk management and for risk transfer

i. Section 75 'employer debt' calculations

ii. Cash equivalent transfer values

iii. ALM modelling

(c) For reporting in the sponsor's accounts

i. Disclosures of pension obligations under IAS19, FRS17 and FAS132

ii. Disclosure of directors' pensions

(d) For other miscellaneous purposes (not considered further because they were out of scope or did not introduce any new principles)

i. Calculations when members exercise options

ii. Modification of subsisting rights

iii. Bulk transfers without members' consent

iv. Reference scheme test for contracting out of state scheme

v. Benefit reductions on winding up in a deficit

vi. Calculations for entry to Pension Protection Fund (PPF) and for the PPF levy.

vii. Calculations related to the exercise of member options such as cash commutations, early retirements and benefit augmentations.

Funding calculations

8.2 The Statutory Funding Objective (SFO) in the Pensions Act 2004 requires a defined benefits pension scheme to be funded to at least the level of its technical provisions (the funding target). Regular valuations must be obtained by the trustees to check whether the SFO is met. The calculations break down into three stages:

- A comparison of the market value of existing assets with the technical provisions.
- Calculations to determine the contributions required to support future accruals (if any).
- If existing assets do not cover technical provisions, then the establishment of a recovery plan to fund the gap.

Technical provisions

8.3 Technical provisions are set by the trustees on the advice of the Scheme Actuary and with the agreement of the employer. They are calculated on actuarial principles as the amounts needed at any time to cover the benefits already accrued under the scheme. These include pensions in payment (including those payable to survivors of former members), deferred pensions for early leavers, including requisite levels of indexation in deferment and payment, and, for members in service, the accrued benefits as calculated by an 'accrued benefit method' recognised by GN26, 'Pension Fund Terminology'.

8.4 The main differences in how accrued benefits are defined between schemes revolves around whether future salary increases are included (wholly or in part) in the technical provisions, how certain in-service member options are dealt with (principally the early leaver and early retirement options) and whether and to what extent advance provision should be made for discretionary benefits in the funding. In essence this is a choice between the merits of smoothing future contribution flows for these members. If the proportion of liabilities in respect of active members is small relative to the whole, then it makes little difference which of the GN26 methods has been used to define accrued liabilities.

8.5 The technical provisions are calculated using assumptions chosen by the trustees upon the advice of the Scheme Actuary and usually with the sponsor's agreement. The actuary needs to advise trustees on a number of matters before they can set the technical provisions. Amongst these are matters related to making sure the trustees understand the full range of choices available for the technical provisions and how contribution rates under the different methods may develop, as well as the ability and willingness of the employer to make advance provision for future events such as salary increases and discretionary benefits in the technical provisions.

8.6 With regard to measurement of technical provisions, there is a wide range of choice for trustees in how they direct their actuary on the choice of discount rates, taking into account either or both of :

a. the yield on assets held by the scheme to fund future benefits and the anticipated future investment returns, and

b. the market redemption yields on government or other high-quality bonds.

8.7 Deterministic calculations are envisaged, with a requirement for the economic and actuarial assumptions to be chosen prudently. Whilst prudence is not defined precisely, the guidance from the Regulator requires trustees to think wider than mere margins for adverse deviations in each assumption and has provided guidance on some of the significant matters they are expected to take into account.

8.8 The Regulator has made it clear that legislation does not require technical provisions to be set at the level needed to buy out the accrued liabilities with an insurance company. But he has also prompted trustees to consider the actuary's estimate of the solvency position (effectively a proxy for buy-out) and the assumptions underlying that calculation as useful reference points.

8.9 The sponsor covenant has also emerged as a key input to decisions by trustees on the level of technical provisions, and on the degree of prudence in the financial assumptions used to measure technical provisions. The Regulator had earlier planted the thought that trustees managing large deficits should behave like major creditors, although more recent guidance reminds them that any action which may force the employer into insolvency may not be in the best interests of members.

8.10 Trustees are, however, expected to form an objective assessment of the employer's financial position and prospects as well as his willingness to continue to fund the scheme's benefits (the sponsor's covenant), in order to inform their decisions about the level of prudence appriopriate in the technical provisions (and also to inform them on the appropriate length of the recovery plan). They are also required to ensure that the pension scheme is treated fairly in relation to other creditors and equity providers, and not disadvantaged.

8.11 The Regulator's June 2009 statement was quite clear about how trustees were expected to address perceived changes in employer covenants during the weakened economic and financial conditions:

> '*Where the employer covenant is so weak as to be negligible, the assumptions should be chosen so that the scheme is self-sufficient. This means that technical provisions should be set at the level at which they can be expected to meet the full accrued liabilities and expenses in future on the basis that the scheme had been closed and all risks minimised. In particular, there is unlikely to be scope for assuming any risk premium in the discount rates as it is improbable that the employer can meet any additional cost if returns are not achieved as expected'.*

'If the employer covenant is considered to be strong relative to the scheme, the technical provisions could be set using assumptions which reflect the strong ability of the employer to underwrite any risks that the actual experience in future might vary from the assumptions made.'

8.12 In the latter case, the Regulator has also made it clear that prudent assumptions could allow for some out-performance of scheme assets relative to bonds depending on specific circumstances. Amongst other things this would depend on the employer's ability to cope with the consequences of the assumptions not been borne out in practice. Contingent assets are recognised as instruments to mitigate sponsor risk and thus allow a lower level of technical provisions to be targeted than would otherwise be the case.

8.13 This appears to us to be an articulation that the underlying liability is the buy-out liability (or a close proxy) and the difference between this and the choice of technical provisions adopted for that scheme is implicitly the value being placed on the sponsor covenant – a number which is not explicitly disclosed but can be discerned from the actuarial valuation report by those who have access to it.

8.14 The process of setting discount rates is therefore scheme-specific and in practice many different models are employed, incorporating different building blocks and varying degrees of technical finesse. Single discount rates live alongside discount rates which break up the liability term in different ways (for example, a post-retirement discount rate with a focus on fixed and index-linked stocks, and a pre-retirement discount rate with an element of out-performance from equities). We do not believe that more than a handful of schemes actually carry out full cash-flow based valuations for funding purposes, although many might do some approximate calculations based on cash-flows to derive approprately averaged discount rates for the main calculations.

8.15 We would therefore expect a wide range of measurement bases in practice for the technical provisions. The Regulator's '*Orange Book*' provides a simplified analysis, with discount rates translated to an equivalent single discount rate, of what pension schemes are reporting. Their latest study (published in November 2009, covering the three year period to September 2008) suggests that in practice the median outperformance assumption (over gilts) for measuring technical provisions was about 1% a year until September 2007 and then increased to 1.5% a year around March 2008. At any one time the range of discount rates used by actuaries to measure technical provisions appeared to be from gilt yields to gilts +1.5% or 2%.

Future Service Contribution Rate

8.16 This is the contribution rate required to meet continuing accruals for active members and where appropriate new members. It is the standard contribution rate (as defined in GN26) appropriate to the chosen funding method before taking into account any actuarial surplus or deficiency. Regular expenses met from the scheme would normally be included.

8.17 The regulatory requirement (*Code03 (73)*) is for the contribution rate to be consistent with the technical provisions. There is no specific requirement for prudence, so in theory the contribution rate could be assessed using best estimate assumptions rather than those used in the technical provisions. There is the further argument here that the actuary should have more regard to the investment of new money over a period in the future and therefore place proportionately less emphasis on current market conditions. Information supplied by Mercers (2009) confirmed anecdotal evidence that in practice the assumptions used to determine future service cost are, except for a small minority of schemes, the same as those used for the technical provisions.

Recovery plans

8.18 Recovery plans are focussed on affordability by the employer. The trustees are required to aim for any shortfall to be eliminated as quickly as the employer can reasonably afford. What is possible and reasonable, however, will depend on the trustees' assessment of what the employer can afford, including their ability to pursue the employer to make good the deficiency in the event of a scheme wind-up.

8.19 Once again there is no prescription on the assumptions underlying the recovery plan and these do not have to be the same as those in the technical provisions. Indeed there may be an argument to employ best estimate discount rates based on the scheme's actual investment strategy regardless of the view taken with technical provisions. Where assumptions underlying the recovery plan differ from those underlying the technical provisions, then GN9 requires the actuary to provide suitable sensitivity advice.

8.20 In principle, the inclusion of contingent assets in a scheme's funding strategy could mean that the trustees accept a recovery plan that they would not have otherwise agreed to, or set lower technical provisions than they might otherwise have done.

8.21 The Regulator's June 2009 statement also clarified how trustees were expected to approach the balance between technical provisions and recovery plans in the light of potentially weakened employer covenants and reduced affordability as a result of the financial crises:

'*technical provisions should not be compromised to make a recovery plan affordable; the size of the deficit does not necessarily dictate deficit repair contributions; these must be determined with reference to what is reasonably affordable for the employer'*

8.22 In essence the expectation is that technical provisions will be strengthened when employer covenants weaken and, if short term affordability is an issue, then recovery plans may be back-loaded and/or recovery periods extended, or greater use made of contingent assets.

Solvency estimates

8.23 An actuarial valuation must include the actuary's estimate of the 'solvency' of the scheme. This estimate and the assumptions underlying the calculations are useful reference points for trustees and the employer when considering the adequacy of the technical provisions.

8.24 The definition of solvency is contained in Regulation 7(6) of the Scheme Funding Regulations and is essentially the estimated cost of buying annuities with an insurance company to secure the liabilities (including an allowance for expenses) on the effective date of the valuation. If the actuary does not consider this to be practical then the legislation gives requires him/her to exercise professional judgment to provide an estimate considered appropriate for the circumstances of the case and include a brief account of the principles adopted in making the estimate.

8.25 GN9 provides some guidance in the latter case, one option being to discount best estimate future cash outflows represented by the accrued rights by reference to market terms of financial instruments that insurance companies would be expected to invest in to obtain as close a match as possible to the accrued liabilities, with inclusion of appropriate margins for risks implicit in those investments, as well as any remaining mismatch risk. Where the actuary considers the analysis of the risk allowances to be inappropriate, then GN9 suggests a proxy based on gilt yields less a margin.

8.26 However, most actuaries would now regard this proxy as unrepresentative of prices currently prevailing in the buy-out market and may resort to other market intelligence (including available information on recent Section 75 debt calculations – see below). [References: *The OccupationalPension Schemes (Scheme Funding) Regulations 2005 (SI 2005/3377) and GN9 Version 8.1]*

Section 75 'employer debt' calculations

8.27 Section 75 of the Pensions Act 1995 provides for the calculation of a debt when a scheme winds up or when an employer ceases to participate in a multi-employer scheme. The calculation determines the level of any shortfall to *be met by the employer.* The wording in the legislative references relating to the liability calculations is exactly the same as for the solvency estimates, but set out separately in the Employer Debt Regulations.

8.28 Since Section 75 calculations are usually required in connection with transactions (as disctinct from solvency estimates in the actuarial funding report which are planning exercises) there is a greater burden on the actuary to seek information from the markets which is more tailored to recent transactions (and hence the broad guidance in GN9 is confined to actuarial valuation reports and not available for Section 75 calculations).

[References:The Occupational Pension Schemes (Employer Debt) Regulations 2005 (SI 2005/678) as amended by the Occupational Pension Schemes (Employer Debt and Miscellaneous Amendments) Regulations 2008 (SI 2008/731)]

Cash equivalent transfer values (CETVs)

8.29 Early leavers have the option (except for a short period prior to pension age) to transfer their benefits out of the scheme into another approved pension scheme or a personal pension by taking a CETV. Legislation defines a CETV as the expected cost of providing the member's accrued benefits within the scheme.

8.30 From October 2008 it is the trustees who have responsibility to take decisions relating to the calculation of CETVs, after taking actuarial advice (previously the actuary had to certify that they were consistent with a professional technical standard but that is no longer the case). Unlike scheme funding, the employer does not have to be consulted.

8.31 The thrust of the regulatory guidance is directed towards maintaining fairness between the interests of the transferring members and others, but relative to the funding of the scheme. The assumptions are supposed to be best estimates and any options exercisable at the member's discretion (usually cash commutation and early retirement) need to be included if they would increase the CETV (with suitable probabilities if appropriate). Trustees should decide whether discretionary benefits should be included, having regard to established past practice, any consent requirements from the employer and any allowance made in the scheme's funding plan explicitly or through a margin for prudence.

8.32 Trustees need to take account of their investment strategy and where the funding plan implicitly assumes that investments underpinning benefits change at or close to

retirement, then consider whether this should be taken into account when setting the discount rate. Investment returns should be net of investment fees and expenses. They need to monitor assumptions against changing market conditions and are expected to incorporate some form of market value adjustments to maintain best estimate levels.

8.33 For transfers-in the assumptions should be consistent with those for transfers out.

8.34 If the scheme is underfunded then trustees are allowed to reduce CETVs (except for schemes in wind up or in the PPF assessment period) to protect remaining members, but only after receiving a report from the actuary on the 'insufficiency' of the scheme's funding relative to the transfer value assumptions (and for this purpose, if the actuary considers it appropriate after consulting the trustees, the assets would be reduced to allow for a reasonable cost of winding up the scheme).

8.35 Some of the matters trustees would need to take into account before deciding on the deduction for underfunding are the degree of underfunding, strength of employer's covenant, structure of recovery plan, whether there is any contingent security to plug the funding gap on employer's insolvency and whether the employer is prepared to provide a top-up in excess of the funded amount for each member transferring out.

8.36 Previously the legislation was not so clear cut on how the CETV should be assessed. Actuarial guidance (GN11) was more explicit in suggesting that the actuarial value should represent the expected cost of providing the benefits in the scheme and '*should be assessed having regard to market rates of return on equities, gilts or other assets as appropriate'.*

8.37 In May 2005, an exposure draft (EXD 54) of a revised version of GN11 was published for consultation. The main policy thrust was that transfer values should be calculated as the value to the member using discount rates based on bond yields. There was almost universal criticism of this amongst the non-actuarial respondents, who were concerned with the social consequences of the proposal were it to be implemented. The Actuarial Profession felt that determining social policy was the role of Parliament through legislation, and referred the matter to the DWP. This led to the 2008 Regulations, which supported the earlier 'cost to the scheme' interpretation, and GN11 was withdrawn. [R*eferences: The Occupational Pension Schemes (TransferValues) Regulations 1996 (SI1996/1847), as amended by legislation including The Occupational Pension Schemes (TransferValues) (Amendment) Regulations 2008 regulations (SI 2008/1050), and Guidance fom the pensions Regulator (Septembert 2008.)*]

ALM modelling

8.38 The purpose here is to model the potential pay-offs under different investment strategies involving varying degrees of risk. Stochastic models are usually employed (except in the very small schemes) to project risk-reward scenarios over suitable periods, with technical provisions, future contribution rates and deficit recovery plans from the funding strategy being inputs. The assumptions are usually best estimates although it is likely that in practice the prudent margins built into the funding strategy are not in fact stripped out.

Accounting for pension costs in the company's accounts.

8.39 The pension accounting standards under which UK actuaries are most commonly asked to advise are IAS19, FRS17 AND FAS132. The general approach for all three is balance sheet driven, with market-based measurements. Treatment of volatile items differs between the three, with FAS132 allowing smoothed recognition in the P&L, FRS17 not allowing any smoothing and IAS19 moving towards eliminating all smoothing. There are other subtle differences.

8.40 Assets are measured at 'fair value'. Liabilities are measured using the Projected Unit Method with full allowance for future salary increases. Assumptions are supposed to be best estimates and decided by the employer, usually on actuarial advice.

8.41 Discount rates for liability measurements are generally expected to be the market yields on high quality bonds (usually interpreted as AA quality), where there is a deep market. The definition of the discount rate in IAS19 and FRS17 does not allow any adjustment to be made for the default risk on AA bonds. Despite the apparently tight definition of the discount rate, in practice there is a reasonable range due to different data sources, interpretations of what constitutes an acceptable 'AA yield curve' and simplifications for term structure where calculations using the full yield curve are considered impractical or uneconomic. Analyses published by Pension Capital Strategies based on the most recent annual reports (majority believed to be reporting at 31 December 2009) suggests that 50% FTSE100 companies were using discount rates within 10 basis points of the index yield on long-dated AA bonds, whilst 90% were within the range of 40 basis points either side of the index yield (for a typical pension scheme, 10 basis points would convert to approximately 2% of liabilities). However, at 31 Dec 2008 when credit spreads were unusually high due to the the stressed financial conditions, substantial reductions from the index yield were more common.

8.42 Since pension and salary increases are included in the liability calculation, and these are driven by the inflation assumption, therefore further variations in the net discount rate arise from differences in the definition of inflation, how the term structure has

been allowed for, adjustments for perceived supply and demand distortions and how caps and floors on pension increases have been incorporated.

8.43 Within each year's P&L charge is a credit for the expected rate of return on the scheme's assets over the life of the obligation, based on market conditions at the beginning of the financial year. This typically requires an assumption for the long term rate of return expected from the scheme's equity investments and is probably the only entry in the sponsor's P&L which is based on management's assumption of what they expect to earn (this is one of the areas the IASB is currently examining for reform – see Section 10).

Pension disclosures for directors in company accounts.

8.44 The Companies Act 2006 and FSA Listing Rules require, for each person who has served as a director of the company during the financial year, disclosure of various aspects of their remuneration including pensions. For pensions, the relevant disclosures refer to the CETV in respect of the pension benefits accrued at the end of the year.

Others

8.45 There are numerous other calculations which we have not considered further because they do not bring out any new issues. These include:

- Member options other than transfer values, for example, *early* and *late retirment* calculations, *cash commutations* and *benefit augmentations*. Requirements of individual trust deeds vary, with the terms sometimes pre-specified but otherwise giving the actuary or trustees varying degrees of power. The Member Options Working Party of the Actuarial Profession produced a report in this area in 2006. Their principal findings were:
    - *The framework for member options other than transfer values is determined by scheme rules and varies widely from scheme to scheme.*
    - *The notion of actuarial equivalence on an 'ongoing' or 'expected value' dominates the methodology used to set terms for member options.*
    - *Cash commutation rates are almost always set at a rate below the cost of securing the pension within the scheme.they are not adjusted in line with market interest rates.*
    - *Member options are not generally viewed as being sensitive to the terms unless they (a) impact on affordability of retirement or (b) the terms were to be changed substantially.*

- *No credit is given when converting member options for the increased security provided the PPF (the authors also suspected a similar approach to the sponsor covenant).*

- When there is a *modification of subsisting rights* or changes to members' accrued benefits with a requirement for 'actuarial equivalence' then an actuary needs to certify (under Section 67 of the Pensions Act 1995) that the value of the benefits immediately after the change is no less that that immediately before. The actuary is directed by legislation to use methods and assumptions consistent with CETVs.

- When a *bulk transfer is paid without members' consent*, the actuary needs to certify that benefits after the transfer are *'broadly no less favourable'* than those before (Pensions Act 1995). There used to be a direct requirement to consider the before and after situation using a *winding up test* which changed in 1999 (although the relevant guidance note - GN16 - was not amended for a few years). The current situation is that '*broad equivalence*' does not necessarily mean mathematical equivalence, and there are many legal issues to address. Whilst ultimately some calculation of a transformation may be necessary, the context will usually be the actuary's best guide to the choice of methods and assumptions.

- Pension schemes which are contracted-out of the State Second Pension must provide benefits which have been certified by an actuary to be at least of equivalent value to a Reference Scheme.

- When a pension scheme winds up in deficit, calculations are required for different categories of members to determine how the benefits should be reduced.

- For the purposes of the PPF levy and assessment to enter the PPF actuaries need to carry out calculations of liabilities. These arise from Section 179 and 143 respectively of the Pensions Act 2004. In both cases calculations are based on asumptions specified by the PPF (similar but not identical), with the actuary having little or no discretion.

9 Current practice: Others

Finance, Investment and Banking

9.1 Calculations relating to the market-making books in wholesale banking business are usually transaction-based and therefore need to take account of what the markets are saying. Calculations may be long- or short- term in nature and the management of volatility is important. Considerations which involve social aspects or the use of discretion to treating the customer fairly are rare. Hence there is a strong focus on market-consistency and we would expect 'least risk' discount rates to be the norm.

9.2 Lessons from the financial crises have prompted a debate on what constitutes 'least risk'. In order to price a swap, the cash-flows that the counterparties have agreed to pay each other over the life of the contract should be discounted at the rate at which each counterparty will fund them. Up until mid-2007 it was assumed that LIBOR was the rate at which all banks could borrow, and so that was the standard rate for pricing. As capital became scarce, and banks began to differentiate between secured and unsecured borrowing, dealers began to realise that non-collateralised trades should be funded at the rate at which the bank's treasury is able to borrow money in the market. There is therefore no longer a common discount rate for pricing uncollateralised trades.

9.3 For pricing collateralised trades, a new standard has emerged. Banks have generally moved away from discounting cash flows using LIBOR to discounting at the relevant overnight indexed swap rate. However, for technical reasons, calculations for the exchange of collateral have not kept pace with this development, thus leaving a mismatch between the collateral held by the bank and what it will ultimately receive if the counter-party defaults. This has tended to lead to banks being forced to take into account the way in which they fund the liabilities, rather than adopting a pure least risk assessment. (Whittall (2010))

9.4 ALMs in banks, unlike other areas of actuarial work, are usually for the purposes of assessing risk exposures to counter-parties. They may also be short- or long-term in nature, but the investment content of the portfolios is usually matched (by time-bucket cash-flow techniques).

9.5 Calculations elsewhere in banks may be different, particularly in corporate finance work and in retail banking with regard to domestic mortgages. In retail banking interest rates for mortgages were traditionally treated as floating, so that the liabilities could in effect be adjusted as the nature of the backing assets changed. In recent years banks have developed a much broader range of mortgage products, including various forms of guaranteed interest rates for differing terms. This has taken the banks into similar territory to life insurance firms, since it is difficult to match assets and liabilities in any very precise way when there are borrower options to pay off an existing mortgage and remortgage the property. Retail banks have not so far been required to mark their mortgage book to market, so our assumption is that discount rates are

determined on the basis of budgeting calculations according to our typology. However, this is an area which would merit further investigation

Enterprise Risk Management

9.6 In Enterprise Risk Management (ERM), calculations for the purposes of hedging and managing short-term financial risks are also transaction-based and need to be market-consistent. However, longer-term strategic ERM may involve assessing the risk-reward pay-offs of different risk strategies, and therefore have more of a *budgeting* flavour, albeit associated with extensive analysis to quantify uncertainty and risk. Here, as in ALM, the impact of investment risk needs to be separated from 'risk-neutral' calculations in order to allocate the risks and rewards along functional lines; therefore 'real world' calculations (using budgeting type discount rates) co-exist with least risk discount rates.

Government projects

9.7 For the purposes of appraising and evaluating central government projects, the following extract from HM Treasury's Green Book refers to the real discount rate as measuring social time preference:

> *"Discounting is a technique used to compare costs and benefits that occur in different time periods. It is a separate concept from inflation, and is based on the principle that, generally, people prefer to receive goods and services now rather than later. This is known as 'time preference'."*
>
> *"For individuals, time preference can be measured by the real interest rate on money lent or borrowed. Amongst other investments, people invest at fixed, low risk rates, hoping to receive more in the future (net of tax) to compensate for the deferral of consumption now. These real rates of return give some indication of their individual pure time preference rate. Society as a whole also prefers to receive goods and services sooner rather than later, and to defer costs to future generations. This is known as 'social time preference'; the 'social time preference rate' (STPR) is the rate at which society values the present compared to the future."*
>
> *"The discount rate is used to convert all costs and benefits to 'present values', so that they can be compared. The recommended discount rate is 3.5%. Calculating the present value of the differences between the streams of costs and benefits provides the net present value (NPV) of an option. The NPV is the primary criterion for deciding whether government action can be justified."*
>
> *"Social Time Preference is defined as the value society attaches to present, as opposed to future, consumption. The Social Time Preference Rate (STPR) is a rate used for discounting future benefits and costs, and is based on comparisons of*

utility across different points in time or different generations. This guidance recommends that the STPR be used as the standard real discount rate."

"The STPR has two components:

- *The rate at which individuals discount future consumption over present consumption, on the assumption that no change in per capita consumption is expected, represented by ρ; and*

- *An additional element, if per capita consumption is expected to grow over time, reflecting the fact that these circumstances imply future consumption will be plentiful relative to the current position and thus have lower marginal utility. This effect is represented by the product of the annual growth in per capita consumption (g) and the elasticity of marginal utility of consumption (μ) with respect to utility."*

9.8 The Treasury's current guidance assumes 1.5% a year for the former (based on empirical evidence of long term returns received by savers in the UK), and 2% a year output growth. A central feature of the current guidance is an un-bundling of the discount rate such that it now reflects only one factor – the STPR, and there is separate guidance in the appraisal process on how risk and uncertainty should be allowed for (previously a discount rate of 6% a year was used to reflect both factors). The impact of the current guidance is that proposals and options to deliver long term benefits, and long term cost savings, are now relatively more attractive than was the case under the previous guidance.

9.9 Another feature of the current guidance is that when appraising projects over very long terms (beyond 30 years) a declining discount-rate should be used to reflect uncertainty about the future, with the 3.5% a year real rate declining over time to 1% a year for periods in excess of 300 years. In support of this approach of using a falling discount rate for periods over 30 years, the Treasury quotes a report for government (OXERA, 2002), which argued for the use of lower discount rates for the longer term.

"The first set of arguments derives from empirical observations of how people actually discount the future. There is some evidence that individuals' time preference rates are not constant over time, but decrease with time. Individuals are observed to discount values in the near future at a higher rate than values in the distant future. While some evidence still supports time-constant discount rates, the balance of the empirical literature suggests that discount rates decline in a hyperbolic fashion with time."

"The second set of arguments in favour of time-varying discount rates derives from uncertainty about economic magnitudes. Two parameters have been selected for the main focus of this approach. The first is the discount rate itself. The argument is

that uncertainty about the social weight to be attached to future costs and benefits—i.e. the discount factor—produces a certainty-equivalent discount rate which will generally be declining with time. The second uncertain parameter is the future state of the economy as embodied in uncertainty about future consumption levels. Under certain assumptions, this form of uncertainty also produces a time-declining discount rate."

"The third set of arguments for time-declining discount rates does not derive from empirical observation or from uncertainty. Instead, this approach—the 'social choice' approach—directly addresses the concerns of many that constant-rate discounting shifts unfair burdens of social cost on to future generations. It adopts specific assumptions (axioms) about what a reasonable and fair balance of interests would be between current and future generations, and then shows that this balance can be brought about by a time-declining discount rate."

9.10 In July 2008 the Treasury issued supplementary guidance to the Green Book on social discounting in relation to intergenerational wealth transfers (HMT, 2008).

9.11 The driver for the revised guidance was consideration of the impact of climate change. Because of its frame of reference, the report of the Stern Review on climate change had to consider fundamental ethical issues concerning the responsibility of the current generation to future generations. This led the Review to conclude that it was not ethically defensible for pure social time preference to be applied to future cost-benefit calculations where these involved significant and, for all practical purposes, irreversible wealth transfers from the future to the present.

9.12 The revised guidance therefore proposed that long-term cost benefit analysis should be carried out on two bases, one as mentioned at the beginning of paragraph 9.9 and another which excludes the pure social time preference and takes discount rates of 3.0% a year for the first 30 years, falling to 0.86% for over 300 years. The difference between the two provides an estimate of the wealth transfer that is attributable to pure social time preference.

9.13 In practice the logic adopted appears to be that the bulk of government expenditure is financed from other means, and since many of these projects are of an infrastructure and environmental nature, they also involve social preferences on behalf future generations who will also be benefitting. Consequently, discount rates are set by reference to other criteria, with assumed long-term rates of return involving a social element being more appropriate than current market yields on what is after all only a marginal financing tool for government.

10 Current Developments

Regulatory developments: Solvency II

10.1 Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 put in place a new regulatory system for insurance companies in the EU, known colloquially as Solvency II. The Directive constitutes Level 1 legislation under the current (Lamfalussy) legislative procedures (similar to an Act of Parliament in the UK). The Level 1 legislation will be supplemented by Level 2, currently being drafted by the Commission and subject to consultation with Member States and with stakeholders. In addition there will be Level 3 measures which will be promulgated by CEIOPS – the Committee of European Insurance and Occupation Pension Supervisors (and in due course by EIOPA – the European Insurance and Occupational Pension Authority – once it has been established in 2011).

10.2 Any discussion of Solvency II requirements can therefore only be provisional. In fact key decisions concerning discount rates are still to be taken and have been the subject of active current discussions in the CEIOPS Task Force, which was established with Member State and stakeholder representation (including the Groupe Consultatif) and which reported on 1 March 2010.

Technical Provisions

10.3 The broad context for the Solvency II regime has already been established. Articles 76 to 82 and 86 of Directive 2009/138/EU (reproduced in Appendix A) set out the overarching requirements for technical provisions, which are expected (Article 77(1)) to be best estimates plus a risk margin, in respect of liabilities already assumed by the undertaking as at the valuation date. Article 76(2) states the exit value principle – that "The value of technical provisions shall correspond to the current amount insurance and reinsurance undertakings would have to pay if they were to transfer their insurance and reinsurance obligations immediately to another insurance or reinsurance undertaking." Article 76(3) refers specifically to market-consistency and Article 76(4) says that the technical provisions should be calculated in a prudent, reliable and objective manner.

Risk-free interest rates

10.4 Article 77 provides for CEIOPS to adopt implementing measures for defining the relevant risk-free interest rate term structure to be used in calculating the best estimate. CEIOPS consulted in July 2009 on this question in Consultation Paper (CP) 40: Draft CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: Technical Provisions – Article 85(b) – Risk-free interest rate term structure. Following comments received on CP40 and feedback from QIS4 (Quantitative Impact Study 4), the recommendations paper was reissued in final form as CEIOPS-DOC-34-09 in October 2009.

10.5 In a letter of 26 March 2008 the Commission invited CEIOPS to use a risk-free interest rate term structure based on swap rates. However, the position taken by CEIOPS in CP40, and subsequently confirmed without change, was that it should be based on government bond yields. Desirable characteristics for the risk-free rates, according to CP40, are the following:

(a) No credit risk: the rates should be free of credit risk.
(b) Realism: it should be possible to earn the rates in practice.
(c) Reliability: the determination of the rates should be reliable and robust.
(d) High liquidity: the rates should be based on financial instruments from deep, liquid and transparent markets.
(e) No technical bias: the rates should have no technical bias.
(f) Available for all relevant currencies.
(g) Proportionate: available also to small and medium-sized companies which might not be in a position to derive the term structure themselves.

Swaps or government bonds?

10.6 In fact both swap rates and government bond yields satisfy most of these criteria, although swap rates may embody some systemic banking sector risk and an element of credit risk in rapidly moving markets, whilst government bond rates are often subject to downwards technical bias. Swap rates can also be subject to distortion, e.g. during the recent global financial crisis.

10.7 In order to ensure that the risk-free term structure is available in all territories and for small and medium-sized as well as large companies, CEIOPS envisaged making the full term structure available, and the methodology used to derive it, for all major currencies on at least a three-monthly basis.

10.8 The UK FSA (and one other supervisor) entered a minority report in the final advice on CP40, since they considered that the risk-free term structure of interest rates should be based on swap rates, because they are much more liquid.

10.9 The Groupe Consultatif advocated that the basic 'risk-free rate' structure (i.e. in respect of the most liquid liabilities) should be published every day and should be able to have regard both to swap and government bond markets with some flexibility to vary relative emphasis over time, having regard to the technical situation in the market, including relative liquidity.

10.10 Swap rates with the broadest range of maturities are referenced to floating legs (the variable interest rate side of the swap transaction) based on term LIBOR (London Inter-bank Offer Rate) or the EURIBOR (Euro Inter-bank Offer Rate) in relation to euro swaps. Although swaps are two-way and are normally collateralised and therefore contain little credit risk, LIBOR cannot be earned without basis risk, as it is a

theoretical unsecured offer rate and is affected in extreme conditions by systemic banking sector risk.

10.11 The risk associated with LIBOR as a reference for the floating leg is reduced in swaps based on overnight LIBOR (and EONIA – Euro Overnight Index Average) and these, being also highly liquid, have advantages for deriving the risk-free rates at short durations. However, they are only generally available and liquid for durations up to two years. The Groupe Consultatif recommends using overnight LIBOR (and EONIA) swap rates for the shorter durations and taking the difference between LIBOR and overnight LIBOR (and respectively EURIBOR and EONIA) rates as the basis for extrapolating synthetic overnight LIBOR rates at higher durations.

10.12 Notwithstanding a preference for basing the reference rate on swaps, the Groupe argues that some flexibility is desirable to take into account temporary market distortions. Ideally CEIOPS should publish the term structure daily for all relevant currencies.

10.13 On 1 March 2010 CEIOPS issued the Report of the Task Force on the Illiquidity Premium. This report also arrived at certain provisional conclusions with regard to the selection of the risk-free rate and extrapolation of the term structure of interest rates. It did not finally resolve these issues, although it moved closer to accepting the principle of adjusting swap rates to determine the risk-free rates.

10.14 In a late submission to the Task Force, the CRO/CFO Forum proposed the following principles:

1. The basis risk-free interest rate should be based on a swap curve appropriately adjusted to remove credit risk.

2. The adjustment for credit risk should refer to overnight swap rates where these are available and the market is sufficiently liquid.

3. Where this is not the case, other market swap rates adjusted for long term through-the-cycle credit risk should be used.

10.15 CRO/CFO Forum also suggested two options for implementing these principles.

Option 1: use overnight swaps rates where liquid, then move towards interbank rates adjusted for credit risk. This option requires the fixing of a cut-off point beyond which overnight swap rates are no longer considered to be liquid, the calculation of a long term adjustment beyond the cut-off point and the definition of the speed of transition between the overnight swap curve and the interbank rate curve.

Option 2: use quoted EONIA overnight swap rates without adjustment. These rates involve negligible credit risk and are attracting an increasing proportion of market

liquidity. They are quoted up to 30 years, although active trading is concentrated at durations up to 5 years. This can lead to distortions in rates beyond 5 years, which requires consideration to be given to means of extrapolating the rates beyond the reliable data points.

10.16 Due to constantly changing market conditions, both options ask for some discretion for the central EU institution in charge of the determination of the risk-free interest rate term structure.

10.17 The options should not to be considered mutually exclusive, and different options could be retained for different currencies or different points in time. Due to time constraints these proposals were not discussed during the meetings of the Task Force and at the time of writing reactions of Task Force members and CEIOPS members were still being sought.

Extrapolation

10.18 One of the unresolved issues in CEIOPS-DOC-34-09 was how to extrapolate the term structure of interest rates to longer durations, when there are insufficient data points to derive the full curve. This was considered by the Task Force on the Illiquidity Premium, which came to certain conclusions.

10.19 It was agreed that extrapolation is of crucial importance for certain types of long-term insurance business, where slight differences in the extrapolated part of the term structure may lead to considerable differences in the quantum of technical provisions. Moreover, the choice of an extrapolation method and its results over time may have systemic consequences on the solvency of the insurers, since changes in extrapolated rates or spread between estimated and actual rates can have broad effects on the balance sheets and results of the insurers.

10.20 Depending on the existence of observable liquid data points, the need for extrapolated rates clearly varies for the different currencies. However, common principles governing the methods of calculations should ensure a level playing field between the different currencies.

10.21 The proposed central feature was to define an unconditional ultimate long-term forward rate, to be determined for each currency by macro-economic methods. While being subject to regular revision by the central EU institution referred to in principle #4, the ultimate long term forward rate should be stable over time and only change due to fundamental changes in long-term expectations.

10.22 The task force did not recommend, however, going beyond these principles in the level 2 implementing measures, as the precise methods to be used may vary from one currency to another and may vary over time depending on the evolution of the markets.

Illiquidity premium

10.23 There is another major issue regarding the discount rate for best estimates, which at the time of writing was unresolved. This concerns the question of whether an addition to the risk-free yield can be justified in respect of illiquid liabilities, i.e. cases where the obligation is not redeemable at all, or is not redeemable at short notice without penalty. This corresponds to the additional yield which can be obtained on bonds which are less marketable than government bonds, even if they do not have any significant credit risk. Illiquidity occurs, for example, where the asset is not readily saleable due to uncertainty about its value or due to the lack of a market in which it is regularly traded. Where assets are illiquid, investors demand an additional premium as a reward for the risk of incurring additional transaction costs in case where the asset has to be sold.

10.24 Allowance for an additional yield over gilt yields is permitted under the current FSA rules for market-consistent technical provisions, although this is justified with regard to the illiquid assets in which the company is invested to back the relevant liabilities. The FSA, together with the insurance industry and the Groupe Consultatif, are arguing for a similar premium for illiquidity to be permitted under Solvency II. In this framework it has to be argued that the relevant liabilities are illiquid, rather than the assets held to back them, although it can be argued that a replicating portfolio for annuities would contain a high proportion of the less marketable bonds and hence justify the illiquidity premium in that way. It is less clear that a similar argument would apply to other life insurance liabilities, where it is argued that a liquidity premium should also be permitted. Supervisors would like there to be objective and reliable measures of illiquidity (or partial illiquidity) before agreeing to a liquidity premium.

10.25 As a result of the difference of opinion between CEIOPS and the industry and actuarial profession, and encouraged by the Commission, CEIOPS agreed at its Members' Meeting on 29 October 2009 to lead further work on whether to include a liquidity premium in the risk-free rate for discounting technical provisions and a Task Force was created. The aim of the Task Force was "to consider, from a technical point of view, the implications of allowing for a liquidity premium in order to provide Members with the technical background information to advice the political level in this area. In doing so, the Task Force was to take into account considerations expressed in CEIOPS' advice for Level 2 implementing measures and previous work done by stakeholders." The report uses *liquidity premium* for what we have described as an illiquidity premium and we follow that precedent in the paragraphs which follow.

10.26 In the light of work carried out by the insurance industry it was concluded that in normal circumstances the liquidity premium on assets is small and thus has no significant influence on the valuation of insurance liabilities. However, during periods of stressed liquidity the liquidity premium on assets has a positive value, but its application to insurance liabilities aims only to eliminate a valuation mismatch

between the valuation of assets and liabilities. Although it is not its main objective, the liquidity premium has an anti-cyclical effect and allows a harmonized treatment of distressed market conditions.

10.27 The Task Force proposed that the following nine principles should apply to the use of liquidity premiums:

1. The risk-free reference rate applicable to the valuation of a liability should be the sum of a basic risk-free reference rate and a liquidity premium depending on the nature of the liability.

2. The liquidity premium should be independent of the investment strategy adopted by the company.

3. The liquidity premium applicable to a liability should not exceed the extra return which can be earned by the insurer by holding illiquid assets free of credit risk, available in the financial markets and matching the cash flows of the liability.

4. The liquidity premium applicable to a liability should depend on the nature of the liabilities, having regard to the currency, the predictability of their cash flows (e.g. the ability to cash back/withdraw/surrender) and the resilience to forced sales of illiquid assets covering technical liabilities (e.g. where any loss of liquidity premium can be transferred to policyholders).

5. The liquidity premium should be calculated and published by a central EU institution with the same frequency and according to the same procedures as the basic risk-free interest rate.

6. The liquidity premium should be assessed and quantified by reliable methods based on objective market data from the financial markets and consistent with solvency valuation methods.

7. No liquidity premium should be applied to liabilities in the absence of a corresponding liquidity premium evidenced in the valuation of assets.

8. The design and calibration of the SCR standard formula should ensure that its calculation is consistent with recognition of a liquidity premium in the valuation of liabilities and compatible with the set Solvency II target criteria for solvency assessment. The calculation of the SCR with internal models should also include an appropriate recognition of the risk arising from the liquidity premium in order to guarantee the targeted confidence level.

9. The undertaking should have in place risk management systems and investment policy provisions specifically oriented to the risks inherent to the application of a liquidity premium, including liquidity risks.

10.28 The Task Force did not formally recommend permitting the use of a liquidity premium but nevertheless reached the following conclusions:

- The solvency position of insurers would be improved by an introduction of a liquidity premium. This effect will be strongest in case the insurer is well-hedged in terms of liquidity.
- Where a liquidity premium is introduced, the design and calibration of the standard formula calculation would need to be reviewed to ensure that it continues to lead to capital requirements which are commensurate with the solvency valuation of assets and liabilities and with the set Solvency II 99.5% VaR target criteria.
- In particular this is relevant with respect to the design and calibration of the spread risk module and the interest rate risk module, as well as with regard to the setting of correlation assumptions, but other areas in the standard formula may also be affected.
- In case a liquidity premium is introduced, the Task Force recommends including recognition of the associated risk in the spread risk module. Such a change would necessitate a re-calibration of the spread risk module factors and would imply that the correlation assumptions with respect to spread risk would need to be reviewed.
- Introduction of a liquidity premium is also likely to impact the calibration and calculation of the risk margin.

10.29 We should perhaps add that it is only the disclosed solvency position which would be improved as a result of allowing for a liquidity premium and then only in cases where the liquidity premium is positive. One formula considered by the task force was:

*Illiquidity Premium = 0.5 * max {corporate bond yield – swap yield – 0.4%}*

Clearly in some circumstances this could be negative. Furthermore, the formula focuses on corporate bonds but there are other types of illiquid asset, such as municipal bonds, property and small cap equities.

The issue will now be considered by CEIOPS members and probably by the European Commission in the context of the overall calibration of Solvency II in the light of QIS5.

Effect on SCR and risk margin

10.30 Allowance for a liquidity premium in the discount rate will, other things being equal, reduce the technical provisions and increase the amount available to meet the capital requirements. However, potential changes to the liquidity premium also need to be considered in looking at the capital requirements, particularly in relation to the measurement of spread risk and interest rate risk in the standard formula.

Current developments in International Accounting Standards

Insurance accounting

10.31 As described above in the insurance Sections, the international accounting standard for insurance contracts is International Financial Reporting Standard (IFRS) 4, which does not draw any distinction between life insurance and general insurance.

10.32 The current version of IFRS 4 is intended only to operate on an interim basis, pending promulgation of a revised version. It permits continuation of many existing practices and, as a result, does not provide a fully consistent standard.

10.33 The International Accounting Standards Board (IASB) has been working for some time on the development of a revised version of IFRS 4, which will provide a consistent basis of accounting for insurance contracts. The accounting standard will not deal with all aspects of the accounts of an insurance entity, but only with accounting for insurance contracts. This means that it will exclude contracts which are already covered by existing accounting rules for deposits, investments and other provisions, in particular International Accounting Standard (IAS) 39 (Financial Instruments: Recognition and Measurement, to be replaced in due course by IFRS 9) and IAS 37 (Provisions, Contingent Liabilities and Contingent Assets).

10.34 The generally accepted principle is that liabilities under insurance contracts (and under financial instruments) will be measured at 'fair value'. However, there remains considerable debate about how this should be defined.

10.35 The IASB have tentatively accepted that a so-called 'building block' approach (which we might recognise as an actuarial approach) should be used to measure an insurance contract. That approach consists of expected probability-weighted cash flows, incorporating the time value of money, and an explicit margin that is split into (a) a risk adjustment and (b) a residual margin.

10.36 In September 2009 the Board narrowed down the candidate measurement approaches for insurance contracts to two possibilities – exit value and fulfilment value. Exit value is the approach being developed in the project to amend IAS 37 *Provisions, Contingent Liabilities and Contingent Assets*, although the proposal in IAS37 would be modified by the inclusion of a residual margin that excludes any gain at inception whilst requiring any loss at inception to be recognised.

10.37 Exit value is defined as the amount the entity would rationally pay a contractor at the future date to carry out the service on its behalf. If a market exists for such services, the amount is the price that a contractor would charge and, if no market exists, the entity must estimate that amount. IASB staff are developing guidance explaining how, in the absence of a market, an entity would use a 'building block' approach to estimate the amount it would rationally pay a contractor to carry out the service.

10.38 Fulfilment value is the entity-specific value of the cash flows which the entity will experience in fulfilling the liability.

10.39 In September the Board tentatively decided to select the exit value approach, modified to exclude gains at inception. Nevertheless, a significant minority of Board members supported an approach based on current fulfilment value. Therefore, at that stage it was anticipated that the exposure draft of IFRS 4(revised) would explain both approaches.

10.40 At the same meeting the Board also discussed discount rates for insurance liabilities. The Board decided tentatively that the discount rate for an insurance liability should conceptually adjust estimated future cash flows for the time value of money in a way that captures the characteristics of the liabilities rather than using a discount rate based on expected returns on actual assets backing those liabilities. However, they also agreed that the accounting standard should not give detailed guidance on how to determine the discount rate.

10.41 By the time of the December meeting, which was held jointly with the US Financial Accounting Standard Board (FASB), the Boards had moved more towards the fulfilment value approach. The insurer's obligation would be calculated using the following building blocks:

- the unbiased, probability-weighted average of future cash flows expected to arise as the insurer fulfils the contract;
- the time value of money;
- a risk adjustment for the effects of uncertainty about the amount and timing of future cash flows; and
- an amount that eliminates any gain at inception of the contract.

10.42 The IASB and FASB also tentatively decided that:

- these building blocks should be used to measure the combination of rights and obligations arising from an insurance contract rather than to measure the rights separately from the obligations. That combination of rights and obligations should be presented on a net basis;
- the objective for measuring an insurance contract should refer to a value rather than cost;
- the risk adjustment should be the amount the insurer requires for bearing the uncertainty that arises from having to fulfil the net obligation arising from an insurance contract;
- the risk adjustment should be updated (re-measured) each reporting period.

10.43 In the working draft of the revised IFRS 4 dated 19 February 2010, the preliminary wording of the measurement objective is as follows:

"An entity shall measure a liability at the amount that it would rationally pay at the end of the reporting period to be relieved of the present obligation."

"The amount that an entity would rationally pay to be relieved of an obligation is the lowest of:

(a) the present value of the resources required to fulfil the obligation, measured in accordance with Appendix B;

(b) the amount that the entity would have to pay to cancel the obligation; and

(c) the amount that the entity would have to pay to transfer the obligation to a third party."

"An entity might be unable to cancel or transfer some obligations within the scope of this IFRS. If there is no evidence that an entity could cancel or transfer an obligation for a lower amount, the entity measures the liability at the present value of the resources required to fulfil the obligation in accordance with Appendix B."

"The amount that an entity would have to pay to cancel or transfer an obligation is the price that the counterparty or a third party would demand, plus any costs of cancellation or transfer."

10.44 The working draft also included some more specific guidance concerning how to calculate the unbiased, probability-weighted average of future cash flows.

"The amount or timing of the outflows of resources required to fulfil an obligation might be uncertain. In other words, more than one outcome might be possible. All possible outcomes affect the amount that an entity would rationally pay to be relieved of an obligation. The more likely it is that any particular outcome will occur, the greater the effect that the outcome has on the amount that the entity would rationally pay. Thus, if the outcome is conditional on the occurrence or non-occurrence of uncertain future events, the measurement of the liability reflects the uncertainty about these events."

"The range of outcomes and their effects shall be taken into account by estimating the expected present value of the outflows. Estimating the expected present value involves:

(a) identifying each possible outcome;

(b) making an unbiased estimate of the amount and timing of the outflows of resources for that outcome (see paragraphs B5-B13);

(c) determining the present value of these outflows (see paragraph B14); and

(d) making an unbiased estimate of the probability of each outcome."

"The expected present value is the probability-weighted average of the present values of the outflows for the possible outcomes."

"The expected outflows shall be discounted to their present value using rates that reflect:
(a) current market assessments of the time value of money; and

(b) risks specific to the liability (but only if and to the extent that the risks are taken into account by adjusting the discount rate rather than by the other methods discussed in paragraph B16)."

10.45 The discount rate is therefore intended to be a market-consistent rate. This is in line with paragraph 47 of IAS 37, which states: "*The discount rate (or rates) shall be a pre-tax rate (or rates) that reflect(s) current market assessments of the time value of money and the risks specific to the liability. The discount rate(s) shall not reflect risks for which future cash flow estimates have been adjusted."*

10.46 The 'other methods' discussed in paragraph B16 are

- adjusting estimates of the future outflows; and
- calculating the expected present value of the future outflows and adding a risk adjustment to the amount so calculated

10.48 From this we can conclude that an adjustment of the discount rate for risk is intended to be one of the acceptable approaches. The discount rate should be based on current market assessments of the time value of money. However, consistent with the decision taken at the September 2009 Board meeting, the current working draft does not contain any guidance on how the market-consistent discount rate should be arrived at, i.e. how a risk-free rate should be determined (e.g. from government bond rates or from swaps or from corporate bond rates adjusted for risk), and whether a liquidity premium or similar would be permissible.

10.49 There has also been a lively debate as to whether the liabilities should reflect the entity's own credit risk, i.e. discounting at a higher rate if there is less chance of the commitments being honoured and thus reducing the liabilities. This is, of course, the opposite of what regulators expect (compare the expectations of The Pensions Regulator that pension liabilities should be valued at a lower discount rate where there is a weak employer covenant). However, the current working draft does not propose taking own credit risk into account.

10.50 The current timetable is for an Exposure Draft of IFRS 4 (revised) to be issued in June 2010, and the new IFRS to be published in June 2011, coming into effect in 2013.

10.51 The International Actuarial Association (IAA) last year published a book on Measurement of Liabilities for Insurance Contracts: Current Estimates and Risk Margins, intended to pave the way for implementation of IFRS 4 (revised) as then

currently understood and expected. Among others this included the following statements:

"If, according to the applicable measurement attribute, a liability is to be measured independently from the actual assets held by the reporting entity, its measurement does not depend either on the particular block of assets or an entity's investment strategy. This, in part, is because assets are fungible and can be replaced, either by the reporting entity or an actual or hypothetical entity to which they would be transferred."

"The following is an approach that might be used, if there are no other requirements to be applied. A transferee places a value on a specific liability, based on a set of assets that would reproduce the expected cash flows associated with the insurance obligation with minimum deviation (a replicating portfolio, also referred to as a minimum risk portfolio). If used, an additional margin for the risk of any remaining mismatch between the liabilities and their corresponding assets would be included as part of the liability."

"If there are no relevant observable market rates for assets that make up a replicating portfolio whose cash flows are comparable with the characteristics of the liability, then the applicable reporting framework may provide guidance…"

" If discount rates are modelled stochastically, two approaches can be taken: (1) develop different scenarios, each with its own set of expected cash flows and discount rates consistent with the scenario, with the results of each scenario weighted to derive the present value of the set of cash flows or (2) weight the cash flows in each scenario by the probability of that scenario and then apply the current yield curve to the applicable expected cash flows….In addition, if market-consistent current estimates are desired, the resulting discount rates should be consistent with market yield rates."

"An accounting framework could require or permit mean-reversion interest rate or equity yield models, particularly in what appear to be historically extreme market conditions. The resulting discount rates are not usually considered to be market-consistent."

"Alternative approaches to determining discount rates currently, at least to the extent allowed by the reporting framework, include the use of high quality long-term bond assumptions, deflators (particularly if equity assets are included in a linked set of assets), or average historical long-term experience."

10.52 The International Actuarial Association is expected to propose an international actuarial model standard on carrying out work under IFRS 4, and it is possible that this standard may include further guidance in relation to discounting, e.g. on

- how discount rates should reflect the nature, amount and term of the liabilities with the discount rate independent of the assets backing the liability.
- how a replicating portfolio might be determined;
- what to do in case a replicating portfolio cannot be constructed or if the assets in an appropriate replicating portfolio do not have readily available market values;
- whether a liquidity margin, reflecting the liquidity of the liabilities, is permissible in discount rate (most significant for annuity business); and
- how to approach the setting of risk margins to be added to the best estimate of the liabilities.

10.53 There remains the issue as to whether agreement can be reached on an international actuarial standard, as this will require the buy-in of existing well-established actuarial standard-setters, such as the Board for Actuarial Standards in the UK and the Actuarial Standards Board in the United States. An International Round-Table of Actuarial Standard Setters has been established, whose mission and tactics are as follows:

Mission

To achieve globally accepted actuarial standards over an appropriately long timescale. Globally accepted actuarial standards encompasses both national standard setters adopting model standards (presumably, but not necessarily published by the IAA) and national standard-setters reporting substantial congruence with the model to the IAA through its member organizations on a voluntary basis.

Tactics

a. To identify the purpose of actuarial standards, both core values acceptable to all members, and other values espoused by only some members.

b. To identify common principles and practice in existing national standards and seek ways to reflect the appropriate ones in all national standards.

c. To identify gaps which could be filled by common standards, for example in relation to the planned revision of IFRS4

d. To encourage the IAA to adopt one or more such IASPs suitable for adoption in all major jurisdictions.

e. To encourage those organizations issuing standards to consider seriously adopting such IASPs, with minimal modification.

f. Repeat a. – d. until the mission is achieved.

10.54 As can be seen, the possibility of developing a model standard for actuarial work in connection with IFRS4 (revised) is envisaged, since none of the standard-setters currently have any such standard and the opportunity therefore exists to create a

standard which all the current standard-setters (and other actuarial associations and future standard-setters) would accept and adopt, without the risk of overlap and inconsistency with existing standards.

10.55 For the purposes of the current study, it remains open what the requirements will be for actuarial work in respect of financial reporting under IFRS4 (revised) but in all probability a market-consistent approach will be required, with the discount rates reflecting the characteristics of the liabilities but not the actual assets held.

Pension accounting

10.56 A fundamental review of the International Accounting Standard, IAS19, is to commence in 2011. The eventual outcome should be linked to many other parallel projects of the IASB and the FASB, including fundamental projects on the conceptual framework for accounts, recognition and presentation[2]. There has been an ongoing debate between accounting standard setters on a number of inconsistencies built up over time in the accounting treatment of different liabilities. Additionally, new financial instruments and other developments have led to a review of some of the basic concepts, including what is meant by an 'ongoing basis'. Tentative decisions which would affect pensions appear to be:

- The removal of all smoothing mechanisms, corridors and deferred recognition.
- Sponsors will no longer be able to take advance credit in their profit statements for the expected return from plan assets.
- All changes in the value of plan assets and obligations will be recognised in the Statement of Comprehensive Income

There will be improved disclosures, including new disclosures on 'actuarial risk', cash-flows and disclosure of an accrued benefit measure which excludes the effect of future salary increases.

10.57 Measurement aspects of pension obligations will be dealt with as part of the fundamental review of IAS19. A decision to measure these with an allowance for future salary growth already appears to have been taken, but other measurement issues deferred to the fundamental review are

- An examination of the concept of what constitutes a pension asset or obligation for the sponsor.

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[2] *An Exposure Draft dealing with some of these matters was released by the IASB at time of finalising this report – we have not reviewed it in any detail.*

- The building blocks for the discount rate and in particular the allowance for credit defaults/downgrades, illiquidity premium and sponsor's own credit risk.
- Allowance for expenses
- How the various member options and options for management to curtail liabilities should be taken into account.

10.58 To help inform this review, the IASB has asked the IAA to assist with some preliminary thinking. Work has started on examining the similarities and differences between pensions and insurance, and the implications of different approaches to measurement. The IAA has been developing thoughts on a number of approaches:

- An economic approach, where cash-flows are analysed between those that are vested and/or collateralised (via pension assets or contingent assets) and others, with different discount rates applying to each reflecting characteristics such as illiquidity, non-performance risk etc.
- A solvency approach, based on the principles of buy-out pricing in insurance companies, stripping out factors not consistent with the nature of pension liability cash-flows, and adding for the effect of solvency/funding requirements of local pensions law (and for the European countries, EU-wide pension law as well). An alternative, which should amount to the same thing if all else is consistent, is to start from the principles of accounting for insurance and adjust for the differences between pensions and insurance.
- A vehicle-specific approach, which looks through the vehicle used to deliver pension benefits as if there is a direct obligation from the sponsor. This would recognise that the vehicle used can change the nature of the cash-flows which the sponsor is obligated to provide, key considerations being credit and non-performance risks.
- An ERM approach, which looks at the pension scheme as part of the sponsor's business, with cash-flows modelled accordingly to recognise local funding rules etc and measured to provide consistency with accounting of core business assets and liabilities.
- An asset-liability approach, which looks at the expected development of the pension scheme's actual strategy over time, as well as the liabilities, to derive an appropriate risk-adjusted discount rate.

Other forces of convergence between insurance and pensions

10.59 Much of this new thinking in accounting is of course a reflection of developments in financial services leading to an increased convergence between pensions and insurance from the management, accounting and regulatory viewpoints, including

- The growth of new products and tools which provide new options in pensions, including the increased use of derivatives, and a growing pension transfer market forcing all those connected with the management of pensions, and users, to think more about gap between pension funding and insurance and capital market pricing.
- Increased use of ERM in financial firms, requiring the 'pension subsidiaries' of these firms at least to be managed as part of the core business.
- The treatment of own pension liabilities for banks and insurance companies being different from that for other firms.
- A forthcoming Green Paper on pensions to take forward the debate that has raged over the last few years on whether the interests of pension scheme members would be better served if the risks in pensions were regulated on the same principles as those in banks and insurance companies.

A Life Assurance: References

I. **Statutory valuation of liabilities as required under the Prudential Sourcebook for Insurers (INSPRU) and further comments:**

- INSPRU 1.1.16 R requires an insurance firm to establish adequate *technical provisions*.
- INSPRU 1.2 sets out rules and guidance as to the methods and assumptions to be used in calculating the mathematical reserves, which form the main component of the technical provisions for long-term insurance business. The rules and guidance set out the *minimum* basis for mathematical reserves. Methods and assumptions which produce reserves that can be demonstrated to be equal to or greater than the minimum basis may be used instead of the minimum basis, though the methods and assumptions must meet the basic requirements for prudence set out in INSPRU 1.2.7 R to INSPRU 1.2.27 G.
- The mathematical reserves must normally be established by calculating, on prudent assumptions, the present value of future net cash flows expected to arise under its long term insurance contracts.
- INSPRU 1.2.33 requires the valuation rates of interest that are used in calculating the mathematical reserves to be determined with margins for adverse deviation in accordance with INSPRU 3.1.28 R to 3.1.47 R, the key requirements of which are as follows:
  - 3.1.28: The valuation rate of interest must not exceed 97.5% of the risk-adjusted yields on assets held to back the liabilities, the reinvestment of the proceeds of those assets and the investment of future premium receipts.
  - Risk-adjusted yield is defined in 3.1.30 R and refers to yield after an adjustment for credit risk (described in 3.1.41 R). It requires associated hedging instruments to be taken into account and reasonable assumptions to be made about the exercise of options embedded in the assets.
  - 3.1.29: The rate of interest assumed must allow for rates of taxation that apply to investment return on the policyholder assets.
  - 3.1.34: Risk-adjusted yield is defined as a running yield for equities and real estate and the internal rate of return for all the other asset classes. Yields are combined using market values as the weightings. Internal rate of return is defined as being the rate of interest which, if used to calculate the present value of future pre-tax income, would produce a value equal to the market value.
  - [*There re 2 definitions of risk adjusted returns?? See text highlighted in yellow above and below*]
  - 3.1.36: The running yield for real estate is the ratio of rental income arising over the previous 12 months to the market value of the real estate. Account should be taken of any changes in the rental income known to have occurred by the valuation date.

- 3.1.37: For equities, running yield is based on current dividends and earnings, but taking into account known or forecast changes in dividends or earnings which have been publicly announced by the issuer by the valuation date. Running yield is defined as the greater of 1) the dividend yield; and 2) the sum of the dividend yield and the earnings yield divided by two.
- Both running yields and internal rates of return must be reduced to exclude any part of the yield that represents compensation for credit risk.
- 3.1.45: The maximum interest rate for which credit can be taken on future investment and re-investment (more than three years after the valuation date) is defined in 3.1.45 and must not be greater than 6.5% per annum or the long-term gilt yield if lower. The full specification is that the risk-adjusted yield must not exceed the lowest of a), b) and c), where these are defined as:
    (a) The higher of
        i. The long-term gilt yield; and
        ii. The greater of:
            A. The forwards gilts yield; and
            B. The forward rate on sterling interest rate swaps, reduced to exclude that part of the rate that represents compensation for credit risk; where the forward yields and forward rates corresponding to the time when the sums are expected to be received are weighted so as to reflect the investment and reinvestment characteristics of the liabilities covered;
    (b) 3% per annum, increased by two thirds of the excess, if any, of the percentage in (a) over 3% per annum
    (c) 6.5% per annum
- For investment and reinvestment income to be received within three years of the valuation date, the maximum yield has to be interpolated between the risk-adjusted yield on assets held at the valuation date and the risk-adjusted yield for more three years from the valuation date, calculated as above.
- No credit may be taken for future growth of income or capital from property and equities, which would usually be held to back liabilities for with-profits contracts. This introduces a potentially large margin for prudence and is seen as an implicit provision for future bonus (in particular terminal bonus).
- The Actuarial Profession issued GN8 to amplify and clarify the valuation requirements, originally of the Insurance Companies Regulations 1981, then the Insurance Companies Regulations 1994 and finally the FSA Prudential Sourcebook. This Guidance Note was adopted by the BAS on 19 May 2006 but has not been updated, so some of the references, which were to the FSA's Interim Prudential Sourcebook, are now no longer extant. A particular general principle set out in GN8 was the idea of hypothesising parts of the asset portfolio to particular segments of the liabilities in order to justify appropriate valuation rates of interest. This is taken up in GN45 (see below in relation to Peak 2 reserve calculations)

- Other BAS adopted standards, such as GN40 and GN 41, are concerned with the role of the actuarial function-holder and the with-profits actuary but they do not contain detailed valuation guidance. However, GN44 does provide guidance to the actuary which is supplementary to the Prudential Sourcebook. Section 4 in particular is relevant to decisions that have to be made about interest rate assumptions. It includes reference to hypothecation of assets to liabilities, allowing for accrued interest up to the valuation date in calculating the internal rate of return and allowing for credit risk
- GN45 provides some additional guidance in relation to taking credit for liquidity premiums, although this guidance note only applies to actuaries of life insurance firms required to determine a with-profits insurance capital component.

Realistic reserves / Peak 2 reserve calculations:

- Realistic reserves (or Peak 2 reserve calculations) are required for *realistic basis life firms*. A realistic basis life firm is defined in GENPRU 2.1.19 R as an insurer having with-profits liabilities in excess of £500m (unless it is a non-directive mutual). Insurers which are excluded under this definition may voluntarily opt to be treated as realistic basis life firms.
- GENPRU 2.1.18 R stipulates that the Capital Resources Requirement (CRR) for a life insurer is the higher of the Minimum Capital Requirement (MCR), traditionally known as the required minimum margin, in GENPRU 2.1.24A R and the Enhanced Capital Requirement (ECR) in GENPRU 2.1.38 R.
- The ECR is the sum of the long-term insurance capital requirement and the with-profits insurance capital component. In order to calculate this additional component a firm is required to carry out additional calculations of its liabilities on a realistic basis. Provisions relating to this are set out in INSPRU 1.3.
- The mathematical reserves, even for a realistic basis life firm, are not required to include provision for future annual bonuses or terminal bonuses. [*But there is reference later – in connection with PPFM - to a bonus reserve valuation, where presumably you would need to include an allowance for future bonuses?*]The idea of the ECR is that resources in addition to the mathematical reserves may be required to ensure that terminal bonuses can be awarded in such a way as to pay due regard to the interests of policyholders and treat them fairly.
- 1.3.37 R requires a firm to calculate the present value of future profits (or losses) on non-profit insurance contracts written in the with-profits fund using methodology and assumptions which are in accordance with generally accepted actuarial practice and are based, inter alia, on current estimates of future experience, involve reasonable (but not excessively prudent) adjustments to reflect risk and uncertainty and allow for a market-consistent valuation of any guarantees or options within the contracts valued. Assumptions should be derived from current market yields, having regard to International Financial Reporting Standard 4: Insurance Contracts (IFRS4 – see accounting section), as if it were being applied to determine the value under that standard

for the first time. In general, a firm should only include an allowance for future investment margins if its assumptions are limited to no more than a risk-free rate and the discount rate is set consistently. However, this does not preclude a firm from using a replicating portfolio of assets to determine the discount rate for the liability.

- The calculation of the realistic value of liabilities must reflect the firm's duty to treat customers fairly and be consistent with its Principles and Practices of Financial Management (PPFM). A retrospective (asset share) method may be used or a prospective (bonus reserve) method.
- 1.3.43 R requires a risk capital margin to be calculated, based on a range of scenarios for market risk, credit risk and persistency risk. Various market risk scenarios must be tested (1.3.62 R), including a rise or fall in yields on all fixed interest securities of up to 17.5% of the long-term gilt yield. 1.3.77 R to 1.3.93 R deal with scenarios in relation to credit risk and assumptions about the widening of credit spreads. 1.3.94 R to 1.3.97 G deal with credit risk in relation to reinsurance recoveries.
- In order to calculate the cost of any guarantees, options or smoothing, firms may use deterministic scenarios with allocated probabilities, a stochastic approach using a market-consistent asset model or the market costs of hedging the guarantee or option (1.3.169 R). Either market consistent risk neutral or deflator models are acceptable.
- For the purposes of INSPRU 1.3.169 R (1), a stochastic approach requires an appropriate market-consistent asset model for projections of asset prices and yields (such as equity prices, fixed interest yields and property yields), together with a dynamic model incorporating the corresponding value of liabilities and the impact of any foreseeable actions to be taken by management. Under the stochastic approach, the cost of the guarantee, option or smoothing would be equal to the average of these stochastic projections.
- There are no specific requirements laid down in the Prudential Sourcebook for assumptions, except that they should generally be realistic and include market-consistent valuation of options and guarantees. GN45 Determining the *With-Profits Insurance Capital Component*, adopted and amended by the Board for Actuarial Standards, provides some further guidance, for example in relation to the assumptions for determining the Present Value of Future Profits for Non-Profits insurance business, including the application of a liquidity premium (section 2.1.3).
- GN47 Stochastic Modelling of Economic Risks in Life Insurance deals with recommended practice for techniques of stochastic modelling, applicable for assessing the ECR under Peak 2, as well as for Individual Capital Assessment. Paragraph 2.4 indicates that it is equally appropriate to use a risk-neutral probability measure, discounting at risk-free rates, or any other measure (including 'real world' measures), discounting using consistent deflators.
- GN47 requires that any stochastic approach used for valuing guarantees, options and smoothing when calculating the With-profits Insurance Capital Component should be 'market-consistent' and deliver prices for assets and liabilities that can be directly

verified from the market. It should deliver market-consistent prices for those assets that reflect the nature and term of the with-profits insurance liabilities. Underlying model structures should be arbitrage-free. The model should be one that has been shown to reproduce option features as at the valuation date sufficiently accurately.

Individual Capital Assessment

- In CP136, published in May 2002, the FSA set out plans for a wide range of firms to carry out a self assessment of their own capital requirements, having regard to their risks, business profile and systems and controls.
- Individual Capital Assessment (ICA) was effective from 1 January 2005, although some firms were required to prepare an ICA during 2004.
- ICA is covered by Chapter 7 of the Prudential Sourcebook. The requirement harks back to some fundamental rules in GENPRU, such as 1.2.26, which states that a firm must at all times maintain overall financial resources, including capital resources and liquidity resources, which are adequate, both as to amount and quality, to ensure that there is no significant risk that its liabilities cannot be met as they fall due.
- Rule 1.2.30R expands further to state that:

A *firm* must have in place sound, effective and complete processes, strategies and systems:

(1) To assess and maintain on an ongoing basis the amounts, types and distribution of financial resources, capital resources and internal capital that it considers adequate to cover:

(a) The nature and level of the risks to which it is or might be exposed;

(b) The risk in the overall financial adequacy rule; and

(c) The risk that the firm might not be able to meet its *CRR* in the future; and

(2) That enable it to identify and manage the major sources of risks referred to in (1), including the major sources of risk in each of the following categories where they are relevant to the firm given the nature and scale of its business:

(a) Credit risk;
(b) Market risk;
(c) Liquidity risk;
(d) Operational risk;
(e) Insurance risk;
(f) Concentration risk;
(g) Residual risk;
(h) Securitisation risk;
(i) Business risk;
(j) Interest rate risk;

(k) Pension obligation risk; and
(l) Group risk.

- GENPRU sets out in more detail in rule 1.2.42R the requirement for a firm to carry out stress tests and scenario analyses and identify an appropriate range of adverse circumstances of varying nature, severity and duration relevant to its business and risk profile and consider the exposure of the *firm* to those circumstances.
- The requirement for an Individual Capital Assessment in INSPRU7 is seen as a separate requirement from the general stress-test requirement in GENPRU 1.2.42, since it is focused on the firm's own assessment, including other forms of capital on which the firm may be relying which are not taken into account for the purposes of meeting the minimum capital resources requirement.
- In any case, both the stress-testing requirement of GENPRU 1.2.42 and the ICA requirement of INSPRU7 require the firm to model the future behaviour of the portfolio in a variety of circumstances. The focus of both of these exercises is on projecting forward and testing what current level of capital is needed to ensure with a sufficiently high level of probability that the resources will prove adequate in the stress scenarios. There is no requirement to discount the cash-flows back to the assessment date and therefore the exercise is not one which makes use of discount rates as such, although the economic and market scenarios used to project forward are the accumulation equivalent of discounting, so there is still an underlying interest rate model.
- Rule 7.1.36 of INSPRU states that, where possible, the value of the assets should be marked to market and that the valuation of assets and liabilities should reflect their economic substance, be realistic and not contain explicit margins for risk or bias towards optimism. The valuation of liabilities should be consistent with the valuation of assets, in other words a market-consistent basis.
- Further recommendations (but not mandatory standards) are contained in GN46: Individual Capital Assessment and GN47: Stochastic Modelling of Economic Risks in Life Insurance. These GNs, originally drafted by the profession, have been adopted by the Board for Actuarial Standards.
- Paragraph 2.4 of GN47 states that it is equally appropriate to use a risk-neutral probability measure, discounting at risk-free rates, or any other measure (including 'real world' measures), and discounting using consistent deflators. In other words the actuary is not constrained to any particular approach, provided that the overall structure of the model is market-consistent. There is some degree of discretion as to what is considered risk free. As in the case of Peak 1 technical reserves, it is regarded as appropriate to assume a liquidity premium over a risk-free rate to allow for instruments that are less marketable.
- The liabilities in respect of with-profits business should be based on realistic assumptions about the future evolution of bonuses in a way consistent with the firm's Principles and Practice of Financial Management.

- The cost of financial guarantees is explicitly allowed for in the stochastic projections
- The ICA report must consider an assessment focused on achieving, over a one-year timeframe, a 99.5% confidence level that the value of assets exceeds the value of liabilities. However, the firm may also carry out assessments using different confidence levels (7.1.49R of INSPRU).
- The current ICA requirements will be superseded by Solvency II, which has its own version of ICA, known as Own Risk and Solvency Assessment (ORSA). This is discussed further in the section on Solvency II under Current Developments.

Companies Act requirements for accounting for life insurance technical provisions

Turning to the Companies Act requirements, SI 2008 No. 410 – The Large and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008, paragraphs 53 and 54 of Schedule 3 to Regulation 6(1) deal specifically with life insurance business as follows (set in the context of the general paragraphs on technical provisions, which are paragraphs 48 and 49):

Preliminary

48. Provisions which are to be shown in a company's accounts are to be determined in accordance with this Section.

Technical provisions

49. The amount of technical provisions must at all times be sufficient to cover any liabilities arising out of insurance contracts as far as can reasonably be foreseen.

Long-term business provision

52.—(1) The long-term business provision must in principle be computed separately for each long-term contract, save that statistical or mathematical methods may be used where they may be expected to give approximately the same results as individual calculations.

(2) A summary of the principal assumptions in making the provision under sub-paragraph (1) must be given in the notes to the accounts.

(3) The computation must be made annually by a Fellow of the Institute or Faculty of Actuaries on the basis of recognised actuarial methods, with due regard to the actuarial principles laid down in Directive 2002/83/EC of the European Parliament and of the Council of 5th November 2002 concerning life assurance.

Long-term business

55. The amount of the provision for claims must be equal to the sums due to beneficiaries, plus the costs of settling claims.

DIRECTIVE 2009/138/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) (recast)

SECTION 2
RULES RELATING TO TECHNICAL PROVISIONS

Article 76
General provisions

1. Member States shall ensure that insurance and reinsurance undertakings establish technical provisions with respect to all of their insurance and reinsurance obligations towards policy holders and beneficiaries of insurance or reinsurance contracts.

2. The value of technical provisions shall correspond to the current amount insurance and reinsurance undertakings would have to pay if they were to transfer their insurance and reinsurance obligations immediately to insurance or reinsurance undertaking.

3. The calculation of technical provisions shall make use of and be consistent with information provided by the financial markets and generally available data on underwriting risks (market consistency).

4. Technical provisions shall be calculated in a prudent, reliable and objective manner.

5. Following the principles set out in paragraphs 2, 3 and 4 and taking into account the principles set out in Article 75(1), the calculation of technical provisions shall be carried out in accordance with Articles 77 to 82 and 86.

Article 77
Calculation of technical provisions

1. The value of technical provisions shall be equal to the sum of a best estimate and a risk margin as set out in paragraphs 2 and 3.

2. The best estimate shall correspond to the probability-weighted average of future cash-flows, taking account of the time value of money (expected present value of future cash-flows), using the relevant risk-free interest rate term structure.

The calculation of the best estimate shall be based upon up-to-date and credible information and realistic assumptions and be performed using adequate, applicable and relevant actuarial and statistical methods.

The cash-flow projection used in the calculation of the best estimate shall take account of all the cash in- and out-flows required to settle the insurance and reinsurance obligations over the lifetime thereof.

The best estimate shall be calculated gross, without deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles. Those amounts shall be calculated separately, in accordance with Article 81.

3. The risk margin shall be such as to ensure that the value of the technical provisions is equivalent to the amount that insurance and reinsurance undertakings would be expected to require in order to take over and meet the insurance and reinsurance obligations.

4. Insurance and reinsurance undertakings shall value the best estimate and the risk margin separately.

However, where future cash flows associated with insurance or reinsurance obligations can be replicated reliably using financial instruments for which a reliable market value is observable, the value of technical provisions associated with those future cash flows shall be determined on the basis of the market value of those financial instruments. In this case, separate calculations of the best estimate and the risk margin shall not be required.

5. Where insurance and reinsurance undertakings value the best estimate and the risk margin separately, the risk margin shall be calculated by determining the cost of providing an amount of eligible own funds equal to the Solvency Capital Requirement necessary to support the insurance and reinsurance obligations over the lifetime thereof.

The rate used in the determination of the cost of providing that amount of eligible own funds (Cost-of-Capital rate) shall be the same for all insurance and reinsurance undertakings and shall be reviewed periodically.

The Cost-of-Capital rate used shall be equal to the additional rate, above the relevant risk-free interest rate, that an insurance or reinsurance undertaking would incur holding an amount of eligible own funds, as set out in Section 3, equal to the Solvency Capital Requirement necessary to support insurance and reinsurance obligations over the lifetime of those obligations.

Article 78
Other elements to be taken into account in the calculation of technical provisions

In addition to Article 77, when calculating technical provisions, insurance and reinsurance undertakings shall take account of the following:

(1) All expenses that will be incurred in servicing insurance and reinsurance obligations;

(2) Inflation, including expenses and claims inflation;

(3) all payments to policy holders and beneficiaries, including future discretionary bonuses, which insurance and reinsurance undertakings expect to make, whether or not those payments are contractually guaranteed, unless those payments fall under Article 91(2).

Article 79
Valuation of financial guarantees and contractual options included in insurance and reinsurance contracts

When calculating technical provisions, insurance and reinsurance undertakings shall take account of the value of financial guarantees and any contractual options included in insurance and reinsurance policies.

Any assumptions made by insurance and reinsurance undertakings with respect to the likelihood that policy holders will exercise contractual options, including lapses and surrenders, shall be realistic and based on current and credible information. The assumptions shall take account, either explicitly or implicitly, of the impact that future changes in financial and non-financial conditions may have on the exercise of those options.

Article 80
Segmentation

Insurance and reinsurance undertakings shall segment their insurance and reinsurance obligations into homogeneous risk groups, and as a minimum by lines of business, when calculating their technical provisions.

Article 81
Recoverables from reinsurance contracts and special purpose vehicles

The calculation by insurance and reinsurance undertakings of amounts recoverable from reinsurance contracts and special purpose vehicles shall comply with Articles 76 to 80.

When calculating amounts recoverable from reinsurance contracts and special purpose vehicles, insurance and reinsurance undertakings shall take account of the time difference between recoveries and direct payments.

The result from that calculation shall be adjusted to take account of expected losses due to default of the counterparty. That adjustment shall be based on an assessment of the probability of default of the counterparty and the average loss resulting therefrom (loss-given-default).

Article 82
Data quality and application of approximations, including case-by-case approaches, for technical provisions

Member States shall ensure that insurance and reinsurance undertakings have internal processes and procedures in place to ensure the appropriateness, completeness and accuracy of the data used in the calculation of their technical provisions.

Where, in specific circumstances, insurance and reinsurance undertakings have insufficient data of appropriate quality to apply a reliable actuarial method to a set or subset of their insurance and reinsurance obligations, or amounts recoverable from reinsurance contracts and special purpose vehicles, appropriate approximations, including case-by-case approaches, may be used in the calculation of the best estimate.

Article 83
Comparison against experience

Insurance and reinsurance undertakings shall have processes and procedures in place to ensure that best estimates, and the assumptions underlying the calculation of best estimates, are regularly compared against experience.

Where the comparison identifies systematic deviation between experience and the best estimate calculations of insurance or reinsurance undertakings, the undertaking concerned shall make appropriate adjustments to the actuarial methods being used and/or the assumptions being made.

Article 84
Appropriateness of the level of technical provisions

Upon request from the supervisory authorities, insurance and reinsurance undertakings shall demonstrate the appropriateness of the level of their technical provisions, as well as the applicability and relevance of the methods applied, and the adequacy of the underlying statistical data used.

Article 85
Increase of technical provisions

To the extent that the calculation of technical provisions of insurance and reinsurance undertakings does not comply with Articles 76 to 83, the supervisory authorities may require insurance and reinsurance undertakings to increase the amount of technical provisions so that they correspond to the level determined pursuant to those Articles.

Article 86
Implementing measures

The Commission shall adopt implementing measures laying down the following:

(a) Actuarial and statistical methodologies to calculate the best estimate referred to in Article 77(2);

(b) The relevant risk-free interest rate term structure to be used to calculate the best estimate referred to in Article 77(2);

(c) the circumstances in which technical provisions shall be calculated as a whole, or as a sum of a best estimate and a risk margin, and the methods to be used in the case where technical provisions are calculated as a whole;

(d) the methods and assumptions to be used in the calculation of the risk margin including the determination of the amount of eligible own funds necessary to support the insurance and reinsurance obligations and the calibration of the Cost-of-Capital rate;

(e) the lines of business on the basis of which insurance and reinsurance obligations are to be segmented in order to calculate technical provisions;

(f) the standards to be met with respect to ensuring the appropriateness, completeness and accuracy of the data used in the calculation of technical provisions, and the specific circumstances in which it would be appropriate to use approximations, including case-by-case approaches, to calculate the best estimate;

(g) the methodologies to be used when calculating the counterparty default adjustment referred to in Article 81 designed to capture expected losses due to default of the counterparty;

(h) Where necessary, simplified methods and techniques to calculate technical provisions, in order to ensure the actuarial and statistical methods referred to in points (a) and (d) are proportionate to the nature, scale and complexity of the risks supported by insurance and reinsurance undertakings including captive insurance and reinsurance undertakings.

Those measures, designed to amend non-essential elements of this Directive by supplementing it, shall be adopted in accordance with the regulatory procedure with scrutiny referred to in Article 301(3).

FRS27 Life Assurance

SUMMARY

a Financial Reporting Standard 27 applies to all entities that have a life assurance business, including a life reinsurance business.

b For large UK with-profits life assurance businesses falling within the scope of the FSA's realistic capital regime, liabilities to policyholders are required by the FRS to be measured on the basis determined in accordance with that regime, subject to adjustments specified in the FRS. Further adjustments are made to related assets and deferred tax for consistency with the measurement of the realistic liabilities, and the resulting effect on profit and loss account is offset by a corresponding transfer to the fund for future appropriations or, in the case of a mutual, to retained surplus.

……..

SCOPE

3 The FRS applies to all financial statements that are intended to give a true and fair view of a reporting entity's financial position and profit and loss (or income and expenditure) for a period, where the reporting entity includes a business that is a life assurance business (including reinsurance business).

LIFE ASSURANCE LIABILITIES AND ASSETS

Measurement of with-profits liabilities and related assets

4 For with-profits life funds falling within the scope of the FSA realistic capital regime:

(a) liabilities to policyholders arising from with-profits life assurance business shall be stated at the amount of the realistic value of liabilities adjusted to exclude the shareholders' share of projected future bonuses;

(b) acquisition costs shall not be deferred;

(c) reinsurance recoveries that are recognised shall be measured on a basis that is consistent with the value of the policyholder liabilities to which the reinsurance applies;

(d) an amount may be recognised for the present value of future profits on non-participating business written in a with-profits fund if:

(i) the non-participating business is measured on this basis for the purposes of the regulatory returns made under the FSA realistic capital regime;
(ii) the value is determined in accordance with the FSA regulations; and
(iii) the determination of the realistic value of liabilities in that with-profits fund takes account, directly or indirectly, of this value;

(e) where a with-profits life fund has an interest in a subsidiary or associated entity that is valued for FSA regulatory purposes at an amount in excess of the net amounts included in the entity's consolidated accounts, an amount may be recognised representing this excess if the determination of the realistic value of liabilities to with-profits policyholders takes account of this value; and

(f) adjustments to reflect the consequential tax effects of (a) to (e) above shall be made.

Adjustments from the modified statutory solvency basis necessary to meet the above requirements, including the recognition of an amount in accordance with paragraph 4(d) or 4(e), shall be included in the profit and loss account. An amount equal and opposite to the net amount of these adjustments shall be transferred to or from the FFA[3] (or, in the case of a mutual, its retained surplus) and also included in the profit and loss account.

5 Amounts recognised under paragraph 4(d) or 4(e) shall be presented in one of the following ways:

(a) Where it is possible to apportion the amount recognised under paragraph 4(d) or 4(e) between an amount relating to liabilities to policyholders and an amount relating to the FFA, these portions shall be presented in the balance sheet as a deduction in arriving at the amount of liabilities to policyholders and the FFA respectively.

(b) Where it is not possible to make a reasonably approximate apportionment of the amount recognised under paragraph 4(d) or 4(e), the amount shall be presented on the balance sheet as a separate item deducted from a sub-total of liabilities to policyholders and the FFA.

(c) Where the presentation under 5(a) or 5(b) does not comply with statutory requirements for balance sheet presentation applying to the entity, the amount recognised under paragraph 4(d) or 4(e) shall be recognised as an asset.

6 The established accounting treatment for UK life assurance business is to measure liabilities for policyholder benefits on the modified statutory solvency basis (MSSB). The FRS does not require any change to the accounting for those funds not within the scope of the FSA realistic capital regime, but requires those UK with-profits funds that fall under that regime to use the realistic value of liabilities as the basis for the estimated value of the liabilities to be included in the financial statements. Where the entity's returns to the FSA have not been completed at the time of completion of the financial statements, an estimate of the amount may be used provided it is in accordance with the FSA regulations.

7 An entity may, but is not required to, adopt the requirements of paragraph 4 for UK with-profits funds that do not fall within the scope of the FSA realistic capital regime or for which the FSA has granted a full waiver from compliance with this regime.

[3] *The **Fund for Future Appropriations (FFA)** is the balance sheet item required by Schedule 9A to the Companies Act 1985 to comprise all funds the allocation of which, either to policyholders or to shareholders, has not been determined by the end of the accounting period.*

ABI Statement of Recommended Practice on Accounting for Insurance Business (SORP) December 2005 (as amended in December 2006)[4], paragraphs 144 – 146 and 178 – 192

Scope

144 Except in the case of contracts issued by insurance undertakings falling within the scope of FRS 26 which do not satisfy the definition of an insurance contract or contain a discretionary participation feature and with-profits life insurance business which, by virtue of falling within the scope of the FSA realistic capital regime, is subject to paragraph 4 of FRS 27, paragraphs **163** to **217** will apply in full.

145 Where and to the extent that an insurance undertaking carries on with-profits life insurance business falling within the scope of FRS 27, the following provisions of the SORP are superseded by the requirements of FRS 27:
• Paragraph **170** to **177** (deferred acquisition costs)
• Paragraphs **180** to **183** (determination of the long term business provision)
• Paragraph **185** (allowance for future bonuses) insofar as future bonuses are recognised in the calculation of the realistic liabilities
• Paragraph **186** (net premium method)
• Paragraph **196** (exclusion of certain regulatory margins from the long term business provision);

146 However, non-participating life insurance contracts written within, or by a subsidiary or associate of, a with-profits fund subject to FRS 27 will be subject to paragraphs **163** to **217** of this statement if they fall to be accounted for as insurance contracts, and paragraphs **158** to **162** will apply if under FRS 26 they are required to be accounted for as investment contracts.

Technical Provisions

178 Under Schedule 9A to the CA85, technical provisions in respect of long term business are analysed as follows:-
- Long term business provision;
- Technical provisions for linked liabilities; and
- Claims outstanding.

Balance sheet liabilities item C4 (Provision for bonuses and rebates) and line II.7 (Bonuses and rebates, net of reinsurance) in the technical account for long-term business should not be used.
Bonuses attributable to the accounting period, other than those included within claims paid in accordance with paragraphs **166** and **167**, should be included in line II.6 (a) (Change in other technical provisions - long term business provision) and in Balance Sheet Liabilities item C.2 (Long term business provision).

[4] *Source: http://www.abi.org.uk/Information/Codes_and_Guidance_Notes/40593.pdf*

Long Term Business Provision

179 Paragraph 46(3) of Part I of Schedule 9A to the CA85 requires the computation of the LTBP of UK business to be made annually by a Fellow of the Institute or Faculty of Actuaries on the basis of recognized methods, with due regard to the actuarial principles laid down in the EU Third Life Directive (92/96/EEC).

180 The *gross premium method* should be used for every class of insurance business except those for which the net premium method is used in the related regulatory returns, but policyholder liabilities of overseas subsidiaries may be computed on a local basis subject to paragraph **202**.

181 The method of valuation used for each principal category of insurance business should be disclosed in the notes to the accounts together with a summary of the principal assumptions made in accordance with paragraph **184**. In the case of overseas subsidiaries, the computation shall be prepared by an actuary or other specialists using recognized actuarial methods. Guidance on the extent to which the local bases of reporting can be incorporated in group accounts is contained in paragraph **202**. Paragraph 43 of Part I of Schedule 9A to the CA85 requires the long term business provision to be at all times sufficient to cover any liabilities arising out of insurance contracts as far as can reasonably be foreseen.

182 Liabilities should be assessed on a basis consistent with the bases adopted for valuing the corresponding assets. In determining the long-term business provision and the technical provision for linked liabilities, no policy may have an overall negative provision except as allowed by FSA rules or a provision, which is less than any guaranteed surrender or transfer value.

183 Having regard to the adjustment referred to in paragraph **172** and the need for consistency in paragraph **182**, the long term business provision may be calculated on the basis used for reporting under FSA rules subject to:

• Reassessment of the provisions and reserves included in the statutory liabilities for solvency purposes to consider the extent to which they should be included in the long-term business provision. This will require the exclusion of the appropriate proportion of reserves (such as investment reserves, reserves to cover general contingencies and reserves to cover the specific contingency of the fund being closed to new business). Any amount in excess of the necessary provision should be disclosed in the financial statements as a reserve or in the fund for future appropriations as appropriate;

• The reversal of any reduction in policyholder liabilities in the regulatory returns where these liabilities already implicitly take account of a pension fund surplus through future expense assumptions, which reflect, lower expected contributions.

184 Paragraph 46(2) of Part I of Schedule 9A to the CA85 requires that a summary of the principal assumptions underlying the long-term business provision should be given. This would include for each principal category of business the more significant assumptions relating to the following:
• premiums;
• persistency;
• mortality and morbidity;
• interest rates;
• the discount rates used with, if relevant, explanation of the basis of reflecting risk margins; and
• if applicable, any other significant factors.
There should be a brief discussion (which may be qualitative) of:
• any changes in significant assumptions or bases of preparation; and
• the sensitivity of the amount reported with respect to changes in the principal assumptions or bases of preparation.
(See also the disclosure requirements in paragraph **240**.)

185 For each significant class of with-profits insurance business, the insurer should disclose the extent to which the basis of preparation of the long-term business provision incorporates allowance for future bonuses. For example, it should be stated (if it is the case) that explicit provision is made only for vested bonuses (including those vesting following the current valuation) and that no such provision is made for future regular or terminal bonuses. If practical, and it can be done without undue cost, insurers should disclose the amount that has been included explicitly in the long-term business provision in relation to future bonuses. If the valuation method makes implicit allowance for future bonuses by adjusting the discount rate used or by another method, this fact should be stated together with a broad description of the means by which such allowance is made.

186 Where the valuation is performed using a net premium method, bonuses should be included in the long-term business provision only if they have vested or have been declared as a result of the current valuation.

187 The aggregate of the bonuses added to policies in the accounting period should be disclosed by way of note to the financial statements.

188 Where the long-term business provision has been determined on an actuarial basis that, in assessing the future net cash flows, has regard to the timing of tax relief where assumed expenses exceed attributable income, the entity should ensure that such tax relief is excluded from the determination of any deferred taxation requirement.

189 Where the technical provision for linked liabilities has regard to the timing of the tax obligation, the effect of this should be excluded from the determination of any deferred tax requirement.

Technical Provisions for Linked Liabilities

190 The relevant provision for any contract should not be less than the element of any surrender or transfer value which is calculated by reference to the relevant fund or funds or index.

191 The net assets held to cover linked liabilities at the balance sheet date may differ from the technical provisions for linked liabilities. The reasons for any significant mismatching should be disclosed. In practice this should apply only to overseas companies included in group financial statements because of the requirements of PRU 4.2.57 of the FSA rules.

Claims Outstanding

192 Amounts included under balance sheet liabilities item C3 (claims outstanding) should include claims in relation to both linked and non-linked business.

CFO Forum: Market Consistent Embedded Value Principles (October 2009)
(http://www.cfoforum.nl/embedded_value.html#principles)

INVESTMENT RETURNS AND DISCOUNT RATES

***Principle 13**: VIF[5] should be discounted using discount rates consistent with those that would be used to value such cash flows in the capital markets.*

G13.1 Where cash flows do not depend on, or vary linearly with market movements, an alternative method can be used which assumes that assets earn, before tax and investment management expenses, *reference rates* as defined in *Principle* 14 and all the cash flows are discounted using *reference rates* which are gross of tax and investment management expenses.

G13.2 Where cash flows contain *financial options and guarantees* such that they do not move linearly with market movements, asset cash flows can be projected and all cash flows discounted using risk-neutral stochastic models. Alternative approaches, for example using deflators, may also be used. In either method, the *reference rates* should be used as risk free rates.

REFERENCE RATES

***Principle 14**: The **reference rate** is a proxy for a risk free rate appropriate to the currency, term and liquidity of the liability cash flows.*

- *Where the liabilities are liquid the reference rate should, wherever possible, be the swap yield curve appropriate to the currency of the cash flows.*
- *Where the liabilities are not liquid the reference rate should be the swap yield curve with the inclusion of a liquidity premium, where appropriate.*

G14.1 In evaluating the appropriateness of the inclusion of a liquidity premium (where liabilities are not *liquid)* consideration may be given to regulatory restrictions, internal constraints or investment policies which may limit the ability of a company to access the liquidity premium.

G14.2 Where the available financial market data used to set the *reference rate* is shorter than the projected liability cash flows, the data should be extended using an appropriate methodology, for example:

- Assuming that either spot or forward rates remain level at the longest available term; or
- If there exists a relevant government bond yield curve which is longer than the financial market data used to set the *reference rate*, this could be used to extend the data by maintaining a constant margin from the end of the available data and assuming it remains level thereafter.

[5] *VIF stands for Value of In-force Business*.

G14.3 Where the financial market data used to set the *reference rate* is not available at all durations between the longest and shortest, the intermediate data points can be calculated by interpolation using an appropriate methodology. If the financial market data used to set the *reference rate* is not available at the very short end, other appropriate market information should be used instead.

G14.4 Where a company invests in fixed-income assets which have a yield different to the *reference rates*, the company should make appropriate adjustments to the projected asset cash flows to ensure that the asset cash flows, discounted at the *reference rates*, equal the market value of the assets.

G14.5 Where companies have businesses in territories and or currencies where swap curves do not exist or do not provide a robust basis for producing *reference rates* then a more appropriate alternative, such as the government bond yield curve, may be used.

STOCHASTIC MODELS

Principle 15*: Stochastic models and the associated parameters should be appropriate for the covered business being valued, internally consistent and, where appropriate, based on the most recent market data. Volatility assumptions should, wherever possible, be based on those implied from derivative prices rather than the historical observed volatilities of the underlying instruments.*

G15.1 Stochastic models should cover all material asset classes.

G15.2 The calibration of the model should be based on market values such as equity option implied volatilities, swaption implied volatilities and the initial swap rate curve for market-traded contracts that are as similar as possible in nature to the option and guarantees contained within the liabilities. The model should reproduce these values to a high degree of accuracy.

G15.3 Volatility assumptions should be based on the most recently available information as at the valuation date. Where there are concerns over the depth or liquidity of the market or if the market displayed unusual characteristics as at the valuation date then less recently observed measures and expert opinion should be considered.

B General Insurance: References

I. Insurance Companies Regulations 1994

Prior to the FSA taking on full responsibility for setting the regulatory requirements for insurance companies, reserving requirements were set out in the Insurance Companies Regulations 1994 (SI 1994 No.1516). The requirements for general insurance companies were very brief compared to life insurers and essentially required technical provisions to be established in accordance with generally accepted accounting practices.

Regulation 60 applied to both life and general insurance companies and stated:

60.—(1) Subject to this Part of these Regulations, the amount of liabilities of an insurance company in respect of long term and general business shall be determined in accordance with generally accepted accounting concepts, bases and policies or other generally accepted methods appropriate for insurance companies.

(2) In determining under paragraph (1) above the amount of liabilities of an insurance company, all contingent and prospective liabilities shall be taken into account but save as provided in regulation 23(3) of these Regulations not liabilities in respect of share capital.

Regulation 62 stated

62. The amount of the general business liabilities shall be determined in compliance with the rules laid down in Section D of Schedule 9A to the Companies Act 1985.

This set a pattern which still persists today, namely that general insurance provisions follow Companies Act requirements and generally accepted accounting principles, rather than special regulatory rules.

II. Statutory valuation of liabilities as required under the *Prudential Sourcebook for Insurers* (INSPRU/GENPRU) and further comments:

- INSPRU 1.1.12 R requires an insurance firm to establish adequate *technical provisions* for general insurance business in accordance with the rules in INSPRU 1.4 for equalisation provisions and otherwise in accordance with GENPRU 1.3.4R.
- GENPRU 1.3.4R requires firms to recognise the asset, liability, *exposure*, equity or income statement item and measure its value in accordance with whichever of the following are applicable:

  (1) The *insurance accounts rules*, or the Friendly Societies (Accounts and Related Provisions) Regulations 1994;

  (2) Financial Reporting Standards and Statements of Standard Accounting Practice issued or adopted by the Accounting Standards Board;

(3) Statements of Recommended Practice, issued by industry or sectoral bodies recognised for this purpose by the Accounting Standards Board;

(4) The Building Societies (Accounts and Related Provisions) Regulation 1998;

(5) *International accounting standards*;

(6) The Companies Act 1985; and

(7) The Companies Act 2006; as applicable to the *firm* for the purpose of its external financial reporting (or as would be applicable if the *firm* was a company with its head office in the *United Kingdom*).

In other words the FSA regulatory framework relies on Companies Act requirements and the Statement of Recommended Practice (SORP) issued by the insurance industry (item (3) of the above list), since the Accounting Standards Board has not issued any specific standard on insurance accounting and the FSA Prudential Sourcebook does not offer any more detailed guidance.

The accounting framework for general insurance business is summarised in HMRC guidance as follows:

III. GIM2180 – Accounting framework: discounting of provisions or reserves

Discounting is the practice of taking account of the time value of money and has potential relevance to the making of provisions. A liability to pay £1,000 in five years' time is less onerous than a liability to pay £1,000 today, because the £1,000 can earn interest in the meantime, and this can be recognised by discounting the future liability back to its present value, using an appropriate discount rate.

Paragraph 53(7) of Schedule 3 to the accounting Regulations (SI 2008 No.410) prohibits implicit discounting; that is, placing a current value on a claim which is expected be settled at a higher value in the future, for example by not taking account of anticipated inflation.

Paragraph 54 does allow explicit discounting of outstanding claims in certain narrowly prescribed circumstances. The expected average interval between the date for the settlement of claims being discounted and the accounting date must be at least four years. The discounting must also

- be on a recognised prudential basis;
- take account of all possible increases in costs;
- be based on a reliable model of claim settlement; and
- be based on a prudent rate of interest.

Discounting of claim provisions is consequently uncommon in the UK, although developing regulatory (Solvency II) and reporting (IFRS Phase II) standards are moving towards compulsory discounting plus an explicit risk margin.

Section 107 of Finance Act 2000 contained rules designed to compensate mechanically for the setting of provisions that failed to reflect all the relevant circumstances, including discounting. These rules were found to be onerous to operate and were repealed by Schedule 11 of Finance Act 2007 and replaced by a rule which limits provisions to an 'appropriate amount' (see *GIM6000*).

IV. Companies Act requirements for accounting for general insurance technical provisions

Turning to the Companies Act requirements, SI 2008 No. 410 – The Large and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008, paragraphs 53 and 54 of Schedule 3 to Regulation 6(1) deal specifically with general insurance business as follows (set in the context of the general paragraphs on technical provisions, which are paragraphs 48 and 49):

Preliminary

48. Provisions which are to be shown in a company's accounts are to be determined in accordance with this Section.

Technical provisions

49. The amount of technical provisions must at all times be sufficient to cover any liabilities arising out of insurance contracts as far as can reasonably be foreseen.

Provisions for claims outstanding

General business

53.—(1) A provision must in principle be computed separately for each claim on the basis of the costs still expected to arise, save that statistical methods may be used if they result in an adequate provision having regard to the nature of the risks.

(2) This provision must also allow for claims incurred but not reported by the balance sheet date, the amount of the allowance being determined having regard to past experience as to the number and magnitude of claims reported after previous balance sheet dates.

(3) All claims settlement costs (whether direct or indirect) must be included in the calculation of the provision.

(4) Recoverable amounts arising out of subrogation or salvage must be estimated on a prudent basis and either deducted from the provision for claims outstanding (in which case if the amounts are material they must be shown in the notes to the accounts) or shown as assets.

(5) In sub-paragraph (4), "subrogation" means the acquisition of the rights of policy holders with respect to third parties, and "salvage" means the acquisition of the legal ownership of insured property.

(6) Where benefits resulting from a claim must be paid in the form of annuity, the amounts to be set aside for that purpose must be calculated by recognised actuarial methods, and paragraph 54 does not apply to such calculations.

(7) Implicit discounting or deductions, whether resulting from the placing of a current value on a provision for an outstanding claim which is expected to be settled later at a higher figure or otherwise effected, is prohibited.

54.—(1) Explicit discounting or deductions to take account of investment income is permitted, subject to the following conditions—

(a) the expected average interval between the date for the settlement of claims being discounted and the accounting date must be at least four years;

(b) the discounting or deductions must be effected on a recognised prudential basis;

(c) when calculating the total cost of settling claims, the company must take account of all factors that could cause increases in that cost;

(d) the company must have adequate data at its disposal to construct a reliable model of the rate of claims settlements;

(e) the rate of interest used for the calculation of present values must not exceed a rate prudently estimated to be earned by assets of the company which are appropriate in magnitude and nature to cover the provisions for claims being discounted during the period necessary for the payment of such claims, and must not exceed either—

(i) a rate justified by the performance of such assets over the preceding five years, or

(ii) a rate justified by the performance of such assets during the year preceding the balance sheet date.

(2) When discounting or effecting deductions, the company must, in the notes to the accounts, disclose—

(a) the total amount of provisions before discounting or deductions,

(b) the categories of claims which are discounted or from which deductions have been made,

(c) for each category of claims, the methods used, in particular the rates used for the estimates referred to in sub-paragraph (1)(d) and (e), and the criteria adopted for estimating the period that will elapse before the claims are settled.

V. ABI Statement of Recommended Practice on Accounting for Insurance Business (SORP) December 2005 (as amended in December 2006)[6], paragraphs 104 – 113

104 Paragraph 47(7) of Part I of Schedule 9A to the CA85[7] prohibits implicit discounting of claims provisions. Explicit discounting of claims provisions to recognise the time value of money is permissible only if the preconditions laid down in Paragraph 48 of Part I of Schedule 9A to the CA85 are satisfied, and the disclosures required by that paragraph are made. Explicit discounting will not affect the total charge to the technical account over time, but will affect the timing of the recognition of that charge.

105 Paragraph 48(1)(a) of Part I of Schedule 1 to Schedule 9A to the CA85 requires that explicit discounting may only be applied where the expected average interval between the date for the settlement of claims being discounted and the accounting date is at least four years. The four-year test should be applied by reference to the end of each accounting period in respect of all claims outstanding at that time, and not just once in the accounting period in which the claims were incurred.

106 Where applied, explicit discounting should normally be adopted by reference to categories of claims (with similar characteristics but not solely by length of settlement pattern) rather than to individual claims.

107 The calculation of the average interval referred to in paragraph 105 above should be weighted on the basis of expected claims before any deduction for reinsurance.

108 Discounting should be considered only if there is adequate data available to construct a reliable model of the rate of claims settlement. The principal factors to be considered are the amount of future claims settlements, the timing of future cash flows and the discount rate. A cautious approach should be taken to ensure a sufficient level of reliability in the construction of the claims settlement pattern. Procedures should be undertaken to assess the accuracy of the claims settlement pattern predicted by the model in previous periods and the current model should be adjusted, as appropriate, to reflect the out-turn and conclusions of analyses in the previous period. Cash flows should be modelled gross and net of reinsurance as reinsurance recoveries may arise later than the related claims payments.

109 As required by law, discounting should be applied only where assets (excluding those attributable to shareholders' funds) are available which are appropriate in magnitude and nature to cover the liabilities discounted. The discount rate must comply with the requirement of Paragraph 48(1)(e) of Part I of Schedule 9A to the CA85. In particular, it should not exceed a rate expected to be earned by assets of the undertaking which are

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[6] *Source: http://www.abi.org.uk/Information/Codes_and_Guidance_Notes/40593.pdf*

[7] *Note that the references in the SORP refer to Schedule 9A of the Companies Act 1985, but the relevant material can now be found in Schedule 3 to The Large and Medium-sized Companies and Groups (Accounts and Reports) Regulations 2008 (S.I. 2008 No. 410) made under the Companies Act 2006, which replaced the 1985 Act.*

appropriate in magnitude and nature to cover the provisions for claims being discounted during the period necessary for the payment of such claims and should not exceed either:

- a rate justified by the performance of such assets over the preceding five years; or
- a rate justified by the performance of such assets during the year preceding the balance sheet date.

110 For the purpose of determining an appropriate discount rate, justification requires a consideration of the returns achieved over the period in question to the extent that this is relevant to the future.

111 When discounting is applied, the following disclosures should be made in the notes to the financial statements:

- the total amount of the provisions before discounting;
- the categories of claims in relation to which discounting has been applied; and
- for each category of claims where discounting has been applied, the methods used, the assumed average period to claims settlement, the rate of investment return used to determine the discounted value of claims provisions, and the criteria adopted for estimating the period that will elapse before the claims are settled.

112 The effect of the unwinding of discounted claims provisions during an accounting period should be disregarded in considering whether material adverse run-off deviations have arisen requiring disclosure under Note 4 to the Profit and Loss Account format in Section B of Chapter 1 of Part I of Schedule 9A to the CA85. (See paragraph 103 above).

113 Investment return associated with any unwinding of the discount on general insurance business claims provisions in an accounting period should be recorded under the headings for investment income or gains in the appropriate sections of the profit and loss account and should not be credited directly to claims incurred. Separate disclosure should then be made, where material, of the amount of the investment return which corresponds to the unwinding of the discount.

VI. Individual Capital Assessment

- In CP136, published in May 2002, the FSA set out plans for a wide range of firms to carry out a self assessment of their own capital requirements, having regard to their risks, business profile and systems and controls.
- Individual Capital Assessment (ICA) was effective from 1 January 2005, although some firms were required to prepare an ICA during 2004.

- ICA is covered by Chapter 7 of the Prudential Sourcebook. The requirement harks back to some fundamental rules in GENPRU, such as 1.2.26, which states that a firm must at all times maintain overall financial resources, including capital resources and liquidity resources, which are adequate, both as to amount and quality, to ensure that there is no significant risk that its liabilities cannot be met as they fall due.
- Rule 1.2.30R expands further to state that:

  A *firm* must have in place sound, effective and complete processes, strategies and systems:

  (1) to assess and maintain on an ongoing basis the amounts, types and distribution of financial resources, capital resources and internal capital that it considers adequate to cover:

  (a) the nature and level of the risks to which it is or might be exposed;

  (b) the risk in the overall financial adequacy rule; and

  (c) the risk that the firm might not be able to meet its *CRR* in the future; and

  (2) that enable it to identify and manage the major sources of risks referred to in (1), including the major sources of risk in each of the following categories where they are relevant to the firm given the nature and scale of its business:
  (a) credit risk;
  (b) market risk;
  (c) liquidity risk;
  (d) operational risk;
  (e) insurance risk;
  (f) concentration risk;
  (g) residual risk;
  (h) securitisation risk;
  (i) business risk;
  (j) interest rate risk;
  (k) pension obligation risk ; and
  (l) group risk.

- GENPRU sets out in more detail in rule 1.2.42R the requirement for a firm to carry out stress tests and scenario analyses and identify an appropriate range of adverse circumstances of varying nature, severity and duration relevant to its business and risk profile and consider the exposure of the *firm* to those circumstances.
- The requirement for an Individual Capital Assessment in INSPRU7 is seen as a separate requirement from the general stress-test requirement in GENPRU 1.2.42, since it is focused on the firm's own assessment, including other forms of capital on which the firm

may be relying which are not taken into account for the purposes of meeting the minimum capital resources requirement.

- In any case, both the stress-testing requirement of GENPRU 1.2.42 and the ICA requirement of INSPRU7 require the firm to model the future behaviour of the portfolio in a variety of circumstances. The focus of both of these exercises is on projecting forward and testing what current level of capital is needed to ensure with a sufficiently high level of probability that the resources will prove adequate in the stress scenarios. There is no requirement to discount the cash-flows back to the assessment date and therefore the exercise is not one which makes use of discount rates as such, although the economic and market scenarios used to project forward are the accumulation equivalent of discounting, so there is still an underlying interest rate model.
- Rule 7.1.36 of INSPRU states that, where possible, the value of the assets should be marked to market and that the valuation of assets and liabilities should reflect their economic substance, be realistic and not contain explicit margins for risk or bias towards optimism. The valuation of liabilities should be consistent with the valuation of assets, in other words a market-consistent basis.
- Further recommendations (but not mandatory standards) are contained in GN46: Individual Capital Assessment. This GN, originally drafted by the profession, and intended to have a particular focus on life insurance ICA, has been adopted by the Board for Actuarial Standards.
- The ICA report must consider an assessment focused on achieving, over a one-year timeframe, a 99.5% confidence level that the value of assets exceeds the value of liabilities. However, the firm may also carry out assessments using different confidence levels (7.1.49R of INSPRU).
- The current ICA requirements will be superseded by Solvency II, which has its own version of ICA, known as Own Risk and Solvency Assessment (ORSA). This is discussed further in the section on Solvency II under Current Developments.

C Pension Schemes: References

Technical provisions

1. The 'technical provisions' are 'the amount required, on an actuarial calculation, to make provisions for the scheme's liabilities' (Section 222(2)[8]). These include pensions in payment (including those payable to survivors of former members), deferred pensions for early leavers, including statutory revaluation, and benefits accrued by members in active service. .

2. The actuarial method should be an 'accrued benefits method' (Regulation 5(2)[9]) as recognised by GN26 'Pension Fund Terminology' (Code03 (74)[10]). In essence the accrued benefits for members in service narrow down to a choice between those defined by:

    (a) The Defined Accrued Benefit Method which defines the accrued benefit as whatever the scheme rules say would be provided if the scheme were to discontinue on the valuation day (usually the early leaver benefits); and

    (b) The 'past service reserves' as defined by any of the family of 'unit credit' methods, all of which allow for the full range of decrements from active service between the valuation date an pension age but with differing levels of allowance for future salary increases. Amongst these the Projected Unit method is the most common, allowing for full future salary increases.

3. Trustees should state whether there are discretionary powers to increase benefits, and if so, the extent to which they are taken into account in the funding of the scheme (Regulation 6(1)(d)) .

4. Trustees should obtain the agreement of the employer and advice of the scheme actuary regarding the methods and assumptions, which are to be used by the actuary in calculating the scheme's technical provisions. (Section 229 (1)(a) & 230 (1)(a)).

5. Assets are taken at the amounts set out in the audited accounts at the effective date of the valuation – at bid market value (Regulation 7(3))

6. Principles to be followed when choosing assumptions are:

    - The economic and actuarial assumptions must be chosen prudently, taking account, if applicable, of an appropriate margin for adverse deviation;

    - The rates of interest used to discount future payments of benefits must be chosen prudently (Regulation 5(3)(a) and 5(4)), taking into account either or both—

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[8] *All references to 'Sections' refer to The Pensions Act 2004*

[9] *All references to 'Regulations' refer to The Occupational Scheme Funding Regulations 2005 (SI 2005/3377).*

[10] *All references to 'Code03' refer to the Pension Regulator's Regulatory Code of Practice 03: Funding Defined Benefits.*

- The yield on assets held by the scheme to fund future benefits and the anticipated future investment returns, and
- The market redemption yields on government or other high-quality bonds;

7. Any change from the method or assumptions used on the last occasion on which the scheme's technical provisions were calculated must be justified by a change of legal, demographic or economic circumstances. (Regulation 5 (4)(d))

8. Matters set out in Code03(79) relating to the assumptions for discount rates which should be covered by actuarial advice and discussed by trustees with the employer are:

    - The current price of UK government securities and the information this provides about the expected return on investments which are low risk in relation to the liabilities.
    - Relevant economic and financial factors such as price and wage inflation, and the expected returns on, and risks associated with, asset classes other than UK government securities.
    - The trustees' investment policy and the extent to which the expected returns on, and the risks associated with, actual investments held should be reflected in assumptions about investment returns.
    - The effect that changes to economic conditions might have on the relative levels of funding and solvency.
    - A range of values or options for each assumption. When considering these, the trustees should ensure they understand the evidence for, and rationale behind, the choices put forward.
    - Sensitivity assumptions, where even small deviations in the experience from the assumed values have a significant impact on the adequacy of the technical provisions. Stochastic modelling may not always be approprite or cost effective (Code03(91))
    - The relationship between proposed assumptions (particularly investment return and mortality) and the assumptions, which the actuary will use in the estimate of the scheme's solvency (which must be included in the actuarial valuation) (Code03 (82) and Regulation 7(4) (b)).

9. Actuary's valuation must include an estimate of the scheme's solvency (Regulation 7(4) (b)). Trustees expected to discuss approach used by actuary and consider implications for scheme.

10. Actuary's estimate of the solvency position and the assumptions underlying the calculations, are useful reference points for trustees and employers when considering the adequacy of the technical provisions (Code03(83)).

11. Trustees expected to form an objective assessment of the employer's financial position and prospects and the strength of the Employer's Covenant to inform decisions on both the technical provisions and any recovery plan needed. (Code03(57))

Prudence

12. Trustees should choose individual assumptions with a level of prudence consistent with the overall confidence they want to have that the resulting technical provisions would prove adequate to pay benefits as they fall due. (Code03(84))

13. The trustees should consider and discuss with the scheme actuary, the extent to which an account should be taken for adverse deviation when choosing prudent economic and actuarial assumptions (Code03(85) and Regulation 5(4)(a)) but are not obliged to attempt to eliminate all risk that they will fail to be sufficient. (Code03(86))

14. Legislation does not require technical provisions to be set at the level needed to buy out accrued liabilities with and insurance company. (Code03(86))

15. Prudent assumptions could allow for some degree of out-performance of scheme assets relative to bonds depending on the specific circumstances of the scheme. In particular, the trustees should consider the scheme's investment policy and the ability of the employer to cope with the financial consequences of assumptions not being borne out by experience. (Code03(92))

16. A contingent asset can be used for an investment strategy consisting of a higher proportion on riskier assets, thereby lowering the required level of technical provisions (if some credit can be given to the anticipated higher returns from the additional risk). (Para. 21, 'Contingent Assets' Guidance from regulator)

17. A change in the trustees' assessment of the strength of the employer's covenant could justify a change in the relevant assumptions.(Code03(93))

18. 'Asset-liability' models might assist trustees when assessing the prudence of either individual assumptions or the overall calculation of technical provisions. (Code03(89))

Recovery plans

19. A 'Recovery Plan' sets out how a deficit will be eliminated. Trustees must aim to achieve full funding relative to technical provisions (Sections 221(1) and 226(2) (a)) and set out the manner in which they aim to do so (Section 223(2)(b)).

20. The recovery plan should include the assumptions underlying the elimination of the shortfall. (Section. 8(2), Regs. 2005)

21. GN9 (4.2) requires actuary to advise on sensitivity of recovery plan assumptions where they differ from those underlying the technical provisions.

22. When preparing or revising a recovery plan, the trustees or managers must take account of the following matters (Section. 8(2), Regs. 2005):

    (a) The asset and liability structure of the scheme

    (b) Its risk profile

    (c) Its liquidity requirements

    (d) The age profile of the members

23. Trustees should aim for any shortfall to be eliminated as quickly as the employer can reasonably afford. What is possible and reasonable, however, will depend on the trustees' assessment of the employer's covenant. (Code03(101))

24. When considering the structure of a recovery plan and the contributions required, the trustees should take into account the following matters (Code03(102)):

    - The employer's business plans and the likely effect any potential recovery plan would have on the future viability of the employer.
    - Scheme's membership profile and impending member movements.
    - Likely benefits to members in the event of the employer's insolvency and ability of trustees to recover a debt...
    - Employer's expenditure commitments.
    - The value of any contingent security provided by the employer, bearing in mind both the term and enforceability. A longer recovery period or one structured with a degree of back-end loading may be appropriate where security has been provided in the event of insolvency.
    - The level and nature of any employer-related investment.

- The effect of the assumptions underlying the recovery plan not being borne out by experience.
- Anticipated risk based PPF levies

25. In principle, the inclusion of contingent assets in a scheme's funding strategy could mean that the trustees accept a recovery plan that they would not have otherwise agreed to, or set lower technical provisions than they might otherwise have done. (Para. 37, 'Contingent Assets' Guidance from regulator)

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