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This abstract relates to the following paper: Cowling, C.A., Frankland, R., Hails, R.T.G., Kemp, M.H.D., Loseby, R.L., Orr, J.B. and Smith, A.D. Developing a framework for the use of discount rates in actuarial work. *British Actuarial Journal*, doi: 10.1017/S1357321712000013

Mr P. W. Wright, F.I.A. (opening): This is the second paper to emerge from the Profession's cross-practice steering committee on the use of discount rates by UK actuaries.

The first of these was authored by Mr Chinu Patel and Mr Chris Daykin, which concentrated on analysing past and current practice in this area, although some recommendations were made.

Section 2 of the current paper is devoted to a broad synopsis of this earlier paper. The remainder of the paper takes the recommendations by Mr Patel and Mr Daykin forward and changes the conclusions in a number of areas, generally moving further towards recommending a market-consistent approach in more areas.

The paper is aimed at actuaries and a simplified version will be produced later in the year for non-specialists. In view of the fact that all of the major traditional areas in which actuaries work are covered, particularly the calculation of liabilities for pension schemes and insurance company contracts, it is useful that a glossary of terms is provided.

The authors have retained the nomenclature introduced in the earlier paper of describing the two families of valuation as either matching (market-consistent) or budgeting ('real world'). The fundamental difference between them is that greater allowance for risk is retained in the discount rate for the latter. The various differences are covered in more detail in Appendix C. These two families correspond closely to the two identified in the conceptual framework of the Board for Actuarial Standards (BAS). It is a pity that slightly different terminology is used, particularly bearing in mind that non-actuaries, such as the directors of insurance companies and the sponsors of pension schemes and the trustees of such schemes, might be expected to be cognisant with the BAS conceptual framework.

Paragraph 1.2.1 explains that this project is primarily justified because "it is possible that two actuaries working in different areas may come up with very different answers to essentially a similar question: 'what is the appropriate discount rate to apply to a particular series of cash flows?'".

At the height of the credit and liquidity crisis, life assurance actuaries were clearly taking very different views when advising on the size of the illiquidity premium element of the yield on corporate bonds, whilst pension actuaries were by no means uniform in their assessment of the yield applicable to high grade AA corporate bonds. The Actuarial Profession may have got away with some of the more aggressive assumptions made, thanks to the largesse of, amongst others, the US, UK, Irish, German, Swiss, Dutch and Belgian taxpayers without whose kind support default rates could have possibly reached catastrophic levels. We cannot rely on this extreme generosity, often extending to the protection of even subordinated debt, being repeated in any further round of rescues.

These important issues are largely relegated to a discussion in Appendix A which makes the paper rather disjointed. The recommendations in section 6 are presumably considered the central feature. These follow on from a proposed framework set out in section 5 but it is not always clear to me whether consistency has been achieved.

The most radical recommendations of section 6, compared to current practice, relate to defined benefit pension schemes. On funding, it is recommended that the target level of technical provisions should be based on a matching framework for the discount rate. This would presumably imply an increased funding rate for many schemes. The solvency assessment proposed is along current lines but the recommendation is that this should be the measure highlighted when providing information to members, trustees and regulators.

On pension scheme accounting, the liabilities are recommended to be calculated using a matching framework making no allowance for sponsor default, but subject to the caveat that this principle is consistent with the accounting for, amongst other items, insurance liabilities. Before I could support this proposition, I would wish to see more clarity on what cash flows are intended to be valued here, in particular, whether allowance is to continue to be made for future salary increases for active scheme members. The inclusion of these increases was one of the reasons behind the selection for Financial Reporting Standard (FRS) 17 of a discount rate based on high quality AA corporate bonds by the Accounting Standards Board (ASB). On the point of consistency with insurance contracts, I note that the International Accounting Standards Board (IASB) has proposed a matching framework for the selection of the discount rate when valuing insurance contracts under phase 2 of its insurance contracts standard, and, furthermore, making no allowance for own credit risk. But this will all be in conjunction with risk and residual margins which I would not expect to see replicated in any revision of International Accounting Standard (IAS) 19.

Before leaving defined benefit pension schemes, it is noteworthy that a recommendation is made that cash equivalent transfer values should be considered in a matching framework. Furthermore, the Profession should encourage regulators to reconsider the regulations which currently imply that a budgeting approach for these would be acceptable. Getting agreement to any proposed course of action along these lines may be difficult, I suspect, based on historical experience.

My final remarks relate to the proposals for insurance companies, which will not be seen as being so radical as those made for pension schemes. In fact, in many cases of accounting and solvency regulation, they are what is being proposed by the European Commission and the IASB. The paper correctly states that there has historically been little regulatory control in the UK over premium rating and then makes reasonable recommendations based on this premise. There are, however, two special areas which perhaps would have deserved a mention in this paper.

The first concerns new business written in a with-profits fund, where there is a Financial Services Authority (FSA) rule that requires the terms of the business written to not be detrimental to existing business in the fund. The second area, which was the subject of an Institute sessional paper around 10 years ago, relates to the reinsurance premium to close at Lloyd's. Here it is necessary to consider equity between the ceding and receiving names on the syndicate. In both these cases, it would seem appropriate to mandate that actuaries giving advice base this on using a matching approach to the discount rate.

Mr C. A. Cowling, F.I.A. (introducing the paper): I will give you a bit of background to the gestation of the project. The Management Board put together a cross-practice group of people and said that they wanted us to consider three core objectives.

They wanted us to survey current practices and developments, getting as much input from a wide variety of stakeholders as possible. They wanted us to consider options for the future. They encouraged us to think as widely as we wanted, potentially to challenge the diversity in current practice and look at the possibility of a more transparent approach to discount rates, where risk is included more explicitly.

The third objective they gave us was to consider how the Profession might deal with the consequences of any changes that our framework might suggest, including how we might help members of the Profession, and also how we might help with communication and ensuring better understanding between actuaries and users of actuarial advice.

We defined several steps to reflect the Management Board's objectives. Firstly, we needed to carry out a survey of current practice; we needed to look at how existing research and debate had developed and what common language already existed. Last year, Mr Patel and Mr Daykin presented their paper giving a very good summary of why we are where we are, how actuarial thinking has developed over the years, and then looking at how to bring the different threads together where possible. That was the first step in this project.

We then took on the challenge of looking at that research, seeing how we might develop it into a framework for looking at discount rates that potentially we could debate here and around the country with actuaries. The framework should allow us to do our job better, with more transparency, so that users of actuarial advice can understand the risks that we are building into our models.

Then, finally, the last but equally important piece of this project is looking at the impact of any framework that might emerge. Again, the Profession is turning to Mr Daykin and Mr Patel to go back independently to stakeholders, consult widely and discuss our suggestions. They will ask: "What would this mean for you? Do you like the framework? What problems can you see?"

They are pulling this together simultaneously with the discussions that we are having here and in many other meetings up and down the country over the next few months. The intention is that by the end of the June the results of all this consultation will be pulled together so that what, at the moment, are simply recommendations from the working party to the Management Board can encompass the views of actuaries and the wider society.

What we have done in this paper is attempt to build a framework for the future, and Mr Wright has already given you a flavour of this. We looked at developing what Mr Daykin and Mr Patel did in

their paper to see how we could take that forward. We have looked at how we can build something that would support what actuaries are already doing, and will allow us to consider options for reducing diversity of practice. However, there is no intention to take away the requirement for actuaries to exercise very careful professional judgement and thinking in what they are doing.

There are clearly many areas where discount rates are used. It is particularly important that the purpose of the calculation is recognised in how we arrive at an appropriate discount rate. We have tried to reflect this in our paper.

Mr Kemp is going to take us through the thinking that Mr Patel and Mr Daykin started, and the building blocks and the outline framework that we have proposed. He will then hand over to Mr Franklin, who will look at the framework and run through some of the recommendations which flow from it. We are not going to go through it in detail but we hope we can start a discussion on how the framework might be appropriate for the future.

Mr M. H. D. Kemp, F.I.A. (also introducing the paper): As has been explained already, this piece of research builds on material written by Mr Daykin and Mr Patel that is summarised in section 2 of our paper. The other sections of our paper cover matching calculations, in section 3, and budgeting calculations, in section 4. The paper then sets out a framework building on both of these types of calculations. This framework is set out in section 5 and in the appendices. In section 6 we move on to recommendations.

I want to focus on the topic of matching versus budgeting.

If there is one thing that we want you to take away from this meeting it is that there are two main alternative ways of doing discounting calculations. The first involves a matching, i.e. market-consistent, focus. The second involves a budgeting focus. As I describe these concepts further, please bear in mind that throughout the paper we use the term "valuation" perhaps a little loosely. Sometimes we use the term in a way that is consistent with the technical meaning given to this term in the relevant BAS standards. However, sometimes our usage is more in line with the vernacular meaning commonly adopted in practice, particularly in the pensions field.

Firstly, the paper produced by Mr Daykin and Mr Patel confirmed the wide range of discount rate methodologies that are currently used in practice, and that have been used in the past. Most of the differences between them are due to the purpose of the exercise, the "valuation", if you would like to call it that.

I would like to highlight before anybody else does that discount rates are not the only elements of "valuations". We could, I suppose, have been asked by the Management Board to formulate recommendations covering the entire body of actuarial practice. But I am sure that they realised that this was going to be far too difficult for us. Instead we were asked to focus just on discount rates. This possibly does result in some disconnect from actual practice. Mr Wright has already highlighted that one reason why certain discount rates are used is because their choice implicitly allows for other factors that are not otherwise incorporated elsewhere within the computations.

Mr Daykin and Mr Patel's work also highlights that some discount rates that are used in practice do not relate to assets, or at least only do so very tenuously. For example, they describe the "social time preference rate". This is quite an important concept in government circles and therefore government

finances. It is therefore also indirectly quite important for us. In effect, it involves a kind of intergenerational trade off between what we should do now as a society and what we should do in the future. There is no fundamental reason why current asset market data should necessarily provide the "right" trade-off for such purposes, although maybe such data is an important input into setting such a rate.

Touching on such trade-offs takes us into wider economic debates. For example, we soon alight on the topics of utility and the difference, if any, between "price" and "value". Again, our paper tries to touch on these topics, to provide further background, to the extent that they are not already covered in Mr Daykin and Mr Patel's work. We would be pleased to receive feedback and comments on these issues.

A key observation is that there are two approaches to discount rates, "matching" and "budgeting". Perhaps the main difference of emphasis in our paper, relative to the work that Mr Daykin and Mr Patel had produced, is the observation that life is not always binary. There may therefore be circumstances where the purpose of the "valuation" is best served by mixing or blending these two types of computations.

The purpose behind a "matching" calculation, or a "market consistent" valuation, is that if two things are the same then we should expect them to be valued identically. If we have assets and liabilities that match, i.e. if we can find some assets that will provide exactly the same cash flows as the liabilities we are trying to value, then nearly any sensible way of valuing the liabilities would be to give them the same value as the corresponding matching assets. We assume here that it is actually possible to observe such a value for these assets.

This principle follows from what is known as the law of one price or the principle of no arbitrage, or, the law of contemporaneous value continuity. This is the mathematical elaboration of the idea that if things are identical, then you would expect them to be identically valued. A more practical corollary is that if they are *nearly* identical, then we would expect them to be *nearly* identically valued. In reality it is very difficult to find things which are identical. It is much more likely that you will find things that are merely very similar.

A key issue that then arises is what to do if we decline to hold the matching asset portfolio, which a lot of people do in practice. This may be, for example, because we think that there is another portfolio or asset strategy that will deliver a higher return. Should this then reduce the value that we place on the liabilities? Views on this topic ultimately drive the choice between a "matching" approach and a "budgeting" approach.

Before moving on to budgeting, it is worth highlighting some of the issues that arise when trying to carry out matching style calculations in practice. Material in appendix A and in section 3.2 explores some of the building blocks underlying matching calculations. For example, it is necessary to choose which instruments to use to derive the discount rate, or more precisely the yield curve. In particular, you need to decide on the extent to which you allow or do not allow for default risk and/or liquidity premiums.

When the paper was presented in Edinburgh these types of topics were specifically raised. For example, the meeting discussed the topic of liquidity risk and the liquidity premium (and how its interpretation seems to differ between pensions and life insurance). The topic of "own" credit risk

also came up. If these topics do come up again, please bear in mind that there is a limit to which you can reasonably expect a paper like this to cover such subtle concepts, important though they may be. I have recently written a book about market consistency and it takes several chapters to cover these topics. Therefore the hope that we can address these topics fully in a relatively short paper does seem ambitious. Likewise we highlight other factors, like tax, which influence the answers. One key observation is that matching calculations are often more subjective than perhaps some people might like. The concept is straightforward but the actual practice is not quite so easy.

Budgeting calculations involve a different rationale. They focus on the observation that when we have some liabilities we might want to concentrate on how we expect to meet them as they fall due. The idea behind them is that we set the discount rates somehow or other by reference to the returns we might expect to be delivered by the investment strategy we expect to use to finance, i.e. "fund", the liabilities.

There is usually a greater embedded risk within a budgeting style discount rate. The risks involved come strongly to the fore. Usually budgeting calculations assume that there is a reward for bearing such risks, so consequently they come up with a lower number for the liability valuation.

One can immediately see that this can introduce interesting dynamics. Clients may prefer lower rather than higher values, and may therefore lean on the actuary to deliver this outcome. Other interested parties may be less happy with such outcomes, especially if the actuary's work is implicitly held out to be 'objective' and therefore not favouring any one party over another. One of the challenges that arises in the actual practice of budgeting calculations is how to reconcile the different interests that different people might have.

Another facet is that usually there is greater uncertainty about whether the planning that underlies the budgeting calculation will actually achieve its objectives. This renders the computation potentially less precise than a matching calculation. Quite often the discount rate might be expressed as a single number rather than as a yield curve that depends on the terms of the different liability cash flows.

As has already been highlighted, the main current use of budgeting calculations is in the field of defined benefit pension scheme funding. The word "valuation" is the description usually given to such a calculation in practice, even if it does not, in our opinion, necessarily correspond to the meaning given to the word "valuation" in relevant BAS standards. Budgeting calculations are also used to some extent within the insurance area, although increasingly less so, particularly in the field of embedded value type calculations.

When deciding to use a matching or a budgeting calculation you might ask what circumstances will actually result in a different answer. Is all the material we have produced highly theoretical, and therefore fairly irrelevant, because in practice the answers come out the same or very close to each other? We all know that is not the case. That is why the Management Board asked us to explore whether it was practical to create an overarching framework for discount rates.

The most important difference is linked to the risks embedded in the exercise. But what does this actually mean in practice? My background is in asset management and so you may expect an investment spin. A question that I would like to pose is suppose I am an asset manager and I ask a *research analyst* following a company: "What do you think that company's shares are worth?" What answer am I going to get? This ultimately is a type of budgeting exercise because there is a

"plan" involved with it. The plan involves me going out and buying or selling the shares and hopefully then in due course unwinding the position at a profit. Ultimately I am asking the research analyst whether he or she thinks that the current market price is right or wrong. Implicitly, I am expecting that in some circumstances the answer will be that the market is "wrong". But suppose I now instead approach a back office fund pricing analyst and say to them, "Please can you value the fund so that we can apportion the assets and units that it owns between the different unit holders?" They generally ignore, as far as possible, what any individual front office research analyst might have said and instead they identify the market value of the assets and apportion the fund accordingly.

So there is a fundamental difference here, driven by what we mean by "value", which I would argue is prototypical of the divide between budgeting and matching computations. Ultimately, the proponent of the budgeting/planning approach is expressing a view on whether they think that the current market price is "right" or "wrong" – an investment view – even if this is not always obvious to themselves or others. Also, the view is being expressed to one person or group rather than to the generality of the populace. In my particular example the research analyst is supposed to be advising *me* so that *I* can make money out of positioning my portfolio accordingly, ultimately at the expense of others who take the opposite position.

This example may seem a little distant from typical actuarial practice but, in my opinion, this would be an erroneous view to form. A key differentiator between the matching and the budgeting approaches is the extent to which it is reasonable to rely on the views of one person, however expert that person is. Is it likely that my research analyst will always come up with gospel truth? How infallible are actuaries? The merits of budgeting versus matching will be driven quite heavily by the extent to which we do or do not want to take advance credit for the correctness of a view on what might happen in the future, a view that might or might not eventually come good, and on how prudent and objective we need to be when considering such views. Weaved into this is the need for transparency. Is it always obvious the extent to which the views we are taking are just that, i.e. views, especially if their use may advantage one party over another?

I now hand over to Mr Frankland to run through some of these thoughts and how they have helped us come up with the recommendations contained in our paper.

Mr R. Frankland, F.I.A. (also introducing the paper): The broad thrust of what we have said in the paper is that choice of discount rates is about choosing between matching calculations and budgeting calculations.

Matching calculations are typically market consistent and tie in the valuation of liabilities to the valuation of assets of a replicating portfolio. A budgeting framework, on the other hand, looks at what we would expect to achieve with the asset strategy we have in place or that we are looking to develop for the assets that are backing the liabilities.

Market consistency is a fairly well-established principle. There is nothing radical there. Whichever approach is taken, unless you adopt a perfectly matched strategy, you will not actually achieve a hedged result. So there is no point trying to select the framework for how to determine the liabilities in the hope that some sort of magic will happen that solves your asset liability management problems.

Broadly, we set out two primary applications for the matching calculations. One of those is looking at the value of transactions. Here one is trying to put a fair value on something that is being bought

or something that is being sold. The other application is where one is looking to identify the adequacy of a pool of assets to cover a set of liabilities.

Budgeting, on the other hand, has greater application when it comes to planning or when it comes to trying to do funding calculations. As we go through the examples, we will see areas where you actually need to do both. First of all, we have an example to show you the outworking of these results. The example comes in two parts. This first one is where we have built a hypothetical series of cash flows. We have then valued them using the two alternative frameworks, the budgeting framework and the matching framework.

However, we have chosen our budgeting framework so it is broadly consistent with the matching framework. We will see how that impacts, the numbers, presently. The bars on the right of the graph you can see in Figure 1 show the cash flows that we are trying to value. The smooth red line is the budgeting framework value of those cash flows. The red line gives a smooth progression. The green line, on the other hand, shows the result of a matching framework. The matching framework delivers a lot of volatility for the value of the liabilities, and one might be concerned with that, except that if you had chosen to match those liabilities perfectly, the volatility that you see on the green line would reflect exactly the volatility of the assets backing those liabilities. So although the liability number is volatile, the difference between that and the asset value is not.

We also looked at the slightly more common commercial application of a budgeting framework where a degree of optimism is built into the method of determining the valuation basis. Here we have applied a 2% equity risk premium so the 6% estimate for the average equity return is 2% above the assumed risk free rate. We see this in how the gap between the green and red lines opens up as we move towards the left in Figure 1. The budgeting value is a much lower value than the green line at most, in this case all, durations. Both graphs tend to the same value of zero at the end. That is based on a fundamental assumption that the assets you are using to back the liabilities with are closely matched. Close matching with an equity risk premium is unlikely to be a practical option. There is a high degree of residual risk in this case by investing in equities to hedge essentially fixed interest liabilities. However, these are the values of the liabilities. The actual assets will not be matched and this will potentially result in a high degree of volatility over time and at the end when the liabilities are finally extinguished.

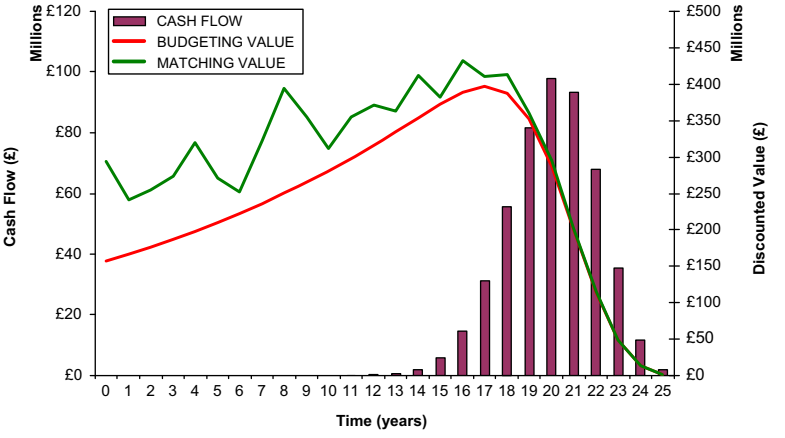

Figure 1. Cash Flows and Discounted Values under Budgeting and Matching Frameworks.

We reviewed the discussion of this paper in Edinburgh and looked at the generic recommendations we have made. We have highlighted recommendation 3 in the paper, which is about the need to be clear about what framework is being used in presenting one's advice to clients or employers. There is a need to set out the building blocks that are being used and the risks associated with the framework and the building blocks.

We need to make sure that the recipients of our information are aware of the implications of all of the assumptions which have gone into our work. That, fundamentally, is what the BAS is recommending in its own standards. What we have done in this work is to take a view of how one might develop this idea to come up with a framework that allows for a rational basis of determining how to determine discount rates which, it is hoped, can be applied in a consistent manner across all sorts of different actuarial applications.

Looking at the specific applications, we highlighted three of these which we thought might be particularly interesting. The first was in the pensions field, where it is acknowledged that establishing a funding rate for pension schemes is fundamentally a budgeting question. What discount rate do the sponsors of the fund want to assume to determine how much they should set aside?

On the other hand, it is very important that members of the pension scheme understand the extent to which the benefits which they expect to receive are secured and backed by the assets of the fund.

In terms of that security and the underlying adequacy of the assets, we believe that a matching approach is the appropriate way of achieving that result. So, notwithstanding the fact that one might recommend the funding rate based on a budgeting framework, it would be a matching framework that one would use to demonstrate the adequacy or otherwise of the assets backing the liabilities.

As has already been highlighted by the opener, life assurance is a much less contentious area. Life assurance has for some time now been moving progressively towards matching frameworks for the evaluation of liabilities. Our recommendation here is not to seek change but support the changes that are going on and the progressive moves that we are seeing under IFRS, and under Solvency II, towards a matching approach to the calculation of liabilities.

There are going to be challenges around how these things get implemented and we are certainly aware that we need to be vigilant and consistent if we are to achieve the ultimate goal we are seeking.

One interesting area, which created heated discussion in Edinburgh, was that of premium rate setting, both in the life context and also in general insurance. It is widely recognised that setting a premium rate is essentially transactional based and therefore, in line with our framework, you might expect the paper to recommend using a matching framework. In reality, though, premium rates are set for all sorts of commercial competitive reasons.

However, having set the premium rate, one needs to come up with an assessment of the profitability of contracts sold. Here we are suggesting the most appropriate measure would be a matching framework consistent with the transactional basis of valuing transactions. There may be occasions when the actual premium rates differs from this, given the desire for stable premium rates in times of unstable market conditions, but then there is a need to provide information that allows the user to be able to judge whether or not it is appropriate to continue using the same premium rates as market conditions change and what the impact is on profitability.

Finally, I will make a few comments about additional information which would be useful to provide to the users of actuarial information.

The first is that, where we are using a matching framework, we do need to be clear that using a matching framework for valuing liabilities does not imply anything about future ongoing security. It might imply something about security today. But, unless the liabilities are well hedged, that says nothing at all about future security. Hence we need to be clear about the limitations of the framework.

If we are using a budgeting framework for the calculations, it is more important that we make it clear that, not only is it saying nothing about future security, it is saying nothing about present security also. That is why we are recommending that where a budgeting framework is used that we should provide supplemental matching framework information.

We also wanted to suggest that in any formal actuarial report, on which business judgements are going to be made, that some indication be given as to the likely volatility of the outcomes. These would be subject to movements in the market conditions over time and the fundamental instability of the differences between the impact of the matching framework chosen on liability values and the asset values.

Dr L. M. Pryor, F.I.A.: The framework proposed for discount rating will assist actuaries to make judgements concerning discount rates in a "reasoned and justifiable manner" (to quote from BAS standards). It sets out a coherent and consistent approach to thinking about how to set assumptions in the area of discount rates and its example should encourage clear thinking about other assumptions, too.

In particular section 5, setting out the framework, is clearly written and does not attempt to hide the undoubted complexities. It highlights the grey areas and talks about the need for judgement. The similarities and differences in terminology between this paper and the BAS's conceptual framework have already been noted, especially by Mr Wright. There may be less inconsistency than feared by some, in that the planning/valuation dichotomy in our conceptual framework refers to the purpose of calculations, while this paper's budgeting and matching distinction refers to the method of deriving discount rate assumptions. In many cases, a budgeting calculation will serve a planning purpose, and a matching calculation a valuation purpose.

I note the large area of overlap between the principles in the Technical Actuarial Standards (TASs) and the recommendations in this paper. The paper does not make the connection. The principles in the TASs concern assumptions and modelling in general, whereas this paper concentrates on discount rates, but the following parallels are clear.

The TASs require the limitations of the models (and, hence, of the assumptions) to be explained to users. Recommendations 4, 14, 15, 16 and 19 cover some of the same ground.

The TASs require the use of consistent assumptions, a requirement that is echoed in recommendations 9, 13 and 18.

If you use an assumption required by legislation or the user and think that it is not appropriate, the TASs say that you should say so, which is echoed in recommendation 10. This would also apply, of course, to using assumptions, or methodologies for deriving assumptions, recommended by others, such as working groups of the Profession.

The TASs say that the assumptions should be suitable for the purpose of the calculation, as do recommendations 14 and 15.

Most importantly, recommendation 3, emphasises the importance of explaining the rationale underlying assumptions in terms that the user can understand. Here I would sound a note of caution. This paper was, quite rightly, written for actuaries. Lifting explanations straight from the paper is unlikely to work for all, or indeed many, users who may not have the level of technical knowledge needed to understand it. It is important that actuaries think carefully about the level of technical knowledge and understanding of users and give explanations at an appropriate level in suitable language. The proposed simplified version may help here but it is always up to individual practitioners to consider the needs of the users whose needs they are serving. It has to be on an individual basis.

Mr D. J. Congram, F.I.A.: The International Actuarial Association (IAA) has sponsored a project on discount rates as well. The title of the IAA project is: "Issues Associated with the Determination of Discount Rates for Financial Reporting Purposes". So clearly the IAA's project ties in very closely but it takes an international perspective.

I should like to comment, however, on some items where there is a slightly different focus and approach. The first one is the accounting side of financial reporting. It builds on the concept of the International Actuarial Standards Board (IASB) of the characteristics of the liability being consistent with the observable current market. This fits naturally into the "matching" concept, but the emphasis on characteristics of the liabilities from an international perspective would include sovereign risk and foreign currency risk. There are other specific items like the extension of the yield curve, alternatives when obtaining the risk free rates, whether you use a top-down or bottom-up approach, and dealing with issues of hyperinflation and approximations.

This is a taste for what is coming. Our initial discussion is planned for Sydney in April.

Mr A. G. Sharp, F.F.A.: My comments are from a pensions perspective, although one or two of them may read across to insurance.

My first comment follows on from what Dr Pryor has just said. It concerns communications and particularly paragraph 1.3.4 of the paper, which identifies a 'possible need for a simple follow-up paper'. A follow-up paper is most definitely needed, for at least two reasons. The arguments for making any recommendations on this subject must be accessible to non-specialist readers, particularly pension scheme sponsors and trustees, otherwise we will not be able to take the majority of our clients with us. As it is a subject on which both specialist and non-specialist readers have strong views, the arguments must be made both simply and with clarity.

Linked to this, my second comment is that 'matching' is potentially a dangerous term to use with the outside world, when dealing with liability cash flows which we know are not certain. We must not fall into the trap of implying too much certainty. Pension increases with caps and/or collars, measured against CPI and/or RPI, salary increases, member options on the form of benefits, the uncertainty of longevity, and not least political risk of further changes to benefits, all contribute to the uncertainty of the liabilities we are seeking to quantify. We must beware of giving any misleading implications as to how absolute our liability calculations are, no matter what discount rates are used.

The authors have taken the term 'matching' from the Daykin & Patel paper, and also discuss 'market consistent' valuations, which may be the better term to use, alongside 'matching' in section 3 of the paper. However, I note that all the recommendations in section 6 use the word 'matching' except for recommendation 2 which uses the term 'market consistent'.

Turning now briefly to some of the recommendations.

First, consider recommendation 4. We already give an estimate of solvency figures in triennial valuations (I have used the word "valuations" but that is defined in the Pensions Act 2004) and the Pensions regulator does look at them so I am not clear as to what more is being proposed here. We also need to educate our audience about the volatility of market consistent measures of liabilities. An examination of the Pension Protection Fund's Purple Book shows PPF liabilities varying between less than £600bn, and almost £1000bn, over a 7 year period, with considerable volatility in between those values.

Second, consider recommendation 7. I was a little puzzled as to why this should be materially different from the present requirement to provide "the actuary's estimate of the solvency of the scheme" as an estimate by the actuary of the cost of purchasing annuities on terms consistent with those in the available market. I am not sure whether that is meant to be market consistent or not.

Third, consider recommendation 8 on information to members. This does need to be phrased in accordance with what the authors set out in paragraph 6.4.1.10, regarding the interaction of the Pension Protection Fund and the employer's solvency with the funding of a pension scheme. A bald statement about the solvency of a scheme on its own, however that is measured, is not sufficient.

In recommendation 10, on members' options, what is missing is any mention of the one-way optionality members have in terms of some of their benefit decisions, including the cash commutation decision in most schemes. Further, it is important to consider the volatility of market consistent values against the need for practical communications and administration of benefits, and dealing with any short-term guarantees which are given.

Finally, I come to recommendation 11 on transfer values. Please remember Exposure Draft 54 (EXD54)! This is one area where clear communication is particularly important. But before saying anything about what discount rates to use, we must go back to ask again the question of what a transfer value is meant to represent. That is what happened after we issued EXD54 some years ago, and, following that the Government decided that a transfer value is not meant to be a market consistent value. We must get agreement on any change to that before moving forward, including any impact on unfunded public sector schemes. Do remember that a transfer value is an option for members to take, not a requirement.

Professor R. Macve, Hon. F.I.A.: In principle both accountants and actuaries are interested in the same thing, which is: what are the future cash flows going to be and how risky is that expectation? Discount rates are a way of getting a handle on that.

In practice, in accounting this translates to: how do we prepare the balance sheet from year to year? One of the things that you may therefore need to address at the next stage, which is currently causing some worries as between the US Financial Accounting Standards Board and the International Accounting Standards Board (IASB), is how far can you decompose your estimate

of a policy liability into (a) a present value of expected cash flows, (b) risk margins, and then (c) something else that explains the difference between what is being charged and what the estimate of the liability is (as what is being charged is usually higher). So what is that difference at (c), how should you deal with it and how should you present it?

The Americans seem to think you cannot really say much about either of (b) or (c), so you should just 'plug' the difference between (a) and what is being charged and include all of (b) and (c) as a 'residual margin'. IASB, on the other hand, would treat (b) and (c) separately, and differently.

Although there is a lot of overlap between what actuaries and accountants are interested in, accountants also have to meet the demand for an income number. Analysts, however well-trained in financial economics, still start with the P/E ratio, and you need the earnings for that. So one of the corollaries of how you do the valuations is going to be how it comes out in the performance from year to year when these things change, and do different kinds of changes have different kinds of performance meanings? Recently the IASB has said that, in valuing business long-term liabilities generally, the 'credit risk change' bit should not appear as part of the earnings of the company because of the paradoxical result that, as your credit gets worse, your liabilities go down and you show a gain. So that is another angle which is going to need to be addressed when you are taking this question of discount rates forward into the professional arena.

Ms H. Salt, F.I.A.: The paper tries to find a consistent and an objective assessment using a matching framework. It tries to find the answer, and that is a beguiling thing to try to find.

Mr Sharp has already explained why "the answer" is quite a difficult thing to find with pension scheme liabilities which include a lot of unknowables. But because we have this beguiling aim held up in front of our eyes of "the answer" from the matching framework, it then becomes clear in the paper that more and more budgeting exercises get dragged within that matching framework.

There is a big mistake at the beginning of the paper. If is very clear from the Stern Report that discount rates are always political and, in particular, lower discount rates are a way of reducing consumption in the present and privileging the future. That is very clear, certainly in the climate change discussion.

The other matter, we can take as a read across from that climate change discussion, is the idea that science will give us the answer and there is no room for politics. I would dispute that. Certainly there is plenty of room for politics in determining discount rates and nowhere is that more explicit than in the current discussion on public service pensions. That is my biggest dispute with the paper because it says that the real danger to the Actuarial Profession is when political objectives become confused with an actuary's professional advice on the appropriate discount rates. It is quite the opposite.

The real danger is when we, as a profession, refuse to recognise that the decisions and the advice we are giving are political.

Mr T. J. Llanwarne, F.I.A.: There is a lot of good points in this paper but it goes into recommendations, which is where I have questions. My questions are about what the Profession might do with the recommendations, not to comment specifically on whether the working party was right or wrong to make them.

It seems to me that the Profession could act in a number of ways in relation to the recommendations where there is sufficient agreement. At the two extremes, it could treat the recommendations as ones between the working parties and actuaries generally with the Profession staying silent, or, at the other, the Profession could make a statement of support for the recommendations, ask BAS to implement them to the extent that they are new, and then take on-board the recommendations targeted directly at the Profession.

The recommendations are couched in quite directive language, with the word "should" appearing in many of them. So this leads to a third possibility, that the Profession can make a statement saying that the recommendations have a lot of sense in them, but there is a need for greater flexibility to allow for professional judgement in the specifics of each case. So the Profession could support them on the basis that actuaries should be aware of what the working party is saying, but then the Profession goes no further.

Against that background, and in terms of how the Profession should react, I offer six questions:-

1 How best can actuaries influence government, the great and good, journalists, our clients and others outside our Profession of the sense and validity of whatever the Profession comes up with?
2 What is the role of the Profession?
3 What is the intended outcome of suggesting actuaries adopt the recommendations?
4 What is the scope?
5 What is the intent of the working party regarding the recommendations?
6 Are there any other aspects to be investigated, for example, extra categories beyond budgeting and matching once you move beyond funded UK insurance and pensions?

I suspect that the answers to these questions will impact both the "what" and the "how" of the next steps.

On the basis that the recommendations cover the wider world outside and not restricted to UK funded pensions and insurance, it is in my opinion not right for the Profession to get into promoting or supporting one technical approach versus other respectable alternative views on a directive "you should" basis, other than that which is approved or approvable by BAS after following a proper process.

From a perspective of influence, my experience says we gain influence by the following:

1. having professional ethical standards;
2. having technical standards from one source, in our case BAS, to give clarity;
3. having lots of tools to support our work, not just one tool;
4. use of professional judgement over how to use the tools within the BAS standards and not being straitjacketed on top by the Profession or whoever;
5. being open-minded and receptive to new and different ideas. Here I should mention macro-economic aspects which I have not found much in this paper and which are relevant in some sense, not just to public sector pension aspects, as Ms Salt was saying, but also in some exciting new developments which we have the potential to be involved with if we are open-minded enough;
6. use the language and meet the needs of users, not an actuary-focused language and approach, which previous speakers have commented on.

There are some excellent outcomes in what the working party is doing. But the paper seems too focused on funded UK pensions and insurance at the expense of consideration of the wider world beyond these spheres. I therefore suggest that if the working party is to look at a perspective beyond funded UK pensions and insurance, this could be achieved by inviting, for example, GAD's new technical director, Colin Wilson, to assist next steps, given his knowledge on unfunded pensions, his interface with macroeconomic considerations in government and his work on risk in project appraisal. He and I are working on some exciting new ideas which are gaining serious interest at high level.

To conclude, in taking this work forward, I am suggesting wider involvement and further thought about desired outcomes in the wider world outside this hall and about the future of the work we, as actuaries, can and will do. In my opinion and experience, the Profession should not be prescriptive in telling actuaries what to do beyond ethics and BAS, as evidenced by the early good progress we are starting to make in approaches to risk management and some really consequent gains and influence. So, the legitimate challenge for the Profession is what to request of BAS.

To succeed in these initiatives, we actuaries need to be innovative and explore new ideas for the greater good of all of our futures. That can give us a sustainable thriving profession and is what I believe we should all be working for.

Mr J. P. Ryan, F.I.A.: This is a very interesting paper. It might be better saying that this produces a lower bound to the liabilities rather than actually calculating liabilities, however you want to define them and for whatever purpose. This is particularly true when you get outside the life assurance and, probably, the pensions field and certainly in my field which is in long-term general insurance liabilities and in the capital projects and other issues that Mr Llanwarne referred to.

The reason for this is that in practice if you can get a perfectly natural portfolio where the variability of the outcomes match the corresponding one for liabilities, then there would not be a problem. The calculations would calculate as laid out using the matching approach and there would not be any difficulties.

But, in practice, the variability of most of the liabilities that we look at – particularly those in the general insurance field and the long-term capital projects and probably also pension longevity risk – are actually much more variable than come out in any of the marketplaces. Therefore you actually have a greater variability and you want a bigger adjustment for risk than the market would normally make. Thus you cannot adjust for that by putting in the corresponding risk in a portfolio where you obviously obtain a lower value and get a higher expected return. Generally, they will not offset each other in that way.

There will be some benefit of diversification of risk because the odds are that the variability in equities is not completely correlated with the variability in the liabilities. But you need to make some adjustment over and above for risk on that.

A lot of the financial theory, as opposed to actuarial theory, addresses this by discounting ranges of scenarios at risk free rates and then making an appropriate allowance for risk over and above that. This is because using a higher risk discount rate obviously reduces the impact of longer term liabilities more than that of the shorter term ones and there is much greater variability in many cases in the longer term ones than the shorter term ones. Therefore adjustment needs to be made for that.

This does not particularly invalidate much that is in the paper, and indeed the need to describe to other people what needs to be done, is an important aspect of it. But it is important to realise that we are only calculating lower bands when we get into the general insurance field for long-term capital projects.

Mr S. R. Rice, F.I.A.: I work for the Pension Protection Fund, which is nearly six years old now. We are not subject to the same regulatory and legal constraints as pension funds and insurance companies. Yet we face many of the same issues regarding discounting. I hope it will be of interest if I compare the authors' analysis and recommendations with the approaches adopted in the Pension Protection Fund in three particular areas.

The first area is accounting. The ninth recommendation, in section 6, is that the Actuarial Profession should call for pension liabilities in company accounts to be calculated in a matching framework (making no adjustment for sponsor default). The PPF is not subject to any requirements to discount its liabilities at an AA corporate bond discount rate. From the start five years ago, its accounting liabilities have been calculated in a matching framework, and its discounting has been at a reasonably risk-free rate. For the first few valuations our discounting was by reference to a zero-coupon interest-rate swaps curve. Lately, whilst gilts yields have exceeded swaps yields for longer durations, the PPF's discounting has been carried out using, broadly speaking, the higher of gilts yields and swaps yields at each duration. The compensation being valued is as set out in schedule 7 of the Pensions Act 2004, but crucially with no allowance being made for any possible future reductions being made by either the PPF Board or the Secretary of State. So we regard the liabilities as guaranteed rather than constructive, in the parlance of the paper.

But estimating market consistent cash flows is not straightforward and this estimation, as well as discounting, is an integral part of a market consistent valuation. How, for example, should a market consistent mortality improvement assumption be derived? What should we do about a market consistent assumption for CPI increases?

Even so, for all that, the PPF has problems in putting the accounting recommendation into practice, I do nonetheless endorse it, and I hope we as a profession can unite behind it. I recognise that making no allowance for sponsor default probably might prove to be a stumbling block for some of us.

My second point of comparison is funding, including the PPF's approach to its levy setting. At the PPF we have a long-term funding strategy which we published in August of last year. We are targeting self-sufficiency in the year 2030. We use this funding strategy in conjunction with our stochastic long-term risk model to assist us in our funding and levy analysis. The model run is based on thousands of economic scenarios, produced by an economic scenario generator, looking many years into the future. Liabilities at a point in time in the future are assessed broadly on our accounting basis and whatever yields are contained within the economic scenario at that point in time. Assets are valued taking into account the PPF's investment strategy and the rates of return in the scenario generator up to the point in time in question. Whilst this is not quite the budgeting approach described in the paper, but I think there is consistency.

Furthermore, in the context of funding pension schemes, I certainly endorse recommendation 4, in section 6, namely that actuaries and the Actuarial Profession should be clear that the use of a budgeting calculation alone in the assessment of technical provisions will not provide adequate information on the assessment of the security of members' benefits. I work each day amongst the

wreckage of pension schemes where one imagines that quite often the trustees had not appreciated just how insecure their members' benefits were. We still see schemes in assessment which have s.143 valuation funding levels of around 60%, sometimes even lower. So I definitely support that recommendation.

My third point of comparison relates to member options, and particularly commutation factors. Paraphrasing slightly, paragraph 6.4.3.3 says that the natural starting point for commutation factor calculations, particularly where equivalence in value is desired, should be a matching framework. The PPF agrees, and we do indeed calculate our commutation factors using a matching framework approach, in line with a legislative requirement for us to adopt actuarial equivalence. My sense is that most trustees, possibly almost all trustees, adopt a calculation framework based on an expected return on assets. I think this leaves members short-changed. One could argue that commutation is a voluntary transaction, into which members are not obliged to enter. That would only be a fair argument if members could be relied upon to have a degree of financial sophistication or to have taken independent financial advice. This is unlikely to be the case with the majority of members. I think commutation factors should be fair values derived on a market consistent basis in the first place.

Mr J. G. Spain, F.I.A.: I am speaking from a defined benefits pensions perspective alone. I am going to concentrate on just a few points.

First, I am quite pleased that I am not the only person to think that we seem to have a lot of "shalls", "shoulds" and "this is the way you will do it". I cannot see that this approach would be consistent with a learned profession which is what the President told us earlier we were going to be striving towards.

Regulators will have their own agendas for deciding what they want done. It is for the Actuarial Profession to enable its members to do what they think fit so long as they are reasonable about it. We should not be telling them exactly how to do everything.

One of the things that really concerns me is that, within the defined pensions environment, it is very unusual to have fixed benefits. Increases, whether inflationary, RPI, CPI, limited, full, whatever – and there are different limits around – need to be consistent with the discount rate. Just fixing a gross discount rate without looking separately at how the increases will be assessed is not really very helpful. I think subsection 6.6 needs to be expanded, at least for that; maybe for life assurance it is not such a big problem as it is for pensions.

There is a footnote to paragraph 2.13 about taking into account the future expectancy in deciding whether or not a budgeting approach or a mark-to-market approach can be taken, and the authors say that they are not really convinced that this is an appropriate thing to do. I would have thought it was a very appropriate thing to do because the potential life of the pension scheme is really all-important. One of the things the trustees should be looking at, apart from or perhaps part of employer covenant, is how long have you got to sustain us as pension scheme trustees in power. If it is not long enough, we are going to assume that we have a poor covenant and we are going to charge you, and you would not be able to justify having what are called risky assets. So I think that footnote is something perhaps the authors should reconsider.

Finally, in paragraph 1.2.2 the authors have several reasons why a framework is desirable. The fifth is effectively to enable actuaries to speak with a clear and consistent voice to regulators, standard setters and other professional bodies. So far, with this top-down approach, I do not think it

is doing that for actuaries, but I am sure the next version will be very much better, to which I am sure we all look forward.

Mr I. J. Kenna, A.I.A.: Actuaries need guidance on discount rates. Such guidance can only be market-based and therefore short term. We are painting a moving surface. Sometimes it seems like the authorities are moving the surface while we are painting it – hence the multitude of caveats in the paper. This situation cannot long continue. We need to look beyond the market and identify trends if we are to arrive at probable medium and long term discount rates.

Members will perhaps be surprised at my reference to world trade. However, I shall return to discount rates before long. The United States dollar is the main trading currency of the world. The United States has got into the habit of printing extra dollars for purely domestic reasons. Many of these dollars are eventually used to buy goods and services from the rest of the world. The rest of the world finds itself in the possession of trillions of surplus US dollars that it can use only for the purpose of buying US bonds. The rest of the world is dissatisfied with this situation. However, no other currency is either willing or able to take over the role of main world trading currency. This problem is beginning to be partially solved by currency and commodity swaps between non-US trading partners, by-passing the US dollar. Russia, the country richest in resources, is trading with China, the world's factory, using oil, roubles and yuan.

If world trade is not to break down into a multitude of bilateral deals, a stable objective reference value for currencies will have to emerge. This can only be gold. Only 80 years ago, major currencies were aligned with gold. One result of this alignment was sound money. Another result was stable risk-free discount rates.

Actuaries are not bankers. Actuaries need to look at medium term and long term risk-free discount rates while, of course, making appropriate allowance for risk in any particular case. Fortunately, actuaries have some guidance on the historical shelves at Staple Inn. We do not need to re-invent the wheel. This paper does all that it can do at the present time. That is, identify short term measures for dealing with a short term situation. However, the recommendations should not be cast in tablets of stone.

Mr D. I. W. Reynolds, F.I.A.: I would like to take up a point around recommendation 11. In looking at discount rates, the Profession has been quite fortunate in avoiding a lot more criticism than it might have received because different bases have been used in the same areas, for example, pension benefits reserved for in insurance companies or in pension funds, or between different pension funds.

One of the great advantages of the paper is that, if there are going to be differences in future, there will be a structure which can explain how the rate has been produced and on what basis. That is its great benefit. Mr Llanwarne thinks there is more still to be done and put through BAS. I think the structure gives a basis for progress.

Turning to recommendation 11 on cash equivalent transfer values, I have always had a simple approach to transfer values between pension funds. Apart from a bid/offer spread, the amount that is transferred should provide the same benefits in the transferee company as in the transferor.

People may argue that if the actuary has been using a risk-free discount rate for their reserves, there is a larger figure coming out. But I have never heard of money being transferred into a fund which is using a discount rate allowing for an equity premium providing higher benefits than were

transferred out. A matching basis should get us to the situation where the calculation will provide the same benefits, apart from the bid/offer spread, whether you transfer out or transfer in.

Now, let me come back to the Management Board and the recommendations. I note in recommendations 5, 9, 12, 13, 17 and 18, various actions should be picked up by the Profession and taken forward. How that happens, whether we actually just go ahead or we go through BAS, I leave to the Management Board.

I should like to leave them with a task, which is that the Management Board is able to report back to the Profession by the time of the AGM on 27 June where they have got with the recommendations. It may be that they have passed some of them to BAS; it may be that there has been further work; but let us not have recommendations, throw them out into the ether and leave them there, so that they are not necessarily picked up. So President, may I give you that date?

The President: On behalf of the Board, I will happily accept that challenge.

Mr B. W. Nimmo, F.I.A.: The point I want to make is that the paper just deals with a particular model. What disappoints me about the paper, about the previous paper, and also about some of the debate we have had here, is the recognition that discount rates, whilst having served the Profession well for a long time and will continue to serve us well in certain areas going forward, is just one model we can use. We have to admit and recognise that there are other models out there that do a lot of the jobs that discount rates have done very well in the past. This is particularly important when we are talking about educating the wider public.

If we are going to widen that debate and educate regulators, the government and everyone else, we need to be looking at those other models, at least recognising they exist, even if we do not explore them in any detail.

Professor A. D. Wilkie, F.F.A., F.I.A.: This is a well-presented paper, but it seems to me to be rather old-fashioned in its approach, perhaps about 30 years out of date. There is a reference in appendix C.4 to stochastic models, and a reference to the Report of the Maturity Guarantees Working Party by Ford and others, in 1980, and then to a paper by myself, Waters and Yang of 2003 about Guaranteed Annuities. But the better paper on that subject is that by myself, Owen and Waters of 2005 about options and hedging.

I shall describe the stochastic approach more fully in a written contribution. However, I would like to go into an additional point in a little detail, which the authors should have made but did not quite make in appendix B.

Assume a liability of 1 in a year's time. It is a fixed liability with no uncertainty about it. Assume the usual stochastic logarithmic Brownian motion for the assets, as the authors do in Appendix B. The mean value of 1, invested now, is $\exp(\mu + \frac{1}{2}\sigma^2)$. But you cannot discount at a force of $\mu + \frac{1}{2}\sigma^2$ to get the mean present value to meet the liability of 1, because the mean present value is given by $\exp(-\mu+\frac{1}{2}\sigma^2)$, not by $\exp(-\mu - \frac{1}{2}\sigma^2)$. Medians work all right, because the median amount of 1 at the end of the year is $\exp(\mu)$, and the median present value is $\exp(-\mu)$. It is the skewness that gives the trouble.

All the cases where the returns are very good mean that you can have a small starting investment; but these are all bunched up as a lot of small present values. In all the cases where the returns are

very bad you require large – possibly very large – starting amounts, and those give a long upwards tail to the present values.

So if you are going to invest in non-matching risky assets, you should use a lower discount rate if you wish to calculate mean present values, not a higher one. However, assets that appear riskier may match the liabilities better, so it is riskiness relative to the liabilities that counts, not riskiness relative to cash.

Reference

Wilkie A. D., Owen M. P., Waters H. R. (2005). Notes on Options, Hedging, Prudential Reserves and Fair Values. *British Actuarial Journal*, **11**, 199–312.

Mr D. Simmons, F.I.A.: The comment I want to make is very basic. We are concerned with discount rates for a series of cash flows. Think of a cash flow of a certain amount at some point in the future. The premise for discounting that cash flow is that we believe that a lower amount now would grow to be sufficient to meet that cash flow at that point in the future.

I make this point because no matter how we get our discount rates, whether it is market consistent, matching or budgeting, at the end of the day they are assumptions of the rate at which money will grow until the cash flow in question materialises. In my opinion it is important to keep a focus that they are assumptions. We need to be clear about why we have derived the assumptions, how we have derived them, how those assumptions might affect the cash flows themselves, the risks that those assumptions are not achieved in practice, and the consequences if this occurs. We should keep a focus on these points.

Dr. Y. Avrahampour (LSE): I am not an actuary but I have looked at some historical aspects of actuarial work.

The first thing that I would like to mention is on the topic of models. I like very much the idea that one should expand the number of models that one uses in order to look at these questions. In particular, the type of model that I have in mind are models of the firm and models of agency because when one adopts a model of agency as consisting in the information asymmetry, the logical outcome of such a model is transparency to the fullest degree and no discretion in actuarial practice.

However, if one adopts different models of the firm and of agency, then one can get to places where there is a trade off in the degree of transparency and standardization. In academia we are developing these types of models right now (Avrahampour, 2008).

The second point I should like to mention is the topic of inflation. In the case that we have very high inflation, then a matched policy is not going, especially with caps on increases to benefits, to meet members' expectations regarding their retirement income. One might have discharged one's responsibility to meet the liabilities, but in fact the customer's expectations regarding the purchasing power that should get to his pocket at the end of the day is dramatically different.

I say this, because it would be a shame if having been criticised for insufficient standardization in the recent past, in my view to a large extent wrongly, it would be a shame if the Profession was in the future criticised for not employing sufficient discretion to protect the real value of pensioner's benefits.

One final observation: if we adopt an actuarial basis that is based on a risk-free discount rate, it may make the current elaborate framework for pension fund financial accounting redundant. In that situation one can adopt a cash approach to accounting for pensions. One can just report the contributions in any given financial period as the cost of pension provision because actuarial valuation is done on a solvency basis. This accounting approach would be perceived to be an accurate presentation of cost from the perspective of pensions fund financial accounting. The end result of this might be that there is no need for the elaborate framework of accounting that we currently have in this area. That might be interesting!

Reference

Avrahampour Y. (2008). A Relational Theory of the Valuation and Management of UK Defined Benefit Pension Funds (1948–2008). *Proceedings of the 2008 Meeting of the Academy of Management*, 1–39.

Mr R. T. G. Hails, F.I.A. (closing the discussion): I am going to outline some of the actions that are going to happen following on from these meetings to the conclusion of our particular part of the project.

I am conscious of the revision in the timeframe that might arise from the challenge that Mr Reynolds has thrown down to the Management Board. I am also on the Management Board, as well as being part of the steering committee, so I am involved at both ends of this particular project.

We have had some very detailed contributions. There have been comments about terminology and transparency which have been made by number of individuals. I am delighted that Dr Pryor from the BAS is not so concerned about the differences in terminology. It is right we should recognise that there are complications associated with the actuarial advice that we provide to our clients and users of that advice. A warning about making our advice understandable to recipients is always something worth making.

I like the idea that market consistent valuations could be beguiling, and there were comments made questioning the certainty of some market consistent valuations in that some of the assumptions underlying those calculations may themselves be more uncertain.

There was a comment about the pensions, insurance and potential UK bias of the paper. Many of the examples have been drawn from areas which those on the steering committee are more familiar with, so that is perhaps not surprising. I do believe that the approach and the framework that we are trying to put together is capable of much wider application. It is not a UK-centric framework that we are commenting on and setting out in the paper.

I do not see this as a particularly technical paper. There have been comparisons drawn between our paper and technical advice. I see the creation of this framework as a tool for actuaries to use in dealing with different sorts of valuation – and I use the word "valuation" intentionally as it is one which we have to cope with in providing advice to our clients. The paper is trying to give people a tool and a framework to describe what the real consequences might be of any particular set of assumptions, and what the consequences are if those assumptions are not borne out.

I do not see the outcome of the work of this steering committee as trying to put future actuaries in a straitjacket or to be a source of prescription from the Profession about particular discount rates. I would just go back to the comment that was made in the introduction that we are here trying to give

people a framework, something that will be helpful to actuaries in understanding more precisely what they are doing, but also making it easier to communicate that to other people who are non-actuaries. It has already been mentioned that part of our remit is to come up with a non-actuary version of this paper, or at least covering the bones of this paper. I suspect that could be a substantial challenge for us all.

The Management Board charged us with being part of and to initiate a full and open debate on these issues. There has been comment about "shoulds" and "shalls". We did intentionally couch some recommendations in terms that would prompt a response. We can safely say we managed that with some success. So, the comments about an appropriate form of language to use in any conclusions that come out of this work are well made and are taken. As we say, the Profession is not setting standards in technical work, but it does have a role in trying to make people think.

The aim is to help actuaries be able to communicate the challenges they are dealing with.

We are seeking views inside the Profession, in forums such as this, and also talking to a number of stakeholders outside the Actuarial Profession who interact with actuaries. We had a meeting a fortnight ago in Edinburgh, and we have this meeting here in London. Similar discussions will be taking place in a number of regional actuarial societies over the coming weeks. In parallel with this, work is being done to talk to stakeholders with whom actuaries have to deal.

If anybody has anything which they particularly want to add, the Profession's research manager, Ruth Loseby, should be the recipient.

The aim is to try to complete the bulk of this consultation around the end of February, which is going to be challenging since we are now at the end of January. The Discount Rate Steering Committee will be pulling these strands together and passing them on to the Management Board for the Management Board for them to consider the next steps.

The President: I am absolutely thrilled that we have had such a fantastic turn out here as we did in Edinburgh a fortnight ago. I remarked to somebody in Edinburgh that it is just like the old days: a great paper, full houses, and some very good contributions from the floor, not just from members but from guests as well.

I am particularly delighted that this, our first major attempt to bring together expert volunteers, with some funding to get leg-work done, and under the firm but fair hand of Ruth Loseby, is a very good example of how we seek to move forward.

We do not just do research for its own sake. We are doing it to advance our standing, to advance our thinking, and also to advance the understanding of those who use actuarial services. I believe that we have made a good step forward. As you will gather from tonight, their job is by no means done. There are a lot of big challenges for the working party. There are also challenges for the Council and the Board of the Profession as they decide what to do with it, the language to use and the route by which this material gets rolled out. But for the working party, we would not have those challenges. I should like you to join with me in thanking them, the opener and the closer.

Professor A. D. Wilkie, F.F.A., F.I.A. (in a subsequent written contribution): I should like to explain further what I mentioned very briefly at the meeting about the use of stochastic simulation models,

which the authors refer to, also briefly, in appendix C.4. The stochastic approach does not try to use discount rates, though it may need them incidentally.

It starts with a set of liabilities, whose future progress through the years is then simulated. This allows one to bring in the uncertainty of the liabilities, including, if you like, the uncertainty of your estimates of the parameters used for the liability model. It also starts with a set of assets and an investment policy, which are also simulated in the same way, taking account both of the uncertain returns and of the uncertainty of your parameter estimates. In the simplest case the liabilities do not depend on the performance of the actual assets, though they could depend on the performance of investment indices. If the liabilities do depend in a more complicated way on the actual asset performance, the problem is more complicated.

In either case, the objective is to find, within each simulated future, the quantum of assets that would be required to meet the liabilities. Since you know the simulated future, this amount can be determined. From a lot of simulations you get a distribution of the present values of the assets that are needed. You can calculate statistics of that distribution – mean, median, quantiles, etc. This knowledge may be sufficient for some purposes, if no transactions are to take place and no formal accounting is to be done. You may have to search around to find a good investment policy that does match your assets. The matching process described by the authors may turn out to be a fairly good one if your liabilities suit it; but the matching discounting method does not allow for the uncertainty of the liabilities.

However, you may have to decide what a suitable value is to use for some cash transaction, or to put into formal accounts. This is where a sensible dialogue with the accountants seems to me to be desirable. Should a "best estimate" be the mean, or the median, or some other quantile? What quantile should a prudent estimate be – perhaps 80% or 99%? Should the prudent estimate be presented as a single number or as a best estimate plus a contingency amount? We should have been discussing these points at the meeting.

Discounting may come into this process. Instead of simulating all the way to the final run-off of the liabilities, you may choose to go forward till they are reasonably small, and then calculate what in Lloyd's would be called a "reinsurance to close". You estimate, using traditional actuarial methods, what the then present value of the small remaining liabilities would be as at your closing date, and wind up your simulations as at that date.

You may also wish to take account of ongoing statutory requirements as you go through, to make sure that your fund, whatever it may be, appears to be solvent at each intermediate year-end. You may then have to use a simulation of whatever the supervisor or accounting standard might require, using traditional methods. But these uses are secondary to the main simulation process.

If all the assets are assumed to be invested in the same way, then one needs to assume only an investment of one unit. Intervening cash flows, in or out, are all accumulated forwards at the same overall rate, and the final total is inverted (discounted if you like, but at the actual asset performance) to get the required starting assets for that simulation. But if different sections of the business are assumed to be invested differently, or with different investment policies, then an initial estimate of a suitable amount of assets for each section may need to be made, and that may be done by classical discounting methods but the initial amounts may need revising after the first simulation

trials have been done. In Wilkie, Owen and Waters (2005) we assumed a specific investment strategy for the hedged portfolio, and a different strategy – actually three different ones – for the investment of the contingency reserve.

There are of course minor transactions where traditional methods are best: valuing a life interest or reversionary interest, valuing pension rights on divorce, calculating transfer values. But the big questions for insurers and for pension funds should, in my view, be tackled by simulation. I thought that that was what Solvency II was all about.