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PENSION FUND VALUATIONS AND MARKET VALUES

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[Presented to the Institute of Actuaries, 25 October 1999, and to the Faculty of Actuaries, 20 November 2000]

The text of this paper, together with the abstract of the discussion held by the Institute of Actuaries on 25 October 1999, are printed in *British Actuarial Journal,* **6,** I, 55-141.

However, when this paper was discussed by the Faculty of Actuaries, the following 'Survey of Practice' had been carried out, and was also presented.

PENSION FUND VALUATIONS AND MARKET VALUES

SURVEY OF PRACTICE

1. Introduction

Our Working Party, set up by the Research and Technical Support Committee of the Pensions Board, presented its paper, 'Pension Fund Valuations and Market Values', at a sessional meeting of the Institute of Actuaries in October 1999. It is presenting the same paper to the Faculty of Actuaries on 20 November 2000. Prior to the Faculty meeting, we have carried out a survey of Scheme Actuaries to assess what methods are actually being used in funding pension schemes. This paper sets out the results of the survey.

2. Scope of the Questionnaire and Number of Responses

A questionnaire (reproduced in Appendix 1) was sent to the 872 Fellows of the Faculty and Institute of Actuaries who held a valid Scheme Actuary certificate in August 2000. The response rate was good, with 295 (34%) being returned.

The questionnaire asked specifically about the method used in the last funding valuation signed by the actuary (i.e. that used to set the employer's contribution rate). We also asked for the actuary's preferred approach going forward (again specifying a funding valuation).

Of the 295 responses, five were completed in a way which did not allow

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them to be included in the results (for instance specifying more than one method), leaving 290. Two were completed for the last valuation only, and nine for preferred approach going forward only.

Of the 290 responses, 248 listed their employer as a consultancy and 34 as a life office (eight not specified). Although there were differences in the responses between these categories, given the relatively small number from life offices, we have not broken down the results between these groups.

A detailed breakdown of the results is set out in Appendix 2, but we comment on the major features below.

3. Valuation Methods Described

We have used the categories of valuation methods set out in the paper, 'Pension Fund Valuation and Market Values', which are summarised below. We asked respondents to choose the one which most accurately describes their approach, although, for those which could not be put in any category, we have given an 'other' option.

The methods we described (with descriptions as per our paper) were as follows:

Method 0 (Traditional Method)

This values both assets and liabilities using a discounted cash flow approach. The assessed value of assets represents the discounted present value of the expected income and capital proceeds from the scheme's assets, usually expressed in the form of a market value adjustment (MVA) to those assets.

Method 1 (Market Value Adjustment (MVA) Approach)

The method takes the market value adjustment (traditionally applied to the assets), and applies the inverse to the discounted value of the liabilities to give a market-adjusted value.

Method 2 (Asset Based Discount Rate)

Under this method, the market reference is made directly via the discount rate. We first derive an implied market discount rate for each asset class. For example, for gilt investments this is simply the gross redemption yield. For equity investments this involves determining the discount rate implied by the current market price and expected dividend and/or sale proceeds. The overall valuation discount rate is then determined as a weighted average of these individual discount rates, based on the proportions invested in each asset class.

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Method 3 (Economic Valuation using Bond Yields)

The discount rate and related assumptions are derived directly from market information. At its simplest, the discount rate is taken as the gross redemption yield on an appropriate portfolio of bonds. The discount rate so derived is then used to value the liabilities.

Method 4 (Bond Yields plus Risk Premium)

This method starts with the Method 3 discount rate (based on bond yields), but then adjusts it to take account of returns expected from other asset classes (e.g. equities). This is done by adjusting (usually increasing) the discount rate by the addition of either a constant or a variable risk premium.

In addition, we asked whether, for respondents using Methods 2, 3 or 4, they employed any explicit smoothing of the results or the parameters used in valuing liabilities.

4. Main Findings

4.1 *Diminishing Use of Traditional Method*

Figure 1 shows the results split between the different methods. Even at the last valuation signed, the majority of respondents used a method other than the traditional method, and, in particular, Method 4 (bond yields plus

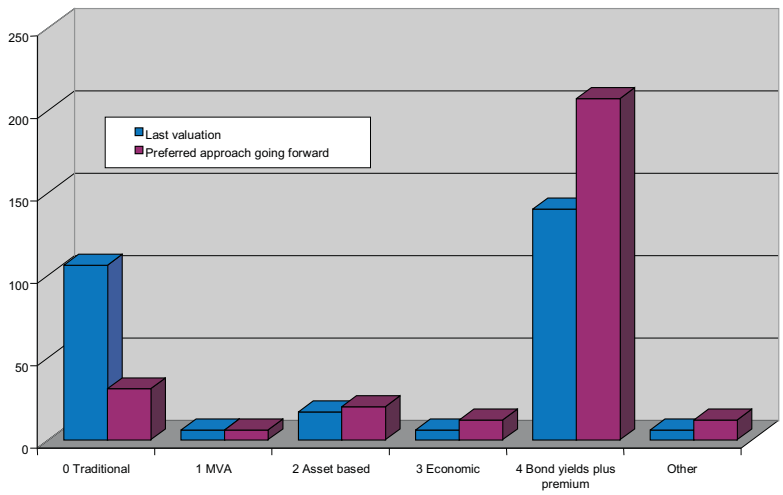


Figure 1. Valuation methods in use

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risk premium). When questioned about their preferred approach going forward, there is very strong support for Method 4. Valuation methods are clearly changing.

4.2 *Variations within Methods 1 to 3*

Whilst a minority of actuaries are using these methods, there are certain interesting features. For those using an MVA approach (Method 1), the trend is towards applying this to both past service liability values and future contribution rates. Methods 2 and 3 are gaining in popularity, marginally, with a majority of actuaries using corporate bonds as opposed to gilts to set their discount rate for a Method 3 (economic) valuation. Term dependent discount rates are not, however, commonly in use.

4.3 *Variations within Method 4*

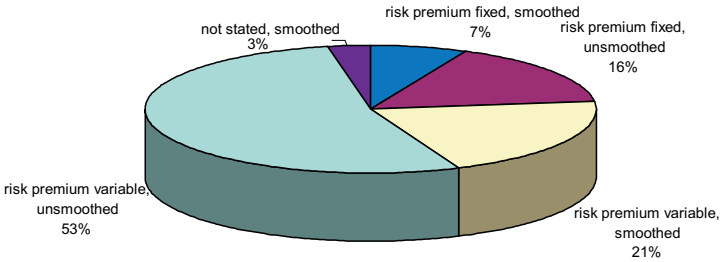
Whilst the majority of respondents are moving towards use of Method 4 (bond yields plus risk premium), there is no clear consensus within this group between the various approaches. Figure 2 shows the variation amongst the responses for the 207 respondents who chose Method 4 as their preferred approach going forward. Most intend to vary the risk premium with changes in market conditions, presumably for some implicit smoothing of results or the use of actuarial judgement. In total, about 30% also apply some explicit smoothing of results. There is a more mixed response in terms of whether the premium is applied pre and post retirement or just pre retirement. The majority, however, tend to use the same basis for past and future accrual of benefit.

5. Conclusions

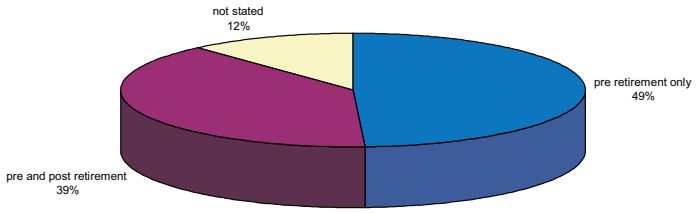
There is no doubt, from the results of the survey, that actuaries are changing the way that funding valuations are presented, with the majority now moving towards our Method 4 (bond yields plus risk premium). At the same time, there appears to be strong support for a variable risk premium. One could conclude that actuaries are looking to retain the ability to smooth results and use actuarial judgement in advising their clients, whilst presenting results in market value terms.

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Method 4: Variation in risk premium



Method 4: Risk premium applied pre or post retirement



Method 4: Use of same basis for past & future accrual

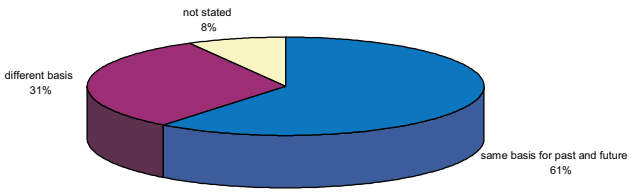


Figure 2. Variations within method 4

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APPENDIX 1

QUESTIONNAIRE

	Last valuation signed	Preferred approach going forward
Method 0: Traditional Method		
same basis for past and future		
different basis for past and future		
Method 1: MVA Approach		
apply MVA to past service only or		
apply MVA to past and future service		
Method 2: Asset-based discount rate		
same basis for past and future or		
different basis for past and future		
Method 3: Economic valuation using bond yields		
discount using gilt yields or		
discount using corporate bond yields		
single discount rate or		
term dependent discount rates		
Method 4: Bond yields plus risk premium reflecting expected equity performance		
is your risk premium fixed or		
is your risk premium expected to vary with market conditions?		
does risk premium apply pre retirement only or		
does risk premium apply pre and post retirement?		
do you use the same basis for past and future service or		
a different basis for past and future?		
Other — (e.g. MFR plus a margin — please specify overleaf)		
If method 2, 3 or 4 is used, do you explicitly smooth the input parameters or the results?	Yes / No	Yes / No

Name (optional).....Employer (optional).....

Type of employer.....

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APPENDIX 2

SUMMARY OF RESULTS

Methods	Last valuation																Preferred Approach													
	Basis for past and future																Basis for past and future													
0 (Traditional	same		different			not stated			total				same			different			not stated			total							
Method)	95		7			4			106				24			4			3			31							
1 (Market Value	Apply MVA to…																Apply MVA to…													
Adjustment (MVA)	past service only		past & future			not stated			total				past service only			past & future			not stated			total							
Approach	5		0			1			6				2			3			1			6							
2 (Asset based	Basis for past and future												Basis for past and future																	
Discount rate)	same		different			not stated			total				same			different			not stated			total							
	4		11			2			17				7			11			2			20							
	Results smoothed?																Results smoothed?													
	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no					
	1		3	0		11	0		2	1		16	2		5	2		9	0		2	4		16					
3 (Economic	Discount using gilt yields or corporate bond yields?												Discount using gilt yields or corporate bond yields?																	
Valuation using	gilt yields			corporate			not stated			total			gilt yields			corporate			not stated			total							
Bond yields)	1			4			1			6			3			8			1			12							
	Results smoothed?																Results smoothed?													
	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		No	yes		no					
	0		1	0		4	0		1	0		6	1		2	0		8	0		1	1		11					
	Single or term dependent discount rates?																Single or term dependent discount rates?													
	Single			term dependent			not stated			total			single			term dependent			not stated			total							
	5			1			0			6			9			2			1			12							
	Results smoothed?																Results smoothed?													
	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		No	yes		no					
	0		5	0		1	0		0	0		0	1		8	0		2	0		1	1		11					
4 (Bond yields plus	Is premium fixed or does it vary with market conditions?																Is premium fixed or does it vary with market conditions?													
Risk premium)	fixed			varied			not stated			total			fixed			varied			not stated			total							
	47			87			6			140			46			147			14			207							
	Results smoothed?																Results smoothed?													
	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no					
	10		37	21		66	3		0	34		106	14		32	41		106	6		8	61		146					
	Does premium apply pre or pre & post retirement?																Does premium apply pre or pre & post retirement?													
	pre retirement			pre & post			not stated			total			pre retirement			pre & post			not stated			Total							
	75			60			5			140			102			81			24			207							
	Results smoothed?																Results smoothed?													
	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		No					
	19		56	13		47	2		0	34		106	33		69	19		62	9		15	61		146					
	Basis for past and future																Basis for past and future													
	same			different			not stated			total			same			different			not stated			Total							
	94			40			6			140			126			65			16			207							
	Results smoothed?																Results smoothed?													
	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no	yes		no					
	24		70	6		34	4		2	34		106	43		83	11		54	7		9	61		146					
Other	6																12													
Not completed	9																2													

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ABSTRACT OF THE DISCUSSION

HELD BY THE FACULTY OF ACTUARIES

Mr S. J. Head, F.I.A. (introducing the paper)**:** The Working Party which produced this paper was originally set up in the wake of the changes to advance corporation tax in the 1997 Budget, but its work has become even more topical since then. From taking part in current issues seminars run by the Institute and the Faculty, it became apparent to us what pensions actuaries were seeking from our group. They wanted us to describe and investigate different valuation approaches. It was also clear that actuaries did not want to be told which approach they should use, but rather to understand the different approaches, and then use their own judgement as to how to proceed. So, we set out to produce a paper that is accessible to all pension scheme actuaries and actuarial students which would do just that. I hope that we have achieved that goal.

The paper was first presented to the Institute of Actuaries just over a year ago. In parts it may seem as though it has been overtaken by events, but in relatively few areas. Since that time, we have conducted a survey of practice among all Scheme Actuaries. [The paper describing this survey appears immediately before this discussion.]

One of the points made early in the main paper is that it is important to identify the purpose of an actuarial valuation. Section 2 of the paper clearly draws a distinction between calculations carried out for funding (that is, setting employer contribution rates) and those for other types of valuation, which we describe as 'pricing valuations', where the aim is not to produce a contribution rate, but to place a value or a price on a pension liability. There is a clear distinction between the two, and it is important to identify this at an early stage.

The main paper then sets out a number of valuation approaches. Our survey has shown that these methods are all in use to calculate liability values for comparison with the market value of scheme assets. At one end of the spectrum is our Method 1, which simply applies the traditional discounted cash flow market adjustment on the other side of the valuation balance sheet. At the other end of the spectrum is our Method 3, the economic valuation using bond yields, where the market pricing of liabilities is carried out by reference purely to forward rates of interest achievable on fixed-interest and index-linked bond investments. We believe that most, if not all, market-based methods in use can be categorised into one of the methods which we set out in the paper. However, one of the important benefits in a discussion like this is that we may hear from individuals who are doing something different from what we have described. I very much welcome those submissions, either today or at a later date in writing.

We describe Method 4, valuing using bond yields plus a risk premium, in general terms, and it is clear that many actuaries are adopting this sort of approach. For the purpose of modelling the results, we needed to decide how to set that risk premium. We could have fixed it for all time periods which would have led to results very similar to our Method 3, but with the funding target at a different level. However, we derived a formula to determine a risk premium, and this is described in Appendix B of the main paper. That formula aims to achieve the greatest local smoothness of funding level. The results in Section 8 of the main paper show that, in this respect, it is reasonably successful. However, do not think that this means that we have found the answer to setting the risk premium. It is primarily the reliance on equity dividend yield in that formula which generates the smoothness, but it also builds in the same characteristics as traditional methods; namely, the exposure to changes over long time periods in dividend yields.

In our conclusions, the principal one is that, whatever approach is taken to the valuation, professional judgement remains of vital importance. Clearly, there are some valuations, for instance for statutory purposes, where the rules of the game must be enforced, although professional judgement still has a part to play in setting those rules. Other valuations, for instance for funding, allow significant flexibility for the actuary to exercise judgement, and, therefore, place a great responsibility on the actuary to do so correctly.

Another conclusion, set out in ¶10.4.2, relates to the Minimum Funding Requirement

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(MFR) basis, which was mentioned in our terms of reference as a Working Party. Since the paper was written, we have been slightly overtaken by events, with Mr Myners suggesting that there should be no such thing. However, I believe that what we have written remains relevant. We use the MFR to illustrate how important it is to identify the purpose of a valuation. If the existing terms of reference for the MFR are retained, we believe that something along the lines of our Method 4, using bond yields plus a risk premium, would be appropriate. If, however, the MFR required the valuation of near certainty of provision, then our Method 3, using bond yields alone, would appear to be the logical option.

I found the results of the survey fascinating. We asked, specifically, for details of the methods used for funding; that is, setting employer contribution rates. We sent out just under 900 questionnaires. We asked actuaries to tick boxes as to which methods they were using. Now, you may have heard it said that an actuary is someone who, when you ask them the time, tells you how to build a watch. A few did, but we still did have nearly 300 responses that we could use.

We asked, first, for the method used in the last valuation that had been signed. We did that deliberately, rather than ask for the one used most often, most recently, so that we aimed for a representative sample. This showed that the traditional discounted cash flow approach was used by about one in three of the respondents, and slightly more than this adopted our Method 4, using bond yields plus a risk premium. There was some support, but not very much, for the other methods set out in the paper.

We then asked about the actuary's preferred valuation method, going forward. Here we saw a marked shift away from the traditional method and towards Method 4, with over two out of three responses favouring this approach going forward.

We also asked how actuaries would be setting their risk premium for use in Method 4. Here there was less consensus. However, around three quarters of the actuaries expect their risk premium to vary with market conditions.

My conclusion from this is that, whilst adopting Method 4, most actuaries are looking to retain professional judgement in setting the risk premium, to allow management or smoothing of the results. I believe that the challenge for us, going forward, is to develop our skills in setting that risk premium and explaining the concept and the impact of it to our clients and to other experts in the field.

Mr W. Yule, F.F.A. (opening the discussion)**:** It is particularly important that the paper tries — and I think succeeds — in delivering a balanced view on market-related valuations relative to traditional methods. The theme of a balanced view is something we would all do well to keep in mind.

Within the profession we must guard against taking an entrenched view. For example, one actuary might say: "I have always used a discounted cash flow valuation; it has always worked well, and I am not changing now." Alternatively, perhaps at the other extreme, an actuary might say: "Traditional discounted methods are wrong; we must all change now. I only use a market-related method." I would hope that we would all agree that a more balanced view is correct. Indeed, with a little tweaking around the edges of a valuation basis, I am confident that a reasonable actuary could use pretty much any valuation method to replicate a given result.

Now, what are the problems with the traditional valuation method that have led us to consider market-related methods? For those of us who work in the pensions area of actuarial work, what is described in this paper as the traditional method (Method 0) is regarded by most as an essential and well-used model. The fundamental strength of the traditional method has been its ability to operate sensibly when investment markets have been volatile. As we stand, in the year 2000, when investment markets are expected by many commentators to be as, or even more, volatile in the future than they have been in the past, surely parting company from the traditional method is the last thing that we should consider. However, to understand this position more, we need to consider why the traditional method has been so successful in the past.

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The traditional method is based, often exclusively, on the assessed (or actuarial) value placed on the dividend stream emerging from the holding of United Kingdom equities. Its success has been based on the fact that, while U.K. equity market values have been volatile, the dividends paid by U.K. company directors have been relatively stable. However, the prospects for U.K. dividends emerging so smoothly in the future are viewed as much reduced.

Firstly, the Chancellor of the Exchequer withdrew U.K. pension funds' ability to reclaim advance corporation tax on U.K. equities. This resulted in secondary effects, such as share buy-backs, distorting the dividend stream. Secondly, there was the impact of new economy or 'dot.com' stocks, which paid little or nothing in the way of dividend. Strong growth in market values in this sector has increased the impact on average U.K. dividends. One extreme example of this, perhaps, was Vodafone's purchase of Mannesmann, the impact of which has already been discussed in actuarial circles.

These are two examples of factors which have disturbed what was once a stable situation. Indeed, one of the most significant comments is the view, in ¶4.2.4, that future U.K. dividend payments will follow the United States model of enhancing shareholder value rather than smooth emerging dividends.

The paper considers a variety of alternatives to the traditional method, all of which are based on a market value of scheme assets. Clearly, this avoids the problems of using the dividend model. However, this may raise new general issues. For example, aside from Method 1 (which is a close relative of the traditional method), Methods 2, 3 and 4 all share a common theme, which is that they use a discount rate based on current market prices to value liabilities. Two critical assumptions as to the validity of this approach are that market prices are rational, and that markets are efficient.

When these assumptions hold, any factor influencing market prices similarly affects liability values through the discount rate used. In theory, the overall balance of the valuation should be maintained through this consistency. Hence, the valuation achieves robustness over a longer term.

However, where the assumption that markets are rational and efficient does not hold, the overall balance of the valuation cannot be guaranteed. We could find ourselves in the situation where short-term forces in investment markets could distort solvency levels and contribution rates. The likely effects of this have been tested by the authors through the back testing and forward testing in Section 8, and these are not thought to be significant. One point that this back testing has not been able to consider is the effect of U.K. pension funds being valued by reference to market values. What effect this might have on investment markets and, in turn, on future valuation results, is not clear. Could we be in the situation, in ten years' time, where we meet again to discuss a more robust valuation method which is immune to such factors?

The paper does not consider alternative solutions to the problems of the dividend model, aside from the market value approach. I wonder if it would have been worth considering methods to adapt the traditional discounted model; for example, using a more realistic valuation basis and, in particular, giving careful consideration to future rates of dividend growth. The traditional discounted model, itself, is not fundamentally flawed, rather the dividend stream on which it relies is changing.

Of the alternatives described, Method 1 is most closely related to the traditional method. Indeed, it might be said to share its flaws, by relying on a stable dividend stream. However, it does make a significant stride, in that future contributions, as well as past liabilities, are in the same currency as assets (in this case, market prices).

Method 3 values liabilities by reference to the yields on appropriate conventional and index-linked gilts, and some interesting results are disclosed. For a scheme which has a typical spread of investments between the normal asset classes (a majority of which are U.K. equities), we find that, using back testing, this method leads to the greatest volatility in contribution rates and solvency levels. This can be attributed to the mismatch between liabilities denominated in index-linked gilts and assets denominated mainly in U.K. equities. Amending the assumed investments to an increased proportion in index-linked gilts sharply reduces the volatility in both

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the contribution rates and the solvency levels. However, such a change in investments does come at a price, and the price of stability is an increased contribution rate. Over the back testing period considered, between 1985-1998, index-linked gilts dramatically under-performed U.K. equities. Does this method, then, only offer stability at the price of reduced investment returns? If so, I would suggest that it is not much of a choice.

One aspect of this method that does concern me is where the actuary comes in. If the valuation relies entirely on market yields to derive assumptions, any well-trained practitioner could complete a valuation. My concern here is for more than my livelihood, in that excluding the actuary excludes actuarial judgement. It is the power of this judgement which has caused actuaries to question the traditional discounted method in the light of recent developments. It is only correct that this judgement should be exercised in the future.

Method 4 determines liabilities in a similar manner to Method 3, but increases the discount rate to allow for the higher expected return from investing in other asset classes with a higher expected return (i.e. equities). The paper offers a method for deriving such a risk premium, which aims to maximise stability in the short term. Back testing experiments show that a variable risk premium, derived in this way, performs favourably, and leads to stable solvency levels and contribution rates. This is not surprising, since the risk premium was designed specifically to achieve this. Forward testing similarly predicts that this method would perform well.

However, it is the risk premium, itself, which raises other issues. Setting this factor is subjective. It is a matter of actuarial judgement and opinion. Ultimately, the level of this premium will have a big effect on the overall results of a valuation. Few actuaries would be happy to stick with the 2% implied by the MFR, and views are likely to be diverse.

The risk premium discussed in Appendix B is a useful starting point. However, most of the Scheme Actuaries whom I know are very practical, and would prefer to use their judgement to come up with a smoothed risk premium. Should Method 4 prove to be a popular valuation method of the future, this is an area where there will be much future research and debate.

The authors note, in ¶10.1, that actuarial science is constantly developing. This is only right. Any profession which is not prepared to adapt in a developing world does not have much of a future. Given the many changes that we have been challenged within the world of pensions, like: the advance corporation tax change; the emergence of technology stocks; the MFR; and the forthcoming changes in International Accounting Standards; it is only correct, now, to take stock and consider what valuation methods are best for use in the future. Indeed, given the results of the 'Survey of Practice', and the fact that we are here at this discussion, it is clear that the profession is already considering these issues.

There are two points that I now make, which were not raised in the paper.

First, scheme wind-ups are a difficult area for defined benefit arrangements, as a scheme which may have recently been described as well funded could have resources far short of the buyout costs on winding up. This raises a credibility question for the profession, and any funding method which can reasonably allow for this must be worth considering.

The second point again relates to the point of credibility. Whilst it is only correct that we review the methods and practices that we use, some of the users of valuations may not share this view. This may be especially true if we criticise unwisely a method which is still in common use, and, indeed, may have been used at the last valuation of a scheme.

In terms of determining the most appropriate method, a balanced view must be taken. In this regard, the attributes tabulated in Section 9.12 are useful, and objectives such as simplicity and objectivity are desirable. However, unless a method produces stable results and is realistic in relation to common investment practice, it is unlikely to be successful. I wonder whether this was why the most popular method in the 'Survey of Practice' was Method 4.

Professor A. D. Wilkie, C.B.E., F.F.A., F.I.A.: I used to favour market values, and I am sure that market values should be shown in any report, but I am nowadays rather less happy about what market values are doing. I should like to show you some figures that I prepared for a different talk recently.

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The figures shown in Table 1 relate to share prices. I have used the periods from the end of September 1970 to 1980; end of September 1980 to 1990; and 1990 to 2000.

Table 1. U.K. past history

All figures (except yield) are rates of change % p.a.

Period	Shares	Inflation	Real dividends	Dividends	Re-rating	Yield at period end (%)
1970						4.31
1970-1980	7.66	13.86	−2.07	11.56	−3.45	6.12
1980-1990	12.73	6.56	5.31	12.22	0.45	5.85
1990-2000	12.15	2.80	−0.12	2.68	9.23	2.42

Share prices rose by 7.66% p.a. in the first decade; 12.73% in the second decade; 12.15% in the third decade. During the first decade inflation was 13%, real dividends dropped by about 2%, and what I call re-rating caused a drop of 3.45% p.a., because yields went from 4.31% in 1970 to 6.12% in 1980.

The main driver in the 1970s was high inflation. In the 1980s there were two roughly equal main drivers — inflation and real dividend increases. In the third decade the driver has been predominantly the re-rating.

Table 2 shows the same sort of figures for the U.S.A.

Table 2. U.S. past history

All figures (except yield) are rates of change % p.a.

Period	Shares	Inflation	Real dividends	Dividends	Re-rating	Yield at period end (%)
1970						3.69
1970-1980	2.62	7.92	−1.41	6.40	−3.55	5.29
1980-1990	8.95	4.48	1.19	5.73	2.86	3.99
1990-2000	17.03	2.61	0.62	3.25	13.35	1.14

The effect is not quite the same, though inflation was relatively high in the 1970 to 1980 period. However, the most conspicuous thing is that share prices have shot up by 17% in the last ten years, but 13% of that has been because of re-rating.

I would say that shares are greatly over-valued at present, and therefore I would not like to use market values as a fair estimate, in my opinion, of what their values are. There are, I think, two themes within financial economics. What I shall call the old theme is that shares are always fairly valued; the market takes everything into account, even these sort of numbers, and still values shares in such a way that they are always at the right price, and the expected return in the future is more or less the same at all times.

What I shall call the new financial economics, which some other authors have been picking up in recent years, is that shares do, in the long run, pay attention to fundamentals like dividends or earnings or net asset value, and we have heard from the opener that, maybe, something is funny about dividends. Earnings for the old 500 Index, now the Non-Financials Index, in the U.K. since 1962 have remained almost constant, in real terms, over nearly 40 years.

You may say that companies are paying out in different ways other than dividends, but they cannot pay out unless they are making earnings. Presumably the 'dot.com' companies — at least this is what people are hoping — are going to make enormous earnings in future. I do not quite know where they are going to make them from.

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Both the old financial economics and the new financial economics are hypotheses. Neither of them is really provable, except, perhaps, in the very long run. The new financial economics says that, although there is an underlying position to which the market tends to go back, it is subject to whims or fads or herd instinct or exaggeration, and it gets far too high at some times and far too low at other times.

I do not think that we can ignore share prices when we are talking about the values of pension funds. They are clearly important for pension funds in the U.K. in aggregate. Small funds can switch across to invest in gilts or index-linked, but the whole of the U.K. pensions industry simply cannot. So, one has to work out how to put shares on one side of the balance sheet and something else on the other side.

As the authors say, pension fund liabilities are not marketable, and so there are not any market values for them and one has to use some fictional market value, something that might be a market value if there were a market.

Index-linked are claimed to be the best sort of hedges. I would not dispute that they are the best available, but they are not perfect hedges for final salary schemes or for pensions with discretionary increases, neither of which are strictly linked to RPI.

The authors of this paper quote other authors in ¶4.4.6, who say that shares are not good hedges, *vis-à-vis* inflation, but I have other figures which show that, over the long run, dividends do go up in line with inflation, and so do wages or earnings, so that all three — inflation, share dividends and wages — do tend to go up together over long periods. However, if you start looking at the correlations on a year-by-year basis, you come to the conclusion that there is quite a low correlation between them. If you then plug in your hypothesis that each year is independent, which is the old financial economics hypothesis, then, of course, the long-run correlation disappears, because you never look at the long run. You only look at what is happening from year to year, month to month or day to day. So, I think that one has to use shares in some way as the basis for pension fund valuations.

I have some other figures which show what I think might happen in the future.

Table 3. U.K. possible futures

Period	Shares	Inflation	Real dividends	Dividends	Re-rating	Yield (%)
1990-2000	12.15	2.80	−0.12	2.68	9.23	2.42
2000-2010A	−5.99	2.80	−0.12	2.68	−8.45	5.85
2000-2010B	0.65	4.50	1.47	6.03	−5.08	4.08
2010-2020B	6.49	4.81	1.61	6.50	−0.01	4.08
2000-2010C	−1.54	3.80	0.90	4.74	−6.00	4.49
2010-2020C	4.98	4.00	0.96	4.99	−0.02	4.50

The first line of Table 3 is the same as the last line of Table 1. The bottom four lines are based on simulations. The second line simply shows what would happen over the next ten years if inflation and real dividends behaved exactly the same as over the last ten years, and the re-rating was reversed, so that dividend yields in 2010 were back up to 5.85%. Over the period shares in the U.K. would drop by 6% p.a.

In the U.S.A., as shown in Table 4, doing exactly the same reversal of figures to a not too unreasonable yield of 3.99% shows share prices dropping by 9% p.a.

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Table 4. U.S. possible futures

Period	Shares	Inflation	Real dividends	Dividends	Re-rating	Yield (%)
1990-2000	17.03	2.61	0.62	3.25	13.35	1.14
2000-2010A	−9.07	2.61	0.62	3.25	−11.77	3.99
2000-2010B	−6.80	3.00	2.13	5.19	−11.24	3.75
2010-2020B	4.10	3.04	1.56	4.65	−0.53	3.96
2000-2010C	−2.50	2.98	2.28	5.33	−7.27	2.42
2010-2020C	3.76	3.00	2.43	5.50	−1.65	2.86

I do not mind if people want to use a market value basis, provided that they start valuing the liabilities, allowing for the 1.14% yield, at minus 8% for the next ten years, and possibly plus 4% or 6% thereafter.

One way of presenting this, which is not a way that has been mentioned in the paper, would be to put the assets at market value on the assets side, and then take off what life office people are quite familiar with, a mismatching adjustment, so as to take shares back down to the actuarial value, and put in the liabilities at sensible values on the other side. I think that that would be an alternative method, and might be more reasonable in present circumstances.

Mr M. D. Thornton, F.F.A.: In the 1930s, nearly all pension funds were valued by life office actuaries, and the student in such a life office might be working one week on a pension fund valuation and another week on the life office valuation. The problems seemed to be the same — future mortality and interest — and therefore the solution applied to them was the same.

The method then was to operate on book values for the assets. Book values had certain advantages over market values. They were smoother. They were the way that accounts were prepared. They were close enough to market values to be realistic, and they were always below market values, so that you got a margin of safety. The thought then was that actuarial technique consisted of looking at the past and using it as a guide to the future, not just taking a snapshot at the present time. So, you looked at the past, and what yield had been obtained, deduced a reasonable yield for the future, and discounted the liabilities at that rate. It worked very well. The actuary was in complete control of the situation, whether he was working on a pension fund valuation or on a life office valuation.

Just after the war, I went with a colleague to see a company, the pension fund of which we were valuing. We had conducted the previous valuation, and had seen the accounts for the fund during the inter-valuation period. The company was wanting to introduce slightly increased benefits, and wondered what it would cost. My colleague said at once: "For that increase in benefits, I think that we will find that, when we do the valuation, you will be able to cover the increase without increasing your contributions at all."

Like all good actuaries in any normal circumstance, he knew the result of his valuation before he started on it, and, of course, he was right. I mention this because his name was Muir McKelvey, and he was an absolute master of valuation on that basis. That is why I think that he would not have said that it was anomalies in book values that led him to produce the 1964 paper (Day & McKelvey, 1964).

If that was not the driver for change, what was it? Two things happened. First, life offices started to write group pensions business. They did it on a minimum funding basis, just buying the accrued benefits. However, there was then a conflict of interest for the actuaries in life offices who used to value all the pension funds. They found that they were selling group life and pension

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schemes in competition. Therefore, as a matter of policy, the pension funds valued by such life offices were passed across to consulting actuaries.

From then on the profession was divided. You had the life office actuaries valuing, as before, on book values, and the consultants valuing pension funds initially on book values, but with no life office valuations beside them with which they felt they had to keep in line.

The second thing that happened in the 1950s was the development of the computer. Computers then were not the sophisticated things that we have now. They were full of teething troubles, and by the time that you had them worked out, your computer was obsolete. Even so, once you had it programmed, it produced a new level of efficiency.

That was fine for a life office valuing thousands of endowment assurances, all at the same rate of interest, but, if you were a consulting actuary, you were losing half the advantage if you had to reprogram your computer for every fund that had a different valuation rate of interest. It was very convenient, therefore, if you could value all pension funds at the same rate of interest; if you could say that there is a prevailing rate of interest, and you would then discount the assets as well as the liabilities at that rate. That was an enormous saving in the actuary's time, and, therefore, in the client's money. At the same time, the actuary never lost control of the situation. However, it was a commercial reason, and the papers written after that were there to put a professional gloss on a business decision.

However, there was a certain disadvantage in the method; it was very difficult for the recipients of the valuation report to understand it. Any previous method, or any life office valuation, could be made reasonably clear to any normal businessman with an active mind. However, this method, discounting assets, was simply beyond them. That was, actually, a serious disadvantage to the profession.

When the people who receive an actuarial report on a pension fund valuation find it impossible to understand, it affects the standing of the profession. I met the pension fund manager of a big London company, who said: "Ah yes! Actuaries! People who live in the clouds, and who only come down when they want their fee." Very few people are so rude as to say that; but many people might think it. This means that, if you are in business, and feel the need for someone to join the board of your firm, someone with shrewd mathematical business sense and the ability to 'make financial sense of the future', and if someone says: "What about an actuary?", then anyone who has had dealings with their pension fund and has had to read reports on it may say: "Oh, not an actuary! He would need an interpreter!" Then they will name someone from another profession.

However, this valuation method got very little criticism within the profession from those engaged in valuation work, and no one ever suggested that the actuary was not in complete control of the pension fund. It was entirely satisfactory in that respect. If the assets were over-valued by 20%, it did not matter all that much, because, even if there were a sudden crash, you had so much 'fat' in the pension fund that you could cover the accrued benefits for everyone without too much difficulty.

What changed all this was a paper by McLeish & Stewart (1987), not mentioned in the paper being discussed. This said that, if the pension fund amounted to just enough to cover the winding up position, the company would keep the rest of the money in its own business. That was fine; some companies had contribution holidays, and did not pay anything into their pension funds for a couple of years until they got down to the level that McLeish & Stewart recommended. However, if you do that, then you do not have the 'fat' in the fund. If your assets are valued above the market value in the way that Plymen was criticising (see ¶3.3.3), and if the fund gets into difficulties, the Government starts taking an interest in things. Then you get regulations, minimum funding requirements and unwelcome controls.

The method of valuation that was being used for pension funds is something that could never have been considered, even for a moment, for a life office. The Government Actuary would have been more than a little unhappy if you had said that you were valuing the company's assets at something like 20% above market value, but it was all right, because you were doing the same to the liabilities. So, when McLeish & Stewart's paper became important, and resulted in a

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generally lower rate of funding, it was necessary to come back to market values, and that is where we are now, and very welcome it is.

Having looked at the methods put forward in the paper, the one that appealed to me most was the economic valuation. The method of deriving the rate of interest for discounting liabilities seemed, not just eminently sensible, but even one that you could explain to people. That, I think, is very important.

All I would suggest is that, if you are using that basis, and if you are writing a report to the company, as well as telling them how you have determined the rate of interest, based on market values, you also test it over the past four years of the pension fund accounts, and show what the pension fund has actually been earning, so that they can see for themselves that the assumption is sensible. That would add credibility to the profession — credibility which, in my experience, some people have thought that it somewhat lacked.

Reference

McLeish, D.J.D. & Stewart, C.M. (1987). Objectives and methods of funding defined benefit pension schemes. *J.I.A.* **114**, 155-225.

Mr J. A. Porteous, F.F.A.: My concerns in using anything other than market-related valuations are that we need to bear in mind that we are not working in a vacuum, we have to work with other professionals, one key group being the accountants, and that they have basically told us that we must use market-related bases under FRED 20.

It seems to me that, if that is where pension expensing is, given that finance directors are now, probably, among the key decision makers in any aspect of running a pension fund, then we have to set our funding basis in some way by reference to the way that they expense the pension fund. I also worry that too often actuaries sit down and say: "Here is my valuation report; here is the right answer." I have generally said, at trustee meetings, that: "The only thing that you can be sure about with actuarial assumptions is that they are wrong, so it is probably more important that clients are aware of where they stand on a line. There is risk in a pension fund. Tell the clients how much risk they are taking. Give them an indication of what happens if you tweak assumptions. Give them some idea of how things will emerge in the future."

Even I recognise that computers are here to stay. They are powerful tools, and we should be using them to educate our clients to understand what is a very complicated financial beast.

We are always very keen on prudence. I do not think that many finance directors will be happy to say: "Okay, my business is failing, but at least my pension fund is prudently funded." We do have a responsibility, in that we cannot let members' interests go completely by the wayside just so that the finance directors can keep their pension costs down; but we need to recognise that a pension fund is a partnership between the trustees and the company. There is no point in members having a secure pension fund and no jobs, if it is possible, in some way, for them to have both. We should be making our clients aware of where they are taking risk, and allowing them to set the assumptions by reference to us, rather than us walking in with a valuation report that is too long, setting out one set of assumptions, and telling everyone that this is the way it shall be.

Mr T. Smith, F.F.A.: My comments are mainly based on my experience as a consulting actuary and as a Scheme Actuary, and I base them on the views of clients over the last, say, two years, when I have been carrying out valuations of pension funds. It has been particularly clear that there have been problems in explaining to clients the significant changes that have occurred, especially when, if you did a valuation two or three years ago using the traditional discounted valuation method for assets, that you had a reasonable ongoing method for funding. However, when the next valuation was due, perhaps this year or last year, because of the tax change and the fact that we have to take a net dividend yield and not a gross dividend yield, we find that, all of a sudden, the scheme which, on an on-going basis, may have been funded to the extent of 100%-115%, assets to liabilities, suddenly has plummeted to 70% or 75%. This is difficult to explain to a client.

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So, what do we do? Initially, we still look at the discounted method, but we change to a net dividend yield, which recently has revealed a very large discount for discounted asset value compared to market value. To help get round it, we just have to adjust the assumptions, so that we come up with an answer that gives a value for assets that produces an answer for the ongoing contribution rate very similar to what the client was paying three years ago, and that keeps everybody happy. However, is that the right thing to do?

More recently, we have also looked at a market-based approach, and demonstrated the results on that basis, taking full market value for assets, but, perhaps, using the bond plus the risk premium method for valuing the liabilities. Doing that, clients get very puzzled when you say that they have got a big deficit on the on-going basis, taking a discounted value for assets. However, if they go to a market-based method, lo and behold, they have a big surplus. A client will ask how that comes about, and find it very difficult to understand. Added to that, you then look at the ongoing contribution rates, taking a basis which is using an interest rate, salary increases, etc., that are much lower than were used three years before, and, lo and behold, you tell them that they have a big surplus: "but, I am afraid, your contribution rate has to go up by about a third." Again, we have difficulty in trying to explain that to them.

What I liked best was the solution put forward at the end of Professor Wilkie's contribution, which, I believe, suggested sticking with the discounted value method as such, but describing it as a market-based approach by applying what he called a mismatching adjustment. This equates effectively to what we are doing, but describes our approach in a different, and perhaps more acceptable, way, which is to take the calculated discounted value, which might come out at 70%, adjust the assumptions to reflect the very definitely changed economic climate, but also adjust the discounted value in such a way as to, perhaps, increase it by 5%. You end up with a result that keeps the client happy, and is not terribly far away from where you were three years ago. Whether that is the right approach or not, I do not know; but that is the one that I find will work best at the present time, and I would prefer to stick with that, certainly for the foreseeable future.

A Vice-President (Mr W. W. Stewart, F.F.A.): I would not claim to be an expert in pension funds, but one thing strikes me in all of this — and Mr Thornton's remarks brought it home to me. When I started as an actuarial student and became an actuary, actuaries had a mystique about them. We did not have to explain to people exactly what we were doing. Mostly, we were believed. Therefore, we could apply the art of actuarial work as well as the science of actuarial work. What has happened over the last few decades has been increasing regulation, increasing scrutiny, and I am not sure that the profession has been able to move with the times in describing what we are doing.

The debate on pension schemes and valuing dividends was alive in the late 1960s, when I remember that it was the fashion to invest less in U.K. equities and put more pension fund assets into the 'dot.com' of the time, which was the Japanese market, where the yields were very low. There was great debate, at that time, as to how one valued the dividend stream on overseas equities. Obviously, they were worth much less, on a discounted basis, than U.K. equities, and this had a constraining effect. I do not think that the problems there have changed all that much with the passing years.

Reading the few pension fund valuations that I do see, I often have difficulty in understanding what all the figures and ratios actually prove. Using market values has the attraction that, at least, the assets side bears resemblance to something that the layman and the trustees will understand. It should not be beyond us to produce the liability side on a consistent and comprehensible basis.

Mr R. S. Bowie, F.F.A. (closing the discussion)**:** One thing that I am sure that we all appreciate in the paper is the objectivity in its description and in its analysis, what our opener described as balance.

It seems to me that what we are all searching for is a tool which helps us guide our clients, in the broadest sense, and serves the public good in the best way moving forward.

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Mr Smith made a good point when he said that he, like I, wondered whether we are doing the best job for our clients when it appears that all the old, reliable indicators that we have been trained on, and been brought up on, seem to be falling apart. Therefore, we are not sure whether we are really doing the right thing for our clients. Yet, this is the very time when the actuarial profession ought to be able to help people. If we cannot help people at a time when there seems to be so much falling apart, then who can?

The drivers for change are well documented in the paper. Another reason why practitioners have difficulty is that, until the late 1970s and early 1980s, many of the benefits of a defined benefit pension scheme were discretionary. They were not actually guaranteed. At any point in time, probably only 60% of the benefits of the liabilities that you were valuing were guaranteed. That ability to absorb the volatility of equity markets, out of the 40% that was discretionary, allowed actuaries to sustain and condone an investment risk, which, probably in the circumstances that we have now, where pretty much 100% of the liabilities are guaranteed, is something that we cannot do. I wonder whether the profession has actually cottoned on to the fact that nearly all of the benefits in the defined benefit scheme are now guaranteed, whereas 15 years ago, perhaps little more than half of them were.

Interestingly, the paper, in its description of financial economics, also invites us to take some account of the credit risk in our discount rate, and that is also what Mr Myners invites us to do in his proposal, which is to take account of the strength of the sponsoring employer, from which I deduce that he means that, if the sponsoring employer is financially weak, you should use a low discount rate, because you cannot afford to take much risk, whereas, if the sponsoring employer is large and strong, perhaps you can. How the actuary is going to be able to assess the strength of the sponsoring employer and determine what that credit risk should be, is quite another question.

Some actuaries, I sense, not so much those who took part in this discussion, but others believe that the use of financial economics in some way drives out the scope for judgement, yet the paper makes it clear that that is not so. That has also been abundantly true in the discussion.

Mr Thornton gave us a marvellous insight into history. First, he told us how actuaries in life offices perhaps did a pension fund valuation in the morning and a life office valuation in the afternoon, and that the reasons for change were different from those set out in the paper, and were commercial expediency with a thin coating of professional gloss.

If we go back to the basic principle, that what we are looking for here is a tool which will help us to do our jobs better, then the consequences of Professor Wilkie's suggestion, although not necessarily a prediction, of a derating in the first decade of the new century, even if just a reversal of the 1990s rerating, would be horrific for British pension schemes. They would bring home, all too clearly, the risks that they are running. Professor Wilkie suggested that, perhaps, the market approach was fine, so long as we then made an allowance for investment returns to be −10% p.a. for the next ten years. However, perhaps actuaries, with that same information, also ought to be suggesting that this is not a time to be running an investment mismatch; that this might well be a time where the difference between Method 4 and Method 3 is pretty small, because, actually, very little of the fund should be invested in equities, if Professor Wilkie's illustration comes anywhere close to being true.

The opener said that the existing method is not fundamentally flawed. Yet, if it is the method in which we have so little confidence that, as Mr Smith suggested, we simply adjust the assumptions until we find something that gives us the same contribution rate as we had three years ago, then the existing method must be flawed in some way, if it gives us no guidance and simply allows us to do that without any kind of constraints.

Mr Porteous made the valid point that we are not working in a vacuum, that we have others to take into account, and he suggested that we should work in partnership with our clients to come up with the assumptions. My experience of clients is that they tend to look to us. It is right that we put forward a whole range of assumptions and the consequences of assumptions, but, in the end, they will tend to turn to you and say: "Well, you are the experts, you ought to know.

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What should I do?'' The actuary is going to have to express a view, and bring judgement to bear.

In Section 10 the authors suggest that the requirements of legislation should not be too prescriptive, and, in his introduction, Mr Head suggested that Method 4 might well be used for the MFR. While I am sure that there is some sympathy with avoiding the heavy hand of bureaucracy — and this, indeed, is the approach that Mr Myners suggests — it then puts a huge onus on the profession at a time when I sense that it is not very confident in its ability to predict the future. It will be terrible if, for 20 years, many of us, having blindly followed Method 0, now blindly follow Method 4 with an equity risk premium of 1%, and simply end up in the same mess in ten years' time, if half of what Professor Wilkie described comes true, as we feel we are in today.

The profession has been slow to get to grips with financial economics, which, in 30 years, has become such a major force, and the generality of the profession — me included — has been on the back foot in responding to that development. We still do not really know whether the basic premise of financial economics holds good or not. We have no reference point for that.

It would be worthwhile for the profession to think about how to improve its radar, so that, the next time that one of these new developments comes on the horizon to change the landscape of what we do, we are rather better adjusted to responding to it than we have been on this occasion.

Mr A. J. Wise, F.I.A. (replying)**:** Within the last few years, we have seen a major review of how to make actuarial valuations of pension funds. This major review was driven by regulatory change, the introduction of LPI guarantees on pension increases and the introduction of MFR from 1997. Consequently, pension liabilities are much more precisely specified than they were in the old days. In view of this more precise specification of pension liabilities, the principles of financial economics and market pricing now have scope to bear down on the way that these actuarial valuations are made, in a way that was not available to that body of theory in the past, because that theory did not have anything so precise or tangible to work on. Pension liabilities were much more flexible, because of the discretion on pension increases and other such factors.

Then, in 1997, we had the tax change on dividend credits, which forced a review of the principle of relying on the dividend income model.

The 'Survey of Practice' methodology shows that actuaries have been responding to these developments. The evident shift of approach, at the grassroots level, to the so-called Method 4, is a sign of cohesion and confidence among the membership, which I welcome. I hope that the paper has been of assistance to members in terms of identifying the issues, and, indeed, the terminology which gave rise to some confusion at the start of this review process two or three years ago.

We have discussed the issue of the choice of risk premium, when a market-based method is used with a premium over and above a bond rate of return. In Appendix B we showed a calculation procedure for evaluating a risk premium. However, as Mr Head said, this was simply a way of trying to anticipate how an actuary might behave if that actuary were making valuations that were trying to smooth out short-term fluctuations in the funding position. It is not a method of calculation which we wish to advocate for getting to a discount rate.

Actuaries have more to offer than evaluating a smoothing mechanism for calculating discount rates. There are all the macroeconomic factors. I believe that actuaries have a continuing role to provide practical, as well as theoretical, input into assumption setting.

I suggest that a Working Party could be formed by the Faculty and Institute to study this question of how to set the discount rate.

The opener raised a number of questions about market efficiency and rational pricing of markets. He questioned whether we might have spent more effort in looking at how the dividend discount model could be refined, to take account of market implications for future rates of dividend growth, and so forth. Perhaps we could, but it is difficult. There was reference made to the Vodafone/Mannesmann issue, which illustrates the problem that the market can make

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changes in dividend yield that we have no way of modelling for the future. So, we thought that it would be hard to do that in a rigorous way, and I think that this must remain a subjective area for those who wish to continue to use the dividend discount model.

Professor Wilkie spoke about the question of market pricing, and whether it is rational or not. Along with the rerating of shares over the 1990s, we saw a rerating of bonds. If we had been carrying out actuarial valuations on Method 4 all through the 1990s, we would have been using discount rates which dropped in nominal terms, and pushed up the liabilities, in just the same way that annuity prices have increased dramatically over that ten-year period. The question is: "What happens if share prices go down, but bond yields stay where they are?" That leads you on to questions about investment policy, as the closer discussed.

Method 4 is open to subjective views in this area. I would not be averse to using a negative risk premium in some situations, where the market seems to justify it.

A couple of speakers mentioned the idea of using mismatching adjustments relative to market values. We referred to it briefly in ¶6.8.1; but, again, there are subjective aspects to using mismatching reserves, so we did not pursue that in detail.

A Vice-President (**Mr W. W. Stewart, F.F.A.**)**:** I am sure that you all join with me in thanking the Working Party for the paper. The profession owes a great debt to people who give a lot of time and effort to working parties. Without them we would have less papers than we do. Thank you to the authors for their hard work.

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