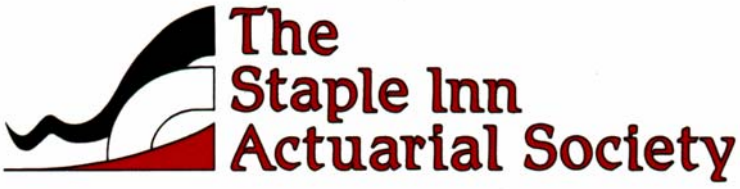

Being Actuarial With the Truth

A story of economic confusion over defined benefit pension schemes

by Simon Carne

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Note on pagination
This is a pdf version of a document designed for hard copy. In the hard copy version, the two pages numbered 4 and 12 are blank (left hand) pages. Those two pages have been omitted from the pdf version and the page numbering skips from 3 to 5 and from 11 to 13.

The author

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In the 1980s, he set up and led the forensic accounting department within a Big 4 accounting firm, providing expert evidence and advice in commercial disputes. In the early 1990s, he was a principal in a US-owned firm of economic consultants. For the past ten years he has been a sole practitioner, recently developing a secondary practice in the management of professional skills in a regulatory or forensic environment.

Acknowledgments

Many actuaries commented on this paper, in whole or in part, whilst it was in preparation. They are too numerous to list here and it would be wrong for me select some for mentioning and not others. They know who they are.

I would, however, like to identify two non-actuaries who commented, especially at the early stages when I first began to formulate my ideas (about 20 years ago), continuing through to the writing of this paper. They are Nigel Macdonald, a member of the Competition Commission and the Review Panel of the Financial Reporting Council and Dr Emma Rasiel, Department of Economics, Duke University, North Carolina.

The opinions expressed in this paper are entirely my own.

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Foreword

In the 1980s, the Thatcher government famously attempted to ban *Spycatcher*, the memoirs of a former intelligence officer. The government had first tried to engage in discussions with the publisher to edit the book prior to publication. But the government's knowledge of the book came from a leaked draft, a fact which they did not want to disclose. So the Cabinet Secretary wrote to the publisher, requesting a pre-publication copy.

Negotiations over changes to the book proved unsuccessful. At the subsequent trial to determine whether publication could be stopped on the grounds of security and confidentiality, the Cabinet Secretary, Sir Robert Armstrong, was called to give evidence. One of the highlights was an exchange during which counsel for the publisher tried to get Armstrong to admit that, by requesting a pre-publication copy of the book when he already had one, he had lied. Armstrong responded to the effect that he had not told a lie; he simply had not told the full truth:

Lawyer: It [the letter] contains a lie?

Armstrong: It was a misleading impression. It does not contain a lie.

Lawyer: What is the difference between a misleading impression and a lie?

Armstrong: A lie is a straight untruth.

Lawyer: What is a misleading impression – a sort of bent untruth?

Armstrong: As one person said, it is perhaps being "economical with the truth".

The final phrase was picked up by the press and reported as though Armstrong had used it as an admission that he had lied, even though it is plain that he was using "economical" in the literal sense of being sparing with the truth – as though it was a commodity which would run out if used too much.[1] From that day onwards, the phrase "being economical with the truth" has been commonly understood to mean "lying".

• • •

This paper is written at a time when commentators on the profession have come to regard actuarial truth as almost synonymous with confusion – Lord Penrose and the *Financial Times* being two very influential current critics. There is an urgent need for "actuarial truth" to mean *clarity*, before it is too late.

[1] A concept that has been attributed to the 18th Century philosopher, Edmund Burke, who is reputed to have said: "A wise man will speak the truth with temperance that he may speak it the longer." Commentators on Sir Robert Armstrong's evidence have suggested that Burke is the "one person" alluded to in the final line of the extract quoted above.

Part I

Business & economics

1 The economic reality of the pension "promise"

There is a debate going on within the profession over the correct way to value a pension scheme. On one side of the debate is a group who claim that the principles of financial economics overturn the traditional approach of the pensions actuary. On the other side are those who believe the traditional approach is valid.

The debate is a false one. The two competing approaches produce different results, simply because they answer different questions – similar, but different. As demonstrated in this paper (see Section 5), both methods implicitly address the issue: how well is the pension scheme funded? The traditional method does so on the premise (typically unstated) that the existing investment strategy will be maintained. The rival approach implicitly supposes that the investment strategy will be changed (but, again, typically leaves the supposition unstated).

Uncovering this truth is only the tip of the iceberg. On examination, recent literature turns out to be full of arguments between parties who use the same words to mean different things. Arguments abound which aren't really arguments at all. And the real debate – the debate over issues that actually need to be resolved if we are to make progress with pensions – are often left untouched and clouded in confusion.

By presenting the issue as a winner-takes-all battle between rival principles, as one or both sides in the debate has been wont to do, the overall security – or insecurity – of pension schemes is misrepresented. This paper argues that the reality is more subtle than is typically appreciated and the solution more challenging for policymakers. Pension scheme security is an illusion for all but a minority of pension schemes. The real challenge is not how to achieve it, but what to aim for instead.

Back to basics

Company pension schemes are the result of a negotiation between the employer and the employees.

An employer has many goals for its pension scheme. Attracting and retaining staff (some of the time) is one of those goals. Keeping costs down, without damaging the first goal, is another. Meanwhile, employees want security for their retirement.

But if the cost of that security means that the promised pension will be meagre, or current salary levels will suffer, employees are usually quick to compromise on security. If that were not the case, why do pension scheme trustees – the guardians of the employees' interests – invest scheme assets so heavily in equities when everyone knows that equities are more risky than fixed income alternatives?

Other evidence of the recognised riskiness of pension schemes is the rule present

in most trust documents which says that employers can walk away from the scheme at any time and not contribute any more. Governments have tinkered with that rule several times in the past decade – first by introducing a minimum funding requirement which overrode the rule, and more recently by abandoning that approach in favour of a legal debt on solvent companies who walk away from accrued benefits. Once the new regime is enacted, there will be no rights – not even reduced ones – against an insolvent company. And none for the link between pensions and future ("final") salaries, which has been the cornerstone of most pension scheme designs over the past three decades.

But let's be practical: if pension schemes are risky, why not make them less so, instead of debating how risky?

The fundamental problem is that there are just too many pension schemes to make them all secure. Individual pension schemes can act, as Boots did during 2000 and 2001, to switch out of equities and into less risky bonds. But if pension schemes tried it across the economy, that would involve dumping something like £500 billion of equities (estimates vary) in favour of bonds.

Faced with equity-bond switches on such a scale, companies would take action. Seeing equity prices collapse, quoted companies would buy back their own shares en masse and issue debt instead (using the debt to finance the share buy-back). But, at the volumes we are talking about, it wouldn't be very high quality debt. In fact, it would be quite risky, certainly not the AA-rated debt that pension valuations are to be based on under a new accounting standard for the employing company's accounts (more of that in the next section).

Pension funds would have swapped one kind of risk – the volatility of stock prices – for another type, the risk of default. Some quick-acting funds would have bought gilts, but there is no reason to suppose that the government would be able to satisfy all the demand for bonds. And companies, desperate to raise funds to buy back their shares to stop a collapse in prices, would be pricing bonds to attract the buyers away from gilts.

Shareholders (that is, all the non-pension scheme investors holding the equities that remain) would face far higher volatility in the price of shares that they own.

Could it be done? Should it be done? Whatever the answer to these questions, it is a decision that would have to involve company chief executives and their boards, not just pension fund trustees and their advisers.

Partially protecting pensions or spreading failure fairly?

Just as each pension scheme represents a contract between the employer and the employees, so the aggregate of pension schemes represents a contract between one generation and the next. There is no law that can guarantee the next generation will honour the contract and no rule of economics that says they will be capable of doing so, even if they want to.

The recently promised Pension Protection Fund cannot overturn that economic reality. The protection fund – to be financed by contributions taken from pension schemes themselves – is, by its very structure, a mutual self-help arrangement. If

stock markets are down and pensions schemes are in deficit, how can they all bail each other out? No wonder that many commentators have, cynically, re-assigned the initials "PPF" to *Partial* Protection Fund.

But maybe those commentators are missing the point. If pension promises cannot be guaranteed, isn't the sensible solution to find a way to spread the potential breaches of promise more fairly? Perhaps that is the *real* goal of the PPF – spreading failure more fairly – in which case we are in un-chartered waters: existing methodologies won't show us how to achieve the goal, at least not so long as there is confusion over what the existing methods are capable of achieving.

So let's try to resolve that confusion.

Note on terminology: investment strategy

As most readers of this paper will know, it is often the case that schemes which invest in equities do so mainly during the working lifetime of the members. Once members have left service or retired, the strategy is often (but not always, it seems) to switch towards bonds. This can be allowed for in the actuary's calculations by discounting each member's benefits at an equity rate during the period from the valuation date to the member's expected retirement or date of leaving service and a bond-related discount rate thereafter.

Accordingly, I have referred in this paper to the rate of return implied by the investment *strategy*, rather than referring simply to the return on the current investments. The word "strategy" has been used to denote that, where the intention is to switch from one class of investments to another at a later date, the rate of return assumption incorporates this.

2 The implications for company balance sheets

Pension schemes are now so big – and so many in deficit – that a proper understanding of their economics is vital to investment decisions, as potential purchasers of W H Smith and Marks & Spencer are currently well aware. With company accounts changing to reflect the bond-based approach under accounting standard FRS 17, due to become compulsory from 2005, bond-based valuations could become the only valuation mechanism in widespread use.

Bond-based values

In a "bond-based" valuation, pension liabilities are discounted at the rate of return underlying gilts or corporate bonds. Such a valuation discloses the amount of money that would need to be invested in the scheme to secure the benefits if all the assets of the scheme are bonds – or replaced with bonds (see Section 5 for a demonstration of that). For an individual scheme which has such an investment strategy – or is considering it in order to make a risky scheme more safe – the results of the valuation are meaningful.

But for all other schemes, the results are easily misinterpreted. The effect of the bond-based valuation is to value a risky pension scheme as though the liabilities were as secure as an AA-rated debt. If the premise is false – and, for the reasons explained in Section 1, it must be false for the majority of pension liabilities – a bond-based valuation needs to be handled with care.

A realistic valuation recognises that investing in equities is risky. This makes the benefits less valuable. No one values a junk bond at the same discount rate as a AA-rated bond. For the same reason, risky pension benefits cannot be valued as though they were AA-rated. So a bond-based valuation on its own can be highly misleading. (The association of "junk" and "pensions" in successive sentences is an uncomfortable one. But some pension promises have been of limited value recently. There is little point in attributing a value to them as if they were secure.)

If the bond-based valuation is to be of use for schemes other than those already invested entirely in bonds, it needs to be set alongside a common sense valuation based on the actual investments held by the scheme. By comparing the two valuation results, one can see the additional funding required to eliminate the risk of holding equities (and other non-bond assets) in the scheme. A bond-based valuation on its own says little about the scheme as it actually is.

Along came FRS 17

FRS 17 requires the bond-based approach to be used. As noted above (and demonstrated in Section 5), this implicitly means that the pension liability valuation in FRS 17 accounts reflects the volume of assets required to meet the liabilities assuming the assets are invested entirely in AA-rated bonds.

The significance of this can be illustrated with a real case. The actuarial valuation

of BT's pension scheme as at 31 December 2002 reported a deficit of £2.1 billion. But this valuation was not carried out on the FRS 17 basis. What the BT actuaries were implicitly saying was that £2.1 billion was the amount which would need to have been injected into the scheme on the valuation date, in order to have made the assets (of £22.8 billion) sufficient to meet the scheme's liabilities, on the premise that the cash injection was invested in line with the existing asset allocation strategy of the scheme.

John Ralfe (a pensions consultant, but not an actuary) estimated that, on the FRS 17 basis, the deficit would have been some £7.5 billion, reflecting an increase in the value of the liabilities from £24.9 billion to a figure slightly in excess of £30 billion (Ralfe 2003).

Ralfe was, famously, the architect for the Boots switch from equities to bonds, so he is very familiar with the debate. In his paper, Ralfe says:

> "Actuarial techniques are notoriously opaque … Until the Actuarial Profession puts its house in order and mandates a bond-based approach, shareholders, bondholders and pension scheme members must not take actuarial valuations at face value."

But is it actuaries or the FRS 17 numbers which are less than transparent? The FRS 17 figure (£7.5 billion, according Ralfe's calculations, not BT's) is the amount which would need to be injected into the BT scheme on 31 December 2002, in order to make the assets sufficient to meet the scheme's liabilities. But only on certain assumptions. The key assumption is that the cash injection and the existing assets of the scheme would both earn the rate of return available on bonds.

But BT's scheme wasn't invested wholly in bonds. Some 65% of the assets were invested in equities. To make the facts fit the FRS 17 assumption, the equities (some £15 billion, apparently) would need to be switched into bonds.

If BT had reported at 31 December 2002 on the FRS 17 basis, BT's balance sheet would have shown a pension deficit of £7.5 billion, made up as follows:

- £2.1 billion, calculated by BT's actuaries, being the cash injection needed to bring the assets up to the level required to meet the scheme's liabilities, on the premise that the cash injection is invested pro rata across the existing assets of the scheme; *plus*

- a further £0.46 billion (inferred from Ralfe's calculations) required to supplement the injection if it is to be invested in bonds, rather than following the investment mix; *plus*

- a further £4.94 billion (also inferred from Ralfe) if the existing assets were all sold and the proceeds reinvested in bonds as well.

It is not clear that the Accounting Standards Board, or the accounting community in general, recognises that FRS 17 is going to saddle the balance sheets of UK plc with the cost of changing the pension scheme's investment strategy – the cost of a strategy that employers and trustees show no sign of wanting implement and which cannot be implemented universally, even if employers and the trustees wanted to, for the reasons explained in the Section 1 of this paper.

For an individual scheme which has such a bond-based investment strategy – or is considering it – the results of the valuation are meaningful, but only when presented in the tri-partite split above. The information is also helpful to trustees who want to see the financial implications of their investment strategy compared with an alternative one. The technique does not, of course, need to be limited to two investment strategies. Many strategies can be considered and evaluated. But whether this information should be disclosed in the company accounts is, to say the least, debatable.

Postscript

Any valuation or funding calculation involves suppositions about the future. Some of these suppositions will relate to matters within the control of the valuer (or the valuer's client), for example the investment strategy to be adopted by the pension scheme. Other suppositions relate to matters beyond control, for example the longevity of scheme members or the rate of return earned on assets invested in accordance with the chosen strategy.

Typically, the literature uses the word "assumption" to cover both types of supposition and that is normally acceptable. But, for this paper, the distinction between the two is, in places, critical. Accordingly:

- I use the word "assumption" to denote suppositions beyond the control of the valuer and the valuer's client (eg longevity, rate of return etc).
- I have used a different term (usually "premise") to denote suppositions which are controllable by the valuer or the valuer's client.

Plainly, the result of the valuation or funding calculation is only valid if the suppositions are borne out in practice. In this paper, I take that as given every time and I do not include (other than here) provisos such as "if the assumptions are borne out in practice".

Part II

In theory

3 The language of value

Financial economics teaches us, broadly, that the value of an asset is not affected by the source of the funds used to finance that asset. So the value of a widget company is determined by its ability to work its widget-making assets and not by the finance director's choice of equity or debt as a source of finance.

From this, some actuaries infer that the discount rate to determine the value of pension fund liabilities should not be affected by the assets held in the scheme.

Unfortunately, this simple inference is almost always wrong. Not because the economics is at fault, but because the word "value" changed its meaning between the first statement and the second. This confusion was identified more than 20 years ago by Professor John Kay, an eminent economist. Addressing the Institute of Actuaries on the subject of a public dispute between the Government Actuary of the day and two economists, Professor Kay told the profession:

> "Much of the disagreement between the Government Actuary and [the economists] rests on what is a semantic confusion. The source of this semantic confusion … is the practice of actuaries to describe an exercise of determining appropriate contribution rates for a pension funding as a "valuation"… [I]t is not a valuation as the man in the street or I, as an economist, understand the word valuation."

Twenty years later, this problem of mis-communication has not gone away. It has grown worse. Now that actuaries are studying financial economics alongside actuarial science, they are exposed to teachings which use the word "valuation" in both senses. The resulting confusion is demonstrated by the following story.

An actuarial "valuation"

Faced with a liability to pay £100 in 10 years' time, a client wants to know how much to set aside now to meet that liability when it falls due. An actuary offers to help and promises to attend the client's offices very soon to deliver his actuarial valuation.

The actuary knows that he must "value" the liability and then recommend to his client that he sets aside a sum of money equal to that "valuation" of the liability. As a financial economist as well as an actuary, he has been taught that the way to value this liability is to find the price of an exactly matching asset, ie a zero-coupon bond maturing in 10 years. This is the liability's market value.

In the absence of any zero-coupon bonds actually existing, the actuary computes the price that would apply if such a bond did exist. The methods are not controversial. The actuary can review the pattern of yield curves for the bonds that do exist and extrapolate out to a hypothetical zero-coupon. Alternatively, the actuary might take the price of a bond with a non-zero coupon and strip out the value of the coupon, notionally selling the coupon in perpetuity, via an undated bond, and buying-back a ten-year future in the same perpetuity. The result of this exercise (on either calculation) is that the

liability is assessed as having a value of £70.

The actuary writes up his analysis for the client in greater detail than I have done here and presents his report, in person, thinking he has done a successful job and all that remains is to collect a modest fee.

Nothing could be further from the truth. With a mischievous smile, the client turns to a colleague, instructing him to place £70 in the company safe and leave it there for ten years. The actuary gasps at the stupidity of such a move.

"What's wrong?" asks the client.

"I was expecting you to invest the money", replies the actuary. "I mean, if you just leave it in the safe …" The actuary tails off not sure how to finish the sentence politely. The client turns once again to his colleague and replaces the instruction.

"Buy £70 worth of equities", he says. "Nothing too risky. I suggest a FTSE-100 index tracker." The actuary gasps again.

"That's still quite risky", he says. The market could be anywhere in 10 years time. I was expecting you to invest in bonds."

The client smiles once more. "It's funny you should say that. Only this morning my neighbour told me on the train that 5-year gilts had had an unnecessary hair-cut or taken a bath, or something. Don't you wish they'd talk simple English?" The client looked at the actuary. "No, perhaps you don't. Anyway, the point was that he recommended I buy some. So let's make that £70 of 5-year gilts, shall we?"

This time, the client doesn't even wait for the actuary's gasp. "What now?" he demands.

"Well, you may get a good deal on 5-year gilts at the moment, but you'll still be utterly dependent on the reinvestment opportunities available when it matures in five years time. You would need to commission another actuarial valuation at that point to see whether you still had enough money to meet the liability."

"Well, obviously you wouldn't dream of charging me for re-doing your valuation. That's what I'm paying you for now, after all", suggests the client. "But I don't like the idea that we might have to find some more money if it turned out that you'd got your valuation wrong today. I suppose we'd just sue you for the difference, would we?"

"Well, no, not really", says the actuary, gulping now, more than gasping. "If you invest in a *10-year* bond …" The client cuts him off with an explanation.

"My other neighbour was a student of Professor John Kay, the economist. He warned me you would probably take me through your calculations to the point where I almost lost the will to live and then miss out the most important point."

"I don't know what you mean" says the actuary.

"Your report told me the value of the liability, but I've had to drag out of you the investment needed in order to achieve that value", pronounces the client.

"Oh no!" says the actuary. "The value of the liability is quite independent of the investment held to meet the liability. I'm quite sure an eminent economist like Professor Kay would agree with me."

Professor Kay may agree with that final paragraph, but he might also point out that it has nothing to do with the conversation that preceded it. As his observation of 20 years ago made quite plain, the *calculation of a contribution to meet a liability is quite different from determining the market value of that liability*. A good old-fashioned actuary understands that the required contribution depends very much on the investment vehicle chosen by the client. Unfortunately, the same actuary typically still calls his recommendation a "valuation". Perhaps this is because he feels compelled to follow the language in the trust deed – drafted by a good old-fashioned lawyer.

Many of the modern actuaries, armed with financial economics, have fallen victim to that confusion. They sometimes divert themselves from the actuarial "valuation" they need to do – ie the assessment of a contribution – and calculate instead the *market value* of the liability, which is often an entirely different thing.

Some readers may be tempted by the example to remark that no client in their right mind would imagine that a fixed monetary liability would ever be saved up for by investing in equities. But that would not only be to miss the point entirely, it would also fly in the face of history.

Unlike the client in my example, who was plainly far cleverer than his despairing actuary, we should not forget the millions of home owners who purchased equity-backed ("with-profit") savings products to meet the fixed and known liability of their mortgages. The current debate within the actuarial profession exists solely because there are actuaries, enthused and confused by financial economics, who assert that the contribution rates to a pension fund should always be assessed by reference to the interest rates expected to be earned on bonds, even for those pension funds that are invested in equities – which is pretty much all of them, at present, to a greater or lesser extent.

To sum up

As true as it is to say that that the market value (or the economic value) of a liability is independent of the nature of the assets held to meet that liability, it is a howler of potentially catastrophic proportions to assert that the contributions needed to meet that liability (sometimes called an "actuarial value") can be – or worse, should be – determined without knowing how or where the contributions are going to be invested.

4 The value of economic values

It is no part of this paper to suggest that economic values are without any use in the assessment of actuarial liabilities. Nothing could be further from the truth. Actuaries do much more than assess contribution rates to pension funds and the like. Economic values play an important part in the work of an actuary. Not least, when the client wants to know the economic value of something!

But economic values are more complex than is often recognised, as the following examples illustrate.

Consider three companies, A, B and C. Company A runs a widget making business which is recognised by the market as having a value of £1,000. In addition, Company A has a liability to pay £100 in ten years' time and has purchased financial instruments which exactly match the liability and which (just as in the previous section of this paper) have a market value of £70.

Since the financial assets exactly cancel out the financial liability, and will do so regardless of future economic conditions, the value of Company A is £1,000, exactly as if the financial asset and liability did not exist.

Company B is similar to Company A in all respects, except that its management decided not to spend any money purchasing a financial asset. Instead, they put the £70 in a safe and made a diary note to take it out again in ten years time.

At first sight, Company B must be less valuable than Company A, since Company B is going to lose money as a result of its financial liability. In ten years time it will be worth £30 less than Company A (all other things being equal).

But Company B isn't worth less than Company A – at least, not today. Anyone buying Company B today can take the £70 out of the safe and purchase the required assets to neutralise the debt. If the market priced Company B at anything less than the full £1,000, the purchaser could obtain a windfall. The market knows that and will not tolerate any discount.

Tomorrow is, of course, another matter. By tomorrow, the debt payment of £100 will be one day nearer and the market value of that debt (ie the market value of any matching assets) will be slightly more than £70 (about £0.006 higher), reflecting the time value of money. In one month's time, if interest rates haven't changed, it would cost approximately £70.20 to buy the matching assets … and so on over the ten years until the day of repayment when the matching asset would cost £100.

The market will certainly recognise all of this and, so long as the cash remains in the safe, will adjust the value of the company downwards against Company A to reflect the progressive loss incurred through giving up the opportunity to earn interest on the £70. But the market will not mark Company B down on account of future interest that hasn't yet been foregone, because the market value – the price at which the company can be bought and sold – will reflect the new owner's right to take the money out of the safe and put it to proper use.

But there is caveat. The previous remarks about the value of Company B are correct only if "market value" means the value on the premise that the purchaser will buy at least a controlling interest. If Company B is quoted on the stock market, and if the market is aware that the current management intends to maintain its policy of under-working the £70 by leaving it in the safe, the quoted price for a *marginal exchange* of shares will not reflect the opportunity to take the cash out of the safe. The share price will be marked down (despite everything written above) unless and until one or more corporate raiders appears on the scene, ready to cash in on the windfall, at which point the competition to buy will force the price back up again.

[Note: Because this analysis is all at the level of economic theory, the cost of the transaction, in both time and money, is ignored; purchasers are assumed to be tempted in by even a marginal windfall; and borrowing (below) is treated as risk-free.]

What about Company C? It is also identical to Companies A and B in all respects save for the last £70 which is invested in equities.

Once again, the market will value the whole company, today, at £1,000. Although the £70 of equities are not guaranteed to match the £100 liability in 10 years' time, a purchaser today can switch the assets to make that happen. So there is certainly no justification for marking Company C down below £1,000 – not today and not if a controlling interest is to be purchased.

But what about marking the company up? After all, equities are expected to outperform bonds over the long term. It would be expected that, in ten years' time, the company will have an excess of the asset over the £100 liability.

And if that excess is actually attained, the market will upgrade the value of the company. Indeed, at all points from now until the end of the ten years, the market will reflect any upswing or downswing in the value of the equity holding and incorporate that into the value of the (whole) company.

But there is no economic reason for marking the company up now simply on account of an expected future performance in equities. The expected performance of the equities is reflected in their prevailing price. Anyone tempted to pay more than £1,000 for Company C would be very unwise. Someone who was prepared to pay even £1,001 to capture the expected benefit of the equities would be wasting £1 of his money, because he could use that £1,001 to buy (or construct) a Company C twin, but with £1 less of debt, as the following paragraph explains.

The investor prepared to spend £1,001 should spend £1,000 of his money on a pure widget making company with no financial assets or liabilities attached and then take the final £1, supplement it with borrowings of £69, and use the combined £70 to replicate Company C's equity portfolio. In this way, the investor's £1,001 will have purchased for him the same £1,000 worth of widget making talent as Company C *plus* the same £70 of equities as Company C, but with debt of only £69, not the £70 that Company C is saddled with.

In this last case, the valuation for someone buying a handful of shares is no different (pro rata) from buying a controlling interest. That is because, whilst holding equities against a fixed-money debt may be *risky*, it is not actually

wasteful – unlike Company B which put money in a safe, which *is* wasteful.

As each day goes by, the increase or decrease in the value of the equity holding – the ongoing outcome of taking that risk – will be reflected in a £-for-£ adjustment in the market value of the business. There is no justification for marking the company up *today* just because it holds equities (for the reason explained above) and no reason to mark the company down, either. Individuals who want to invest in widgets without playing the equity market, should either buy into a pure widget making business, or else buy Company C, sell the equities (based on their current price of £70) and invest the money in debt with a maturity date which matches the company's liability.

To sum up

The market regards the following three statements as logically equivalent to each other and it values assets accordingly:

a) The market value of (the whole of) a business is equal to the sum of the market values of each constituent part on the day of valuation.

b) The prospective owners of a business can trade the component assets, at their market values, as they see fit. The fact that a particular financial asset is expected to, or even guaranteed to, over- or under-perform any other financial asset does not justify deviating from market value (so long as the market is valuing a controlling interest).

c) Over- or under-performance will be reflected as and when it occurs, but not before. *Expected* over- or under-performance, and the associated risks, are already reflected in the market price.

5 We don't need no valuation
We don't need no thought control[2]

And so we come to the theoretical crunch: a demonstration that the debate over valuation methodologies is unnecessary and misconceived.

The conventional approach of actuaries (both traditional and modern) is to place a value on the assets of a pension scheme (A) and on the liabilities (L). The surplus or deficit in the scheme is the difference, A-L. The big debate within the profession – and outside it – is to determine how to calculate A and L.

In a direct replica of the debate described in Section 3 of this paper, there are those actuaries who, armed with the teaching of financial economics, say that the value of the liabilities, L, is independent of the make-up of the assets of the scheme. Both A and L must always be determined by reference to market values, they say, which means that L must be determined, they also say, by reference to the discount rate implicit in the market value of bonds at the date of the "valuation".

But other actuaries disagree. They place a "value" on the liabilities – not the market value – by discounting the liabilities in line with the expected return on the schemes assets. For reasons that are directly comparable to those already given in Sections 3 and 4, and which will be amplified shortly, both approaches produce meaningful answers – albeit to different questions.

To see how both groups of actuaries can be right, we start by addressing a tantalising question: what if there were a way to derive the surplus or deficit, A-L, directly, without any need to derive a value for A and L separately? For if there is no need to value them separately the whole valuation debate would be irrelevant. As we shall see, it *is* possible to derive A-L without knowing either of A or L. It turns out that the valuation debate is, and always has been, a complete waste of time.

Projecting the future, rather than discounting it

To see how to calculate the amount of surplus or deficit, ie A-L, without having to calculate the value of the assets or the liabilities, we must pause for a moment to consider what we mean by the terms "surplus" and "deficit".

If a scheme is in deficit, the assets are not sufficient to meet the liabilities. The amount of the deficit is the sum of money that needs to be injected into the scheme in order that the assets can meet the liabilities. Conversely, a surplus is the amount that can be removed from a scheme's assets and still leave the scheme just able to meet its liabilities.

To value this directly, without having to calculate the value of the assets or the liabilities, we start by building a model in which we project the liability cash flows. These are the payments of pensions, retirement lump sums and transfer

[2] With apologies to Pink Floyd – and to my readers.

payments etc, which the scheme is expected to pay out based on assumptions as to future dates of retirement, salary levels, mortality etc. This is the first step in any actuarial valuation. But unlike a conventional (actuarial) valuation, we stop short of discounting the cash flows.

Next we turn our attention to the cash flows expected to be generated by the assets. For bonds, this is straightforward: we simply project the coupon payments and redemption monies. For investments such as equities and property, the cash flows aren't known, but estimates can be projected (based on assumptions). This is no different from projecting estimated benefit outgoes, which are unknown. Once again, we stop short of discounting the cash flows.

Next we compare the projected inflows and outflows, starting at the valuation date and working forward. Where the inflows exceed the outflows, the model is programmed to reinvest the net income to generate a further set of cash inflows from that day forward. Where the inflows fall short of the outflows, the model is programmed to sell an existing investment. That is to say, a set of future investment inflows is cancelled.

This process of programming the model to use cash inflows to pay off the outflows, reinvesting any net inflows that arise until they are needed and selling assets to finance net outflows, continues until the benefits are paid off or the assets run out, whichever happens first. This tells us whether the fund is in deficit at the valuation date (the assets are projected to run out before the benefits have been paid off), or in surplus (the projection indicates that some assets will be left over after the benefits have been paid).

To quantify the amount of the deficit or surplus, we must ask how much we need to *inject* into the fund at the valuation date, or what amount we can *release*, in order that the model projects that all the benefits are paid off just at the point when the assets run out. This is a process of trial and error: the computer model can be programmed to do that for us.

By this means, we can calculate the amount of the surplus or deficit (ie A-L) without ever having to ascribe a value to A and L individually. The argument over which is the correct method of valuing A and L is an argument about a calculation that is not necessary.

But there is something missing from my methodology. In order to calculate the amount of the injection (ie the deficit) or the release (surplus), we need first to decide how the injected funds will be invested – in cash, bonds, equities, or whatever – and correspondingly, in the case of a surplus, which assets will notionally be disinvested.

Following the reasoning of Section 3, the amount of the surplus or deficit will vary according to the investment/disinvestment strategy, because different assets earn different rates of return. For every potential investment strategy, the model will produce a different result. Any valuation philosophy which insists upon only one methodology cannot be correct, because it denies the possibility that different investment strategies might lead to different investment returns.

This is not some nit-picking difference. This is central to the debate over actuarial valuation methodologies:

- A conventional discounted cash flow valuation based on valuing the assets at market value and valuing the liabilities by discounting at the rate of return expected to be earned by the *existing investment strategy* is mathematically certain to produce exactly the same result as the projection methodology described above, provided that the projection is carried out on the premise that the initial injection or release is deemed to be invested in a portfolio of assets which exactly matches the existing investment strategy (and all subsequent reinvestments and disinvestments of net inflows and outflows are reinvested or disinvested according to that strategy).

- A bond-based valuation, ie a conventional discounted cash flow valuation based on valuing the assets at market value and valuing the liabilities by discounting at the rate of return currently expected to be earned on *bonds*, is mathematically certain to produce exactly the same result as the projection methodology described above, provided that the projection is carried out on the alternative premise that the initial injection or release is deemed to be invested in a portfolio of bonds *and* that the existing assets are deemed to be switched, at the valuation date, from the existing investment into bonds (and all subsequent reinvestments and disinvestments of net inflows and outflows are reinvested or disinvested in bonds).

Those actuaries who advocate the second approach above can now be seen to be advocating a perfectly sound methodology, so long as it is clearly understood by all concerned that *the result is valid only if the client wants to know the amount of the surplus or deficit on the premise that all existing assets and future reinvestments and disinvestments are in bonds*.

This is a perfectly reasonable question to ask, for example because one wants to consider what might happen if the scheme were wound up. But to advocate this method as the only valid one – and to claim the support of financial economics for this assertion – is simply incorrect. It is not the only valid method and there is nothing in financial economics to justify a single approach. Indeed, it is not clear that those actuaries who advocate this method have appreciated the change in investment strategy that their valuation methodology implies – or that those who have appreciated this limitation on the method have disclosed it.

Clearly, those actuaries who use the first valuation approach above (discounting the liabilities by reference to the expected return on the *existing investment strategy*) are using a perfectly sound methodology also. The result is entirely valid, because it quantifies the surplus or deficit on the premise that the existing investment strategy will continue to apply. Once again, it is not clear that those actuaries who adopt this method have always disclosed this implicit premise, but the mere statement that the discount rate has been determined by reference to the existing assets does, at least, give a big hint to any reader of the actuary's report.

The foregoing methodology also reveals some interesting insights into two actuarial "valuation" methods that have been much derided in recent years.

- It used to be common place for actuaries to value the liabilities by discounting at the so-called *long run* rate of return expected to be earned by the assets (not the prevailing rate of return) and valuing the assets, not at their market value, but at the figure derived by projecting the future expected investment income

and discounting it at the same rate as used for the liabilities. This method was much derided, because it produces an asset "valuation" that does not reflect the market value.

But as we saw in Section 3 of this paper, actuaries often use the word "valuation" differently from economists and others. If the "long run rate of return" (a rather loose expression, it has to be said) is the expected *re*investment rate on income from existing assets (and on future new investments), the projection approach demonstrates that this method – as bizarre as it looks when presented in discounting terms – is mathematically certain to produce exactly the same result (in terms of surplus or deficit) as the standard method whereby assets are taken at market value and liabilities are assessed by reference to the prevailing investment strategy.

In other words, valuing the assets at their discounted value can lead to a perfectly credible result so long as:

a) it is the *net* result – ie the deficit or surplus – that is considered, not the asset and liability "valuations" on their own; *and*

b) this net result is converted back to the real *cash amount* that would be injected (in the case of a deficit) or withdrawn (in the case of a surplus), not the funny-money of a non-market discounted value.

The long-running debate over the methodology was unnecessary. All that was necessary was to be very careful with the presentation of the result. (For more on presentation, see the conclusion to Section 6.)

- A related actuarial approach is to value the liabilities by discounting at the long run rate of return (as described above) and to value the assets at their (current) market value. This is a hybrid which is more difficult to rationalise. The method is mathematically equivalent to assuming that the rate of return will immediately rise, or fall, to the expected long run reinvestment (and disinvestment) rate, but also that the value of the existing assets won't change to reflect that.

  In practice, I believe, this approach is used only when current rates of return are higher than the long term rate expected by the actuary. If so, the method is a conservative one, because it anticipates an immediate reduction in the reinvestment rate, without taking credit for the corresponding increase in value of the assets when they need to be disinvested – but the conservatism is somewhat disguised.

To sum up

The debate over the "correct" method of valuation is a false debate. The two main competing methods produce different results, but not because one method is right and the other wrong. They produce different methods because they answer different questions.

- The bond-based method answers the question: by how much is the pension fund in surplus or deficit on the premise that all existing assets are switched into bonds and all future reinvestment of cash inflows will be in bonds also.

- The traditional method answers the question: by how much is the pension fund in surplus or deficit on the premise that the existing investment strategy is maintained, with all future reinvestment following the current investment strategy. Likewise, all disinvestments, when the projected outflows exceed the available inflows, are made by reducing all the assets pro rata across the portfolio.

- Although the "discounted value" approach to assessing the assets will typically overstate or understate the "asset value" in economic terms, ie compared with the market value at any given time, the valuation methodology will (if applied properly) also overstate or understate the value of the liabilities by the same amount.

Postscript on the method

The methodology described in this section projects the assets and the liabilities and then nets them off against each other, to the extent that it is possible to do so. This appears to violate a fundamental rule of financial economics which is that cash flows which have different levels of risk must be valued by discounting at different rates of return. It is argued that cash flows such as equities and pension benefits, which have different levels of risk, cannot therefore be netted off against each other prior to discounting.

The rule is entirely correct and the method described above does not violate it. The methodology described in this section does not value either the assets or the liabilities as the term would be understood by a financial economist. In other words, the method does not purport to produce a market value at which either the assets or the liabilities might be traded. The methodology merely asks: how much does the company need to inject into, or release from, the current portfolio of assets in order to be able to meet the liabilities with nothing left over?

Part III

Myth and misunderstanding

6 Staying within budget

In 1997, three members of the actuarial profession, Jon Exley, Shyam Mehta and Andrew Smith, wrote a paper on the financial theory of defined benefit pension schemes. Others have followed in the direction the authors took and, for many actuaries, the paper has acquired "seminal" status (and one of the authors a near cult following). In this section, I shall follow the practice of others and refer to the authors and their 1997 paper as "EMS".

EMS is, arguably, just as renowned for its critique of traditional actuarial thinking as it is for its application of finance theory to pensions schemes. As much as I went along with the economics, and welcomed the refreshing view that it brought to the subject, I found myself in disagreement with a crucial 2% of the paper (in the literal sense that my disagreement relates to some 2 pages out of 100). The passages I challenge relate to EMS' interpretation of non-market valuation methods – the aspect of their paper that, perhaps, did most to give the authors their notoriety.

Working through a numerical example of their own choosing (which I shall return to very shortly), EMS wrote the following:

> "This is roughly typical of the puzzles that arise with the [actuarial] funding method – anomalies that can be explained in terms of the arcane mechanics of the calculation. It means that, *if we interpret the actuarial numbers as values*, a conglomerate with two separate pension schemes could apparently enhance its 'value' by swapping the assets between them." [EMS paragraph 3.3.5 – my italics]

This passage, taken on its own, seems to be an entirely reasonable criticism. Any analysis which suggests that switching assets between two pension schemes can enhance the aggregate value does, indeed, seem to be utterly bizarre. The authors words "arcane" and "puzzle" seem really quite restrained for so heinous a crime.

But hold on one moment. Look back at the passage and note that, on EMS' own analysis, the criticism can be justified only "if we interpret the actuarial numbers as values". Read some more of EMS and we find not one, but two, clear warnings that we should *not* interpret actuarial "numbers" as "values".

> "An actuarial funding valuation has a different purpose from an economist's value, and the different methods employed reflect this." [paragraph 10.1.1]

> "… valuation is not the final objective of the funding methodology … The liabilities are not being 'valued' but rather budgeted for." [paragraph 3.2.5]

An actuarial valuation is, according to EMS, a budgeting exercise; it "has a different purpose from an economist's value" and "the different methods reflect this." I concur entirely (see also Section 3 of this paper). Wise et al (2004) remind us that actuarial funding valuations form part of a control cycle, which they describe as "the basic method for making financial sense of the future".

The fact that, for many years, actuaries took the assets into their funding

assessments using "numbers" that were different from market value strongly suggests that actuaries in general were wholly aware that their numbers were not economic numbers. The use by actuaries of the term "smoothing" to explain their non-market values would tend to reinforce the point that actuaries knew were applying their own judgement to arrive at the numbers, not the methods of economists – and certainly not the market.

Often, as mentioned in Section 5, the actuarial numbers were arrived at by discounting the (expected) cash flows associated with the assets back to the valuation date at rates of return that were not the prevailing market rate. This was criticised, most often when it led to asset numbers higher than market value – the very opposite of the conservatism that actuaries were supposedly renowned for. That practice has fallen into disuse, not least because of the criticism, with actuaries generally now using market values for the assets.

But actuaries who adopted non-market values for the assets also discounted the *liabilities* at rates which were not the market rate. So neither the asset numbers *nor* the liability numbers in the budgeting calculations were at market values. Complicated? For a lot of people, it probably was. Carrying the clients with you depended on having their trust – something which is, perhaps, in shorter supply these days.

Whether the actuaries who adopted this approach were able to follow the complexity of their calculations is a moot point. Implicitly, I think, EMS (and other papers which came later, for example Gordon (1999) and Chapman et al (2001)) are saying that actuaries had got their methodology wrong.

My own belief, albeit at some distance of time since I last advised a pension scheme myself, is that, as complicated as the budgeting approach is, compared to the market approach, the financial management of a pension scheme from triennium to triennium was easier to conduct using the budgeting technique, with all its smoothed actuarial numbers, than a mark-to-market approach. But mistakes could easily be made.

The following example from EMS shows, perhaps, how easy it is to fall foul of the "budgeting" method, especially for people who are not well practised in it – as seems to be the case with EMS (at least when their 1997 paper was written).

A conjuring trick

Section 3.3 of EMS is headed up "A conjuring trick". And so it is, but, in my view, a trick that backfires on the authors, as we shall now see.

The authors hypothesise two schemes:

- Scheme 1 has assets of 100 (by market value) invested in equities, expected to earn a return of 10% pa (EMS' assumption, not mine). The scheme has a single liability of 165 payable in five years time. By projecting the asset value forward at 10% pa for five years, we find that it is expected to realise 161.05 and, therefore, not quite sufficient to pay off the liability. In short, the scheme is in deficit. That is EMS' assessment and it is mine (on EMS' assumptions).

- Scheme 2 has assets of 115 (by market value) invested in gilts, expected to earn

a return of 8% pa (again EMS' assumption). This scheme also has a single liability: this time it is 250 payable in 10 years time. By projecting the asset value forward at the assumed rate and for the required duration (this time, 8% pa for 10 years), we find that the asset is expected to realise 248.28 and is, once again, insufficient to pay off the liability. This scheme is also in deficit. Again, that is EMS' assessment and it is mine (on EMS' assumptions).

Now, EMS switches the assets between the two schemes. On re-doing the maths, the asset in Scheme 1 is projected to be 168.97 (115 projected forward for five years at 8% pa), which is sufficient to pay off the liability. The asset in Scheme 2 is projected to be 259.37 (100 projected forward for 10 years at 10% pa), which is also sufficient to pay off the liability. Lo and behold, just by switching the assets between the two schemes, the deficits in each scheme have *both* been turned into surpluses. A conjuring trick, indeed – or is it?

Before examining the (rather curious) inferences that the authors draw from this, let us first see how they pulled off the trick.

The key is to watch the equities very carefully. The equities started out in Scheme 1, where they were held for just five years and then sold in an unsuccessful attempt to pay off the debt due in that scheme. But following the transfer to Scheme 2, *the equities are held for ten years, not five*. It is the lower yielding gilts that are sold off after five years. The equity premium (2% pa on EMS' assumption) is now available for five years longer. The extra 2% pa, earned by holding equities rather than gilts for the second five years, is sufficient to turn the aggregate deficit of 5.67 before the switch into a surplus of 13.34 after the switch.

It is the expectation that the equities will outperform the gilts – an expectation (but not a guarantee) which is common to financial economists as well as to actuaries – which gives rise to the extra cash and not some arcane trick.

But EMS draw a wholly different inference. In paragraph 3.3.4, the authors write:

> "By *hypothecating* the better performing asset class to the longer dated liabilities, we obtain a greater total return." [my italics]

What EMS tries to dismiss as a mere "hypothecation" – a notional apportionment which can have no practical consequence – is, in fact, a very real change in investment strategy ("sell the gilts and hold the equities"). But EMS use this example to pour scorn on pension fund actuaries. Immediately following the "hypothecation" assertion quoted above, they write:

> "This is roughly typical of the puzzles that arise with the [actuarial] funding method – anomalies that can be explained in terms of the arcane mechanics of the calculation. It means that, if we interpret the actuarial numbers as values, a conglomerate with two separate pension schemes could apparently enhance its 'value' by swapping the assets between them."

If that sounds familiar, it is because it is exactly the passage I quoted earlier when I challenged the authors criticism of actuarial "valuations". In fact, there is no puzzle. Nothing about this example is arcane. If you change investment strategy to one which yields a higher return, a deficit may, indeed, be turned into a surplus. [Of course, in the real world, it is the *ex post* outturn that determines

whether the liabilities get paid, not the *ex ante* expectation. But budgeting is, by its very nature, an *ex ante* exercise.]

We can now see that, not only does the foregoing passage in EMS contain a false conclusion because it turns on a premise which the authors themselves have acknowledged to be false (as I explained earlier), but the passage is also flawed because it turns on a mathematical example which falls into the trap of mistaking a change in investment strategy for mere "hypothecation".

EMS' mistake – and I think it is a rare, technical slip in an otherwise technically excellent paper – is easily made, and easily missed, because in the form it was published in their paper, the example was worked through by discounting the liabilities back to the present day, rather than projecting the assets forward to the pay-out dates. Mathematically, the two are completely equivalent, but discounting tends to make it harder to see what is going on. In this case, by focussing on discounting to arrive at a value, rather than projecting to produce a budget, EMS failed to acknowledge the change in investment strategy that they had built into their example as they switched from one scenario to another.

The next (and final) extract from EMS is, perhaps, further evidence of confusion.

Homing in on a target

There is no doubt that planning to meet a single pre-determined monetary liability by holding equities is a risky thing to do. If equities are held right up to the point when the liability falls due, it doesn't matter how well funded the "pot" is, there is always a risk that the market will drop and leave a shortfall. If anyone – actuary or otherwise – adopts such a strategy without realising the risk, they need to be warned.

But one can overdo the warnings. And so it is in paragraphs 3.6.1-3.6.2 of EMS, which contain this:

> "Finally, if we regard the funding methodology as a means of homing in our savings on a future liability commitment, we find another rather curious effect, as a consequence of the potential inconsistency with market values.
>
> If, for example, we are funding some index-linked lump sum in ten years' time using equities, we might find ourselves five years down the road with more than enough cash to buy a matching index-linked gilt, but the funding valuation might be writing down our equity assets so much that we are getting the message to put more contributions in. This is directly analogous with the situation that existed in September 1987."

I don't know how many pension funds, if any, found themselves in September 1987 (or at any other time) with just a single remaining liability due five years down the road. If there were any, and the actuaries were advising the client to pump in more money when a matching strategy would have enabled the liability to be hedged away, I would join EMS in criticising those actuaries.

But, as convenient as single-liability examples are for making the analysis easy, such examples produce conclusions which may not hold when the liabilities are spread over multiple dates – just as a (hypothetical) insurance company with a

single policyholder is not suitable for demonstrating how mortality tables work.

The defined benefit pension schemes that EMS were writing about typically contained multiple members, with salary-related liabilities and ongoing accrual of rights. Even if the accrued rights, based on service and salary to date, could be hedged out with index-linked gilts, the fund could be knocked out of kilter by future salary increases.

Moreover, unless EMS are saying that there were funds in 1987 with enough assets to meet long term *future* accruals, ongoing contributions were required, so "put[ting] more contributions in" was a matter of "how much?", not "whether?"

[Note: I am not suggesting that it would be wrong to hedge out the past accrual and develop a future strategy from there. That is a matter of preference. And, if that is the trustees' choice – or an option they wish to consider – they need an actuary who is willing to analyse it and advise. But there were other acceptable strategies available and it was not wrong for actuaries to advise on those (too).]

September 1987 was, of course, a special time: the stock markets were at a high, but also just a matter of weeks away from a crash. Those who were prescient enough – or lucky enough – to close out their accrued liabilities by selling equities at the pre-crash high and switching to matching gilts, got a great result. My advice would always be to sell equities at the pre-crash high and re-purchase when the market is at the bottom – and to do so as often as possible.

But, for those who don't know how to spot the highs and lows of the stock markets (and those who do, probably aren't spending their time managing other people's money!), what exactly is EMS telling us in the passage I quoted above? That budgeting calculations are difficult? Yes, they are. That smoothing techniques must be interpreted with great skill and care? Yes, they must. Anything more than that? I really don't think so.

If EMS want to make the point that market-based techniques are a better tool than actuarial budgeting calculations, I'd want to see the evidence of how the two approaches stack up when compared over time and over a range of pension funds. I don't think we've seen such a comparison published and I, for one, am not sure what it would reveal.

Drawing the strands together

There would be a considerable reduction in confusion if actuaries would stop saying "valuation" when they mean "funding (or budgeting) exercise".

For funding/budgeting purposes, projecting is a far easier tool to manage than discounting (see also Section 5). If the results of a projection are cumbersome to present, there may be something to be said for rolling the projections back to the present day and presenting the results in the conventional (discounted) format. But, personally, I doubt it.

All my instincts as a communicator encourage me to believe that finding a method to present the results of a funding valuation in a budgeting format would benefit clients and actuaries alike. See, for example, Section 5, where the conventional approach to "deficit", as the difference between two values, was

replaced by an approach which described it as "the sum of money that needs to be injected into the scheme in order that the assets can meet the liabilities". With this new definition (mathematically equivalent to the old one), the valuation dilemma was eliminated.

It is also important not to put the funding cart in front of the investment horse. Investment strategies affect how much is needed to fund a scheme, *not* the other way around. It is easy to contradict a funding recommendation – just as EMS did with their September 1987 example – by pointing out that a different investment strategy would call for a different funding plan. But that is a statement of the obvious, not a meaningful insight – still less a criticism.

7 Pensions and bonds – spot the difference

The assertion that pension liabilities are "bond-like" is found in much of the recent literature (for example, Ralfe, Speed & Palin (2003) and Chapman, Gordon & Speed (2001)). It is based on the notion that pension liabilities are a stream of pre-determined monetary amounts, just like the liabilities in respect of bonds.

The significance of the comparison is, according to its proponents, that pension liabilities should be costed as if they were bonds. Typically, the suggested discount rate is that underlying either AA-rated bonds (as in FRS 17) or gilts (eg Chapman et al (2001)).

But there are also aspects of pension benefits that are not like bonds (more of that below). Simply listing similarities (or differences) isn't enough to determine whether or not it is safe to use a bond-based valuation. The test must be: are pensions *sufficiently* 'bond-like' to support such a valuation method?

The analysis below seems to indicate that the answer is an unequivocal "no".

1 *The definition of "pension":* In a final salary scheme, the pension promise depends on future salary increases. In the absence of bonds that are linked to future salaries, the 'bond-like' assertion refers, at best, to the pension based on accrued rights and on salaries to date – effectively the pension as it would be if the employee left service or if the scheme were closed. The proponents of the 'bond-like' assertion generally adopt this definition (eg Chapman et al (2001), Speed et al (2003)), but readers of the 'bond-like' literature have fallen into the trap of thinking that the use of bond-based valuations can be extended to include pensions based on future (unknown) salaries.

   For an example of the confusion caused to non-actuaries, look no further than the Accounting Standards Board, which has defined the pensions liability for accounting purposes as based on expected final salary, both under FRS 17 and its predecessor SSAP 24, but the ASB has adopted bond-based valuation methods for FRS 17. [In Section 2 of this paper, I asked (with reasons stated) whether the ASB really understood the implications of the calculations they had called for under FRS 17. This analysis provides a further reason to question the ASB's understanding of their standard.]

2 *Enforceability of the pension rights:* Setting aside, just for a moment, legislative overrides since mid-2003, pension scheme rules almost invariably contain a walk-away option for the employer. Bonds have no such option. Moreover, when an employer with a defined benefit pension falls insolvent, the pension scheme's claim on the employer's assets is limited to the MFR (which is equity-based for active members, not a fixed money obligation).

   But bond payments are a liability on an insolvent company, fixed in monetary terms. To argue that the value of the pension benefits is equal to the value of corporate bonds of matching duration, one would need to demonstrate that the inability to enforce the payment against a reluctant, or insolvent, employer

is of no economic significance. Is there any evidence for that? I haven't seen it.

So the assertion that pensions are like bonds seems to be justified solely by reference to the nature of the cash flows and not by reference to the very characteristic that makes cash flows a "debt" – namely the obligation to pay.

Legislation introduced in 2003 negated some of the effects of the walk-away option, by overriding scheme rules if the employer is solvent. This certainly assists the 'bond-like' argument, by creating an apparent obligation. But the obligation is enforceable only if the employer or the trustees decide to close the scheme. If the obligation is enforced in this way, all future accruals cease and all future salary increases are disregarded. It's a little bit like knowing that, if your employer is late with your salary on some occasion, you can sue him for it, but you will automatically (and quite legally) be sacked for doing so. Is that as good as having the standard form of enforceable salary obligation? Manifestly not.

Moreover, the legislation may not be 100% effective in creating the (limited) obligation that it seeks to create. Employers may yet find ways to reorganise their corporate structures so as to park the liabilities in an insolvent vehicle. We shall have to wait and see. In the meantime, we should take note that there is a body of economic literature which argues, broadly, that if a law is passed which outlaws an efficient act, parties will, negotiate and contract around it (Coase's Theorem, named after the Nobel Laureate, Ronald Coase). If that theory holds in this case, it means that employers will be able to get around the new law – unless, that is, the walk-away option was not an economically efficient option for an employer to have in the first place. I have not seen that caveat argued, nor can I see why it should be so.

More to the point, perhaps, the 'bond-like' assertion has been around since well before 2003 (both references cited on the previous page pre-date the legislation). Even if the statement were true now – and for the reasons just given I am not convinced that it is – it is only because the law has changed to bolster the assertion, not because the economics were right when the assertion was first articulated.

3 *The cash flows are **not** predetermined:* Unlike bonds, where the cash flows are pre-determined, pensions are subject to a number of uncertainties, including:

- the form in which the payments will crystallise (eg as a retirement pension, deferred pension, death in service benefit or lump sum election etc); and

- the duration of payment, in the case of those benefits which continue throughout the life span of the beneficiaries.

This is acknowledged by Ralfe, Speed & Palin (2003), but they dismiss the point as "not alter[ing] the underlying economics that pension promises are debt-like." Ralfe et al offer no support for this assertion and I disagree with it, for the reasons explained below.

For a scheme with multiple members, these uncertainties can, of course, be modelled using probabilistic assumptions. Often the assumptions will be borne out on practice, but not always. Redundancy programs and/or changes

in the relevant economic sector can lead to radical deviations from the volume and timing of the early leaver assumptions.

More significantly of late, there has been the discovery that longevity has increased significantly beyond the levels previously anticipated. Whatever the reasons for this and no matter that actuaries might (or might not) be blameless for failing to anticipate this, it remains a fact that payments have continued for longer than were once anticipated. How bond-like is that?

So we can conclude that pensions can be said to be 'bond-like', provided that:

- we *ignore* the future salary growth in a final salary scheme,
- we *disregard* the reduced enforceability of a pension obligation compared to a bond, and
- we *pay no attention to* the possibility that the timing of the payments may be sooner or later than anticipated or the possibility that the duration may be longer or shorter than anticipated.

And so to the test I proposed: are pensions *sufficiently* 'bond-like' to support the assertion that the market value of pension liabilities can be derived from the value of matching bonds? It all depends on how significantly the market regards each of the foregoing differences between a pension and a bond obligation.

I accept that the first difference (future salary growth) is simply a matter of how you define the "pension" being valued. But it is an important limitation on the type of pension which can be valued on the bond-like basis and does not extend far enough to include FRS 17 liabilities, notwithstanding that FRS 17 requires a bond-like valuation.

I don't accept that the market regards the second difference (enforceability) as of little value. I would be interested to see any evidence to the contrary.

The third difference (possible failure of the timing and/or duration assumptions) is also difficult to dismiss as insignificant in economic terms. The recent changes in longevity are widely recognised as having a significant impact on the quantification of pension and annuity liabilities. But even before these longevity changes were uncovered, actuaries had the impact of redundancy and other early leaver outcomes to contend with as well as lump sum elections.

Finally, even if evidence could be adduced to show that all three differences really did have minimal effect on the market's assessment of the liabilities, it remains the case that the payment of any unfunded liabilities (ie the plugging of any deficit) depends on the ability of the employer to pay. If the employer has a credit rating lower than AA, how can the promise to make good the deficit be valued at AA rates? The un-funded part of the liability cannot be more creditworthy than the employer.

8 Being actuarial with the equity risk premium

The argument that the equity risk premium cannot be included in discount rates for pension scheme liabilities is found in many places. Gordon (1999) argues that it is "double counting" to allow for the equity risk premium. Chapman, Gordon & Speed (2001) say "risk premiums do not appear in the assessment of economic cost". Shuttleworth (2002) describes the equity risk premium as a "free lunch" – a phrase that is also used by several other writers cited in this paper, eg Ralfe, Speed & Palin (2003).

This constitutes an interpretation of the equity risk premium that is wholly alien to modern economic thinking. In essence, the argument used by the foregoing writers is that, because the equity risk premium is, as the name suggests, compensation for taking on (some of) the risks associated with equities, the premium and the risk cancel out. Since they cancel out, so the argument goes, they should both be ignored: pension benefits should be treated as though they were risk-free cash flows and discounted at the risk free rate.

Quite why both risks must be ignored, rather than both being allowed for (ie treating the cash flows as risky and discounting them at the risk-adjusted rate) is not clear. But since the proponents of the theory are so determined that equal and opposite factors must be ignored, rather than allowed for, there seems to be no alternative other than to go back to basics to see what happens under such a belief system.

Benefits from trade

Consider the following conversation between an actuary and a prospective client. We join it at the point where the client has identified work that he wishes to be done and the actuary has confirmed both his willingness and his ability to take matters to the next step:

Actuary:	I will have to charge you for the work.
Client:	Naturally, I will pay you the going rate.
Actuary:	Not a chance.
Client:	If you have some special skills that add extra value to the service, I will, of course, reward you for those too. You'll find me a very appreciative person to work for.
Actuary:	I'm looking forward very much to working with you. You'll find that I'm a bog-standard, humble actuary, just like all the others.
Client:	Well then, the going rate seems …
Actuary:	And I don't do free lunches.
Client:	Surely there must be some misunderstanding? I'm offering the fair market rate.

Actuary: Just look at the economics: I do a piece of work; you pay me the market rate. Where's the point in that? I've exchanged my time and trouble for something of equal value. Unless you pay me over the odds, it's just not worth me getting out of bed, is it?

We can leave the conversation at that point. If the actuary never gets out of bed unless someone pays him over the odds to do so, he will starve. Indeed, he won't be able to afford a bed in the first place.

Just because a transaction exchanges two things of equal value does not mean that it is pointless, nor that we can ignore its economic effects. This is not only true for the exchange of labour for money. It applies to all transactions, for example exchanging money for food and shelter. It even applies to exchanging financial assets. If I want to buy £100 worth of corporate bonds which I don't presently have, I will need to cough up £100 in cash. Pointless? I don't think so.

The raison d'être for investing

So let's return to our actuary at a later date. After several unproductive sales meetings, he has now learned to accept the "going rate" for his services and is getting out more. He has also been approached by his bank manager with the suggestion that perhaps the accumulating funds in his current account might be directed to a more rewarding savings medium.

Actuary: What do you have in mind?

Bank Manager: I think we should meet to discuss that, but in the meantime, why don't you let me transfer some of the money into a deposit account so you can be earning some interest just to be going along.

Actuary: How much interest?

Bank Manager: The market rate. I'll just look that up for …

Actuary: Not a chance, mate. I'm going to bed.

We know why deposit accounts pay interest. When individuals wish to make temporary use of funds that somebody else owns, experience shows that a deal can be arranged, but only if those who are cash-poor pay those who are cash-rich a sum of money, periodically, in addition to promising to return the initial funds in due course. The periodic payment – called "interest" – is a reward for agreeing to forego the use of one's money. If there is a risk that the money may not be returned, the rate of interest is normally a little (or a lot) higher.

This is not a pointless exchange. Nor is it an exchange that can be ignored. When discounting future cash flows to the present date – or, mathematically equivalent, projecting cash flows forward – it is not appropriate to ignore the interest rate as though it wasn't there, merely because it cancels out the rights foregone.

Now let's look at those equities.

Suppose that investors are offered the choice between an investment with a risk free return of, say, 5% pa and one with an *expected* return of 5% pa, but with volatility around that central estimate. From observations of the way investors behave, we know that investors will prefer the guaranteed return. In order to

persuade investors to buy the investment with a volatile return, it is necessary to increase the expected return beyond the return on the risk free asset.

[Note: This is a matter of observation, rather than logic. As tempting as it may seem to assert that reason dictates that investors must prefer the guaranteed return, it is not impossible to imagine a world in which the human brain has been wired to prefer risk over certainty. Indeed, in a world in which people can be observed jumping out of airplanes for fun, albeit with a parachute on their backs – and even paying for the privilege – it would be intellectually reckless to assume that equities command a risk premium without researching the facts first. But the research has been done and they do. It is universally accepted that some level of premium is required.]

So we can see that the equity risk premium is a reward paid to investors to compensate them for abandoning certainty in favour of volatility. But why would anyone raise money on those terms if they could raise it more cheaply by guaranteeing the return? Government, for example, does not issue equities (or their like). The answer is that businesses, unlike government, do not have the wherewithal to guarantee that they will be able to pay a predetermined return on their investment, year in and year out. If businesses were financed 100% by loans, many more of them would fail as a result of being unable to make the payments of interest or capital.

The lending market arises because there are people and businesses that are cash-poor at the same times as there are others who are cash-rich: the lending market enables them to meet and transact. The equity market arises in a similar way. Some of the cash-poor need to raise more finance than they can promise to remunerate on fixed interest terms. Fortunately for them, there are investors who can tolerate the uncertainty of volatile returns and are prepared to do business with those who can only afford to raise funds on that basis.

The price for raising money on a variable payment contract is that the expected return must be greater than for fixed payment contracts. In an open market, the value of the premium exactly matches the inconvenience caused by the volatility, because that is the rate required to attract into the market enough investors who can tolerate variable returns to meet the demand from those who need such finance. Naturally. That's how markets work.

Dismissing the equity risk premium

And so to the crunch: what possible justification is there for a theory which recognises the return in the lending market, but dismisses the extra return in the equity market as double-counting or a "free lunch"?

Let us take a look at the circumstances in which proponents of this bizarre theory would like us to apply it.

- *Determining the market value of pension cash flows:* If equities are a matching asset (or a surrogate match) for pension cash flows, the discount rate implicit in equity returns should be applied – in full – to any pension cash flows for which a market value is required. If equities are not the matching asset, they shouldn't be used to value pensions. The same goes for risk-free assets.

We have already seen that the degree to which pension benefits can be described as 'bond-like' is somewhat tenuous. It depends upon a restrictive definition of the liability (based on past service and salaries), ignoring the walk-away option (or what is left of the option after recent legislative over-rides) and treating possible failures of the timing assumptions as matched by (or at least equivalent to) the default possibilities inherent in bonds.

Whether equities provide a better match for the liabilities is a matter of some debate. I don't propose to add anything to that debate other than to note that:

- future salary growth seems to include non-trivial elements of volatility, enough to justify at least some level of premium;
- solvency and the decision not to exercise a walk-away option would appear to be linked, in some way, to future economic prosperity; and
- whilst the correlation (if there is any) between longevity and the economy may be positive or negative, depending on how healthily or unhealthily people choose to behave when financially secure, the demographics of redundancy would appear to have some positive link to the economy.

If someone can demonstrate that, in practice, the premium for all these factors is so trivial as to be worth ignoring, I will accept the logic of discounting pension liabilities without a volatility risk premium – for market valuation purposes. But that is a far cry from the "free lunch" and "double-counting" arguments, which are based on (erroneous) logic, not market-testing.

It is sometimes suggested that the "buy-out" market for pensions provides just the evidence needed to demonstrate that the market uses the return on high quality bonds to set the terms on which a pension promise can be transferred from a scheme to a third party provider.

Actually, the buy-out market does nothing of the sort. A pension promise that has been "bought-out" is very different from one which is made by a pension scheme. A bought-out pension is based on the premise that the scheme member has no future accrual rights in respect of service of salary growth. It also treats the employees as though they have left service, so no early leaver or early retirement options exist which can change the value of the benefit.

Even more crucially, in buying out the accrued benefits, the employer's walk-away option is permanently excluded. If the buy-out is triggered by a scheme closure, the employer has effectively walked away already (whether by choice or necessity). If the buy-out follows a decision taken by the trustees of a continuing scheme, they are effectively precluding the employer from walking away in future.

- *Determining the contribution rate for a pension scheme:* As we have seen several times in this paper, determining the contribution rate for a pension scheme depends on how the contributions are applied. In Section 3, the point was made in reliance on common sense. In Section 5, the analysis was extended by looking at the question in terms of projecting cash flows forward, rather than discounting them backwards. The projection analysis showed that, if the contributions are invested in equities, the expected amount needed to fund

the scheme will depend on the expected return on those equities, not the return on some other assets. Discounting and projecting are, of course, mathematically equivalent, so any result proved by one method must apply with equal force to the other.

There is, of course, a risk that the expected return will not be achieved. The actual outturn may exceed or fall short of the expectation. In managing a scheme, something needs to be done to plan for that eventuality. Discounting liabilities at the bond rate (or even the risk-free rate) does not achieve that. If the return on equities falls short of expectations, it may well fall short of the bond and risk-free rates too. Setting aside contributions derived from a risk-free discount calculation will undoubtedly reduce the risk of a deficit later on, but it won't eliminate it.

In other words, discounting at the bond rate or risk-free rate to determine a funding plan represents a form of conservatism – but an entirely arbitrary one.

Modigliani & Miller famously put forward the proposition that the market value of a firm is independent of its capital structure. Put another way, the value of a firm depends on how the assets are deployed, not on how the money is raised to finance the purchase of the assets. This proposition is often cited in support of the notion that the value of a pension cannot be affected by the decision to invest in equities or any other assets, rather than bonds – see, for example, Ralfe, Speed & Palin (2003) and Gordon (1999).

Wise et al (2004) and Blake & Khorasanee (2004) have challenged this on the grounds that the assumptions underlying M&M don't hold. I think there is an even more fundamental challenge than that: even if the assumptions are valid, M&M provide no support whatsoever for the proposition advanced by Gordon, Ralfe and the others. This is because M&M wrote about a business in which equities and bonds appear on the *liability side of the balance sheet*, as the *source* of the firm's capital. The asset side of the balance sheet consists of widget-making equipment. But in a pension fund, equities and bonds are *assets*, not liabilities. What M&M are telling us is merely that we can ignore the *source* of the funds from which the equities and bonds are purchased (ie the different contributors), not that we can ignore the way the funds are applied (ie asset allocation).

Lower contributions as the investments get riskier?

Those who argue that the equity risk premium should not be included in the discount rate tend to argue the corollary that it leads to perverse results. During the discussion of the Address of the Institute President in 2002 (BAJ, **9**, 69), Tim Gordon said:

> "Pensions actuaries advising on funding typically discount liabilities by more if they are backed by more risky assets. This is correct, to an extent, in the other direction, that is valuing a liability with a risky collateral, but it is clearly wrong if advising on funding. This sort of reasoning leads to the perverse situation that, if the scheme is going to take less risk, then the pensions actuary is likely to suggest higher funding."

The key to disentangling what Gordon is saying is to recognise that the word "risk" changed its meaning each time Gordon started a new sentence.

- In the first sentence, where he describes what pensions actuaries are actually doing ("discount[ing] liabilities by more if they are backed by more risky assets"), he is referring to the inclusion of the equity risk premium in the discount rate and, thereby, the *volatility* it rewards.

- In the second sentence, he refers to "risky collateral" – ie the *default* risk.

- In the third sentence, he refers once again to actual practice and, therefore, to *volatility* risk ("if the scheme is going to take less risk, then the pensions actuary is likely to suggest higher funding").

By inserting a reference to the type of risk which would cause contributions to go up (ie the risk of assets defaulting), the reader is drawn towards the notion that putting the contribution rate down in the face of risk must be perverse. But volatility risk is quite different from default risk. Financial economics teaches us that volatility risk (also known as market risk or non-diversifiable risk) earns a reward and that default risk (which can be diversified away) does not. Gordon recognises this – see section 3.6 of Gordon (1999).

To a financial economist, the statement that an asset has *volatility* risk is equivalent to saying that it is expected to earn a higher return. Insert that basic principle into Gordon's third sentence and see, now, what the sentence says:

> "if the scheme is going to ~~take less risk~~ invest in assets with a lower expected rate of return, then the pensions actuary is likely to suggest higher funding."

Surprising? Hardly. Perverse? Of course not. Should I be taking a few ill-chosen sentences from a meeting transcript and making a meal out of them? I wish I didn't have to. But, unfortunately, Gordon's observation has been repeated widely. John Plender, an influential columnist at the *Financial Times*, wrote the following, under the heading *Moonshine*, on 3 March 2003:

> "Yet, in setting the contribution rate for the fund, some actuaries discount the liabilities on the basis of an unearned equity return that includes a premium for risks that have not yet been incurred. This leads to a bizarre situation whereby the sponsoring company pays lower contributions for a fund invested in risky equities and higher ones where less risky bonds are used to match increasingly bond-like pension liabilities."

Once again, some interesting word-play has confused the writer into drawing a muddled conclusion.

- The description in the first sentence of the equity return as "unearned" is gratuitous. Any return in a discounting calculation, including the risk-free return, is "unearned" at the discount date.

- The description of the volatility risks as "not yet … incurred" invites the reader to fall into a similar trap.

  This is a budgeting calculation. Like all budgeting exercises, it relates to the future, so suppositions have to be made. One of the suppositions is that the investment strategy will include equities. Accordingly, the calculations must take into account the characteristics of equities (ie expected volatility and expected premium). One can do an alternative calculation without a premium,

but that would be a budget based on some other investment strategy.

- In the second sentence, the phrases "risky" and "bond-like" appear once more. "Risky" is being used in the volatility sense. And, since the writer is describing *future* contribution rates, we can take it that the scheme is ongoing and the liabilities are based on future salaries. So, why the description "increasingly bond-like"? Where can one find bonds that match future ("as yet unearned") salaries?

I would prefer to see the passage re-written as follows:

> "~~Yet,~~ In setting the contribution rate for the fund, some actuaries discount the liabilities on the basis of an ~~unearned~~ expected equity return that includes a premium for the ~~risks that have not yet been~~ volatility risk that is inherent in equity investments and will be incurred for so long as the equities are held. This leads to a ~~bizarre~~ situation whereby the sponsoring company initially pays lower contributions for a fund invested in ~~risky~~ equities, because they are expected to earn a higher return, and higher ones where ~~less risky~~ lower returning bonds are used. If the higher expected returns are not achieved in practice, the lower contributions will need to be topped up accordingly. ~~to match increasingly bond-like~~ Pension liabilities are related (at least in part) to future salaries and the employer's continued willingness to underwrite the liabilities."

What happens in the long run?

A further source of frequent confusion in this area is the phrase "in the long run". It is used with two completely different meanings, usually without proper explanation, leading to enormous conflict.

On one side of the argument are those who say that, as risky as equities are, their use as an investment vehicle for pension schemes is justified because pension schemes are long term creatures and, *in the long run*, equities can be expected to outperform bonds.

This is countered by some commentators who assert that equities get riskier the longer they are held, not less risky, ie, *in the long run*, the risk associated with equities increases – see, for example, Ralfe, Speed & Palin (2003) and Shuttleworth (2004). This second proposition may depend on whether equities are mean-reverting or not (broadly, whether the equity market is volatile around some fairly stable mean or completely random in its movements from day to day). If equities are mean-reverting, some say they may not be riskier as time goes on.

I leave the debate on equity behaviour to others. I am much more interested in the way the phrase "in the long run" has changed its meaning from one side of the argument to the other. The argument (as put forward by, for example, Shuttleworth) that equities get riskier over time is based on looking at a time horizon, T, for a single investment. The greater the value of T, it is said, the riskier the performance of equities held over that time period.

But pension funds don't have a single injection of funds which are held for a long period of time and then paid out. Initially, pension funds have money for

investment rolling in consistently over many decades. When the time comes for paying out, payments are spread over many decades too. The overall return achieved by a pension fund is a weighted average of many, many investments, each of long duration. The "long run" for a pension fund isn't merely the length of time over which the investments are held, it is also the averaging effect.

Given that the equity risk premium exists so that those who are volatility-tolerant will put their tolerance to work by making funds available, on volatile terms, for those who need to raise finance on that basis, pension funds seem to be well placed to make the most of equity investment.

The expected higher returns from equities aren't, of course, guaranteed, even for a repeat investor. Whole economies do perform badly, possibly even for long periods of time. Look at Germany between the two world wars or Argentina over much of the 20th Century, both of which suffered one or more bouts of hyperinflation. But then think about the performance of fixed interest debt instruments during such periods. Not exactly a match for final salary pension liabilities! In fact, not a very accommodating economy for any sort of pension planning.

9 Pension schemes – independent of cost?

There is an oft-repeated assertion in the literature that the cost of a pension scheme is independent of the assets held within the scheme (eg Gordon (1999) and Shuttleworth (2002)). This assertion has been questioned by Haberman et al (2003). Those actuaries who make the assertion are usually referring to the cost of the benefits based on service and salaries to date and without a walk-away option (eg Chapman et al (2001)). On that basis, the statement is true, but the cost being talked of is neither the economic cost nor the accounting cost of a scheme.

Accounting costs include an allowance for projected future salary increases, as set down in the rules of the scheme. This is the requirement under the new UK standard, FRS 17, under the emerging international standard IAS 19 and it was the requirement under the UK predecessor, SSAP 24. Exley (2002) argues that FRS 17 (and, presumably, now IAS 19) is wrong to use this definition of cost, but unless and until he persuades the accounting profession to adopt his definition, the "cost" he refers to is not "cost" as accountants understand the term.

As for economic cost, there are many different measures, eg marginal, average, or total cost – measured over the short term or long term. All of these measures are forward-looking in concept. A definition based on past service and past salary would not normally be understood by an economist to be "cost".

More fundamentally, an economic definition of cost would also include the employer's walk-away option. If the employer can reduce its contributions to the scheme by taking a gamble on equities, knowing that the walk-away option will limit any downside if equities fail to perform, that is an essential factor for an economist to take into account. That means that the (economic) cost to the employer varies with the trustees' investment strategy and with the employer's willingness to underwrite the strategy if it goes wrong. In the references cited above, that was never allowed for.

Before the 1995 MFR legislation, which first limited the walk-away option, economic cost would have reflected the full extent of the right to walk away from the scheme. Post-2003, the cost must take into account the possibility that the employer can be compelled, in some situations, to top up the scheme to a newly specified level. But, beyond that, the walk-away option should be factored in.

Exley, Mehta & Smith (2001) acknowledge this fundamental truth. They wrote:

> "Thus – we can only reduce the cost of pension benefits to companies by reducing their value to employees ...
>
> Investing in equities does increase the default risks attached to a pension promise … [it] also reduces the value of the benefit to members."

EMS argue from here that any saving is likely to be clawed back through employees demanding higher salaries to compensate for the reduced value of their benefits. This is sound logic. Intelligent and knowledgeable employees may well seek higher salaries (or other benefits) in exchange for tolerating risky

pensions. But whether employees, generally, have sufficient knowledge of their pension scheme's finances, the insight to realise the implications and the negotiating power to secure better salaries is something that can only be determined by factual observation.

EMS appear to believe (or do they just assume?) that employees do have the necessary knowledge, insight and bargaining strength, and yet, at the same time, their paper seems to have been written in response to another belief: that employers, trustees and other players in the pensions game did not understand the implications of investing in equities. It is possible that employees are wise whilst others are not, but in practice those with knowledge, insight and bargaining skills tend to rise to the top of a company, not the other way around.

So, let's be clear about it. On the thesis presented by EMS, an employer who wants to reduce the cost of his pension scheme by investing in equities (or, rather, persuading the trustees to invest in equities) can do just that. The exercise will prove fruitless, say EMS, if the employees secure an exactly compensating increase in salaries or other benefits. But EMS are unequivocal that the cost of the pension scheme, viewed on its own, can be reduced (or increased) by the choice of investments. This is significant, because the references cited above are widely believed to be intellectual soul mates of EMS and yet they state the opposite.

It is also worth considering the timing of the various moves in the negotiating game alluded to by EMS. If the pension scheme was set up with the knowledge and consent of the workforce, and on the premise that it would invest in equities, the negotiation has, on the face of it, already taken place. On EMS' reasoning, a switch from equities to bonds is not something trustees should do unilaterally. The switch will reduce the pension risk and, at the same time, trigger an increase in the employer's pension cost. On EMS' reasoning, employers should reduce the salaries they pay. In practice, that may be a tough sell: employers may prefer to stick with the originally negotiated arrangement. According to Wise et al (2004), wage rates don't respond efficiently to changes in other terms of a compensation package.

It is only when, and if, the negotiated *status quo* is disturbed that the reasoning of EMS should cause the investment strategy to be revisited. One potential disturbance is the publication of papers like that of EMS which may change the players' knowledge. For example, if employees became aware of risks that they were not hitherto aware of, a new round of negotiations may well be triggered.

More likely, however, is that such papers become better known to employers and their advisers rather sooner than to employees and their advisers. Given that the ideas in EMS were foreshadowed in an early (1997) paper by the same authors, published during the dot-com boom of the late 1990s, one might ask whether the result was to increase the employers' predilection for riskier, cost-reducing equities, at least until either employees wised up or the stock market turned down. I am not sure that EMS got enough publicity at the time – actuarial papers seldom do – but it would be ironic if that had been the effect.

Part IV

Future Perfect?

10 Pensions Act 2004 – big challenge or more confusion?

> "People in retirement have to be provided for, and the provision they require is, for the most part, a share of current production. It is not practical to put aside a loaf of bread or a pair of shoes when young and then call on them in forty years' time to supply one's needs in retirement. We can say, then, that in a [macroeconomic] sense all pension provision is pay-as-you go."

Abramson & Carne (1981) used those words in a previous paper to SIAS. At first, they were seen as controversial in some actuarial circles, but only for a short time. But the logical corollary – that nothing we do today can guarantee the retirement incomes of those still in work – has not yet been taken fully on board. The word "guarantee" is still used too frequently in the context of pensions – as an objective, or worse, as an attainable result.

But there are some signs of realism. Within the past few months, the government has, under pressure from The Actuarial Profession and elsewhere, resiled from the confidence with which it initially presented its Pension Protection Fund as the ultimate guarantor of pension scheme deficits.

At the time of writing this paper, the government is still trying to remove a good deal of the freedom which was once available to employers to walk away from their pension liabilities, whilst retaining for the PPF the right to do just that, at the discretion of the Secretary of State. This is unlikely to be the iniquitous act that it seems at first sight. More likely it is a rational and efficient reassignment of the walk-away option, in effect, from individual employers to the Secretary of State, on behalf of employers at large. But this depends ultimately on how future Secretaries of State choose to exercise the option, if and when the circumstances ever arise.

Just exactly what the PPF's objectives are and how they can be achieved is, as yet, the subject of some uncertainty. As is the case, so often, we have to wait until we can observe the legislation in action before we can know for sure what it really meant.

What must we do now?

In the meantime, there is much work to be done to ensure that the PPF does not create incentives for employers to under-fund their schemes, in the expectation that other employers will pick up the tab. Avoidance of such a moral hazard is certainly a stated goal of the PPF, but the PPF board will need to have a rational and efficient economic mechanism by which to determine the appropriate levy, particularly the "risk-based" levy – promised, but not quite yet.

In parallel with the PPF, the Pensions Bill 2004, currently going through Parliament, introduces the new statutory funding objective by which each scheme must have "sufficient and appropriate assets to cover … the amount required, on an actuarial calculation, to make provision for the scheme's liabilities." Regulations will follow which prescribe methods and assumptions to

be used. There will also be a requirement for an "actuarial valuation …valuing the scheme's assets and calculating its technical provisions".

Wise et al (2004) aptly describe the risk-based PPF levy and the statutory funding objective as "carrot and stick". For the system to work properly, the two need to be devised in a coherent and integrated manner, notwithstanding that the statutory responsibilities for each lie with different bodies. It is, therefore, crucial that the Secretary of State (who will set the regulations) and the PPF Board (who will set the levy) have a consistent and coherent understanding of the following:

a) the difference between *valuing* a pension scheme and *funding* one;

b) the meaning and implications of a bond-based valuation, as distinct from a calculation based on assets actually held in a scheme – be it an occupational scheme or the PPF itself; and

c) however much pension benefits may (or may not) *look* like bonds, what matters is whether they *behave* economically like bonds and, if not, which other investment classes (if any) resemble pension benefits in economic terms.

The UK needs a system of pension arrangements which fit the economic realities in which they operate. A proper understanding by all the players – employers, employees, trustees, advisers and the PPF board – is essential, or else no one will have the confidence to rely on such schemes ever again and the legislation will have been an unfortunate waste of time.

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