

Financial Economics and Pension Actuaries: The U.K. Experience

Tim Gordon and Stuart Jarvis

**Presented at The Great Controversy: Current Pension Actuarial Practice in
Light of Financial Economics Symposium**

Sponsored by the Society of Actuaries

Vancouver

June 2003

Copyright 2004 by the Society of Actuaries.

All rights reserved by the Society of Actuaries. Permission is granted to make brief excerpts for a published review. Permission is also granted to make limited numbers of copies of items in this monograph for personal, internal, classroom or other instructional use, on condition that the foregoing copyright notice is used so as to give reasonable notice of the Society's copyright. This consent for free limited copying without prior consent of the Society does not extend to making copies for general distribution, for advertising or promotional purposes, for inclusion in new collective works or for resale.

(note: The quotations appearing in this monograph are exact, except where capitalization and punctuation were changed in keeping with modern style and grammar guidelines.)

Acknowledgements

The first draft of this paper was presented to the Society of Actuaries' "The Great Controversy: Current Pension Actuarial Practice in Light of Financial Economics Symposium" held in Vancouver in June 2003. Thanks are due to Brian Wilson for reviewing this version of the paper.

Abstract

There has been strong resistance within the U.K. actuarial profession against taking on board the lessons of financial economics. Nevertheless, the majority of the largest U.K. actuarial firms have significantly modified their standard approaches to actuarial valuations to take account of criticisms based on financial economics. In the meantime, the failure to come to terms with basic lessons from financial economics has caused the U.K. actuarial profession to lose credibility with key players in the United Kingdom. The U.K. actuarial profession has still not come to a single view on financial economics, and the major divisions that remain continue to hamstring its policy development.

1. Introduction

The experience of the U.K. actuarial profession's grappling with financial economics has been a painful one. There is no avoiding the issue that actuarial thinking has fallen behind financial developments elsewhere and that the language and approaches we use frequently appear to be in contradiction with best practice among other financial experts. If there is one lesson to be learned, it is that trying to avoid the challenges to the traditional actuarial approach presented by financial economics means only that problems are stored up for the future.

The U.K. defined benefit (DB) pension environment is sufficiently similar to that of the United States that lessons learned in one can often be useful in the other. They both have large, employer-sponsored plans providing pension benefits defined in relation to employee earnings that are set up under enabling legislation where the employer makes contributions that are invested to cover the cost of benefits accruing and to offset deficits arising.

The pioneering work on the application of financial economics to pension finance was carried out in the United States in the 1970s and 1980s by the likes of Fischer Black, William Sharpe, Irwin Tepper and Jack Treynor. However, most general financial economics textbooks do

not cover the subject of pensions in detail, possibly because this area is so heavily dependent on legislation or possibly because pensions are seen as incidental to the core functioning of businesses. Where the subject of pensions is covered, it tends to receive relatively short shrift, on the grounds that it can be treated fairly straightforwardly within the more general framework applying to capital structure—in particular, secured corporate debt—albeit with distinctive legal restrictions and extra complications arising from its special function as a form of employee remuneration. Despite this fairly low-key approach, it is nevertheless surprising that the contradictions between traditional actuarial advice on pensions and that of financial economics have received so little attention within the actuarial professions on either side of the Atlantic until recently.

For reasons that we outline in this paper, the U.K. actuarial profession has already been forced to confront the contradictions between traditional actuarial advice on pensions and financial economics. Over the past five years, its view has changed from seeing financial economics as esoteric and of little relevance to the real world, to seeing it as presenting a serious and possibly overwhelming challenge to the traditional actuarial approach.

That financial economics is no longer a fringe activity is evidenced by the fact that, out of the largest four U.K. actuarial consultancies, three have significantly modified their approaches to actuarial valuations to take account of some, although not all, of the specific criticisms with their origins in the financial economics view. This confrontation has not yet been resolved, and the U.K. actuarial profession remains critically paralyzed by its inability to determine a viewpoint on pension issues at a time when the U.K. pension system is considered by many to be in crisis.

Our aim in writing this paper is, therefore, to share some of our experience from the U.K. actuarial profession's struggle with the application of financial economics to DB pension plans in the hope that this may prove helpful for our U.S.-based colleagues.

The remaining sections of this paper cover the following:

- Section 2 provides the briefest of backgrounds about U.K. occupational pensions, including similarities to and differences from the U.S. regime.
- Section 3 provides a brief introduction to the arguments used by financial economists.

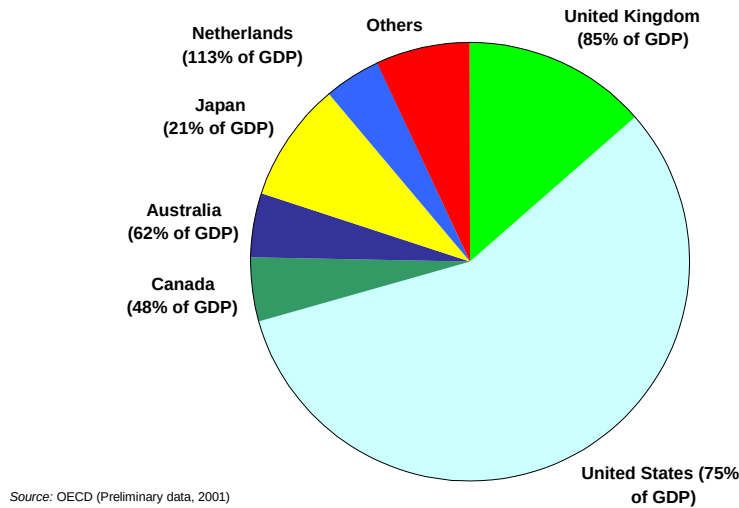
- Section 4 sets out our view, based on our experience and that of others, of why actuaries seem instinctively to find financial economics difficult to accept and the blind alleys that are best avoided.
- Section 5 examines how the U.K. actuarial profession, because of its resistance to the adoption of financial economics, has shed credibility by floundering in two key areas of U.K. public interest: pension accounting standards and the legal minimum for pension plan funding.
- Section 6 attempts to draw some lessons from the U.K. experience.

2. U.K. Briefing

2.1 Financial Background

Figure 1 shows how funded pension provision is split across the countries of the Organization for Economic Cooperation and Development (OECD).

Figure 1
Split of Total OECD Pension Assets by Member Country



The U.K.'s pension assets, expressed as a percentage of GDP, are similar to those of the United States, although the absolute amount, estimated to be about \$1 trillion, is a fraction of U.S. pension assets.

About three-quarters of this saving is in the form of occupational pension plans, with the rest held in individual policies.

As in the United States, although unlike most of continental Europe, private-sector provision forms a significant supplement to state provision. In the United Kingdom, it accounts for 40 percent of all retirement income and covers 10 million employees.

Russell Mellon CAPS statistics suggest that 75 percent investment in equities and 10 percent in bonds is typical for U.K. pension plans, compared with 60 percent investment in equities and 30 percent in bonds for the United States (based on research from Greenwich Associates for Hewitt U.S. for U.S. corporate DB pension plans). Although the CAPS statistic is less representative than it used to be, it is generally accepted that the proportion of investment in equities by DB pension plans is, on average, higher in the United Kingdom than in the United States.

2.2 U.K.-U.S. Regimes: Similarities and Differences

Table 1 summarizes the similarities and differences between the U.K. and the U.S. DB regimes.

Table 1

Comparison between U.K. and U.S. regulatory regimes for DB pensions.

Similarities	Differences
Many large occupational DB plans.	U.K. benefits on discontinuance are very high:
Standard to provide benefits linked to compensation level at leaving.	▪ pensions vest after two years, and ▪ total accrued pension is indexed to consumer price inflation both in deferment (i.e., between leaving service and retirement) and payment.
Sponsoring employer typically pays (balance of) cost.	The U.K. legal minimum funding requirement (1997) is financially weak (compared with the cost of securing termination benefits) – the effective discount rate considerably higher than government bonds.
Similar investment history (equities vs. bonds).	Historically, many U.K. plans provided discretionary increases in payment to counter inflation and in recognition of beneficial investment returns.
Traditional approach to funding is the same, that is, projected unit discounting liabilities at expected returns on assets.	A U.K. equivalent of the PBGC was proposed by the U.K. government in June 2003, although the basis for the levy on employers and how its funds will be invested are not yet clear.
Very broadly, the U.K. equivalent of ERISA is the Pensions Act 1995.	U.K. plan trustees have a key role with significant powers that they are (in theory) obliged to use in the interests of the plan beneficiaries. They can act in conflict with the employer (although, as they are typically also employees or directors, their independence is compromised in practice).

In general, past U.K. governments have focused on increasing the minimum quality of pension benefits (although there is no requirement on U.K. employers to contribute to employee pensions). Significant minimum benefits were, in effect, introduced in 1978 with a test that occupational pension plans had to pass in order to opt out of a new state pension plan introduced at that time. The period since then has been characterized by an incremental series of changes in favor of plan members, in particular, the introduction of requirements to provide consumer price inflation-linked increases to pensions, both for the period between leaving service and retirement and after retirement. U.K. occupation pension plans have been easy targets, unable to maneuver quickly enough or too constrained by employee relations issues to counteract the government-driven rise in the level of underlying guarantees. The impact of this "social engineering" has been significant:

- Its incremental nature has created an unstable environment for benefit design. Companies have been discouraged from providing DB pensions on the grounds that the legislative risk is too great.
- The requirement to provide inflation-linked increases before and after retirement, combined with the decline in long-term U.K. interest rates and improving mortality over the past 10 years, means that guaranteed benefits on discontinuance are now typically not covered by most pension plan funding targets, let alone their actual assets.

The focus on benefit protection in the United Kingdom has been more muted. There has not yet been a U.K. equivalent of Studebaker (although the deficits on winding up of a number of small plans have made headlines) and there is currently no equivalent of the PBGC in the United Kingdom. If the winding up of a plan is triggered, then it either terminates with assets being used to secure benefits as best they can with an insurance company or the plan runs on unsupported.

Until relatively recently, there was a wide perception that U.K. pension plans were overfunded rather than underfunded and, therefore, relatively little attention was paid to benefit security. The government's primary concern in the 1980s was to restrict the maximum assets that plans could hold to ensure that their tax-shelter status was not abused. In 1992, an immediate response to the discovery of financial irregularities in pension plans associated with UK publishing and business magnate Robert Maxwell following his death, was to introduce overriding legislation making a pension plan deficit (albeit on a weak basis) an unsecured debt on the sponsoring employer when the plan is wound up.

Following a later review, also prompted by the Maxwell scandal, a minimum funding requirement (MFR) was introduced in 1997. However, the MFR is financially weak and provides little protection to members. The government commissioned a review of the MFR by the U.K. actuarial profession in 1999, but chose to ignore its findings (presumably on the basis that all the options for change were too unpalatable at the time). Instead, it adopted a vague and still unimplemented approach based on a "plan-specific funding requirement" that seemed designed simply to avoid the government having to make any hard decisions and likely to reduce member security still further. Since our first draft of this paper, the U.K. government has announced the following proposals:

- Legislation will be introduced (with effect from the date of the government announcement) that requires *solvent* companies that wind up their DB pension plans to ensure that 100 percent of the benefits are secured (e.g., via an insurance company).
- It plans in the next few years to set up a U.K. equivalent of the PBGC to be called the Pensions Protection Fund (PPF). The PPF will be funded by a levy on companies with DB pension plans. The levy on a company will be higher if its pension plan is in deficit. At the time of this writing, the basis for determining the levy is not known. Skepticism has been expressed by a number of commentators over the low level of the government's cost estimates and the general problems of setting up such an arrangement when DB pension plans are so deeply in deficit.

In practice, it has been the requirement by the U.K. Accounting Standards Board for U.K. companies to disclose the financial position of their pension plans on a financial accounting standard (FAS) 87-like basis, which has raised public awareness of pension funding problems rather than prompting any proactive work on the part of the U.K. actuarial profession or the government. Indeed, these disclosures were initially strongly resisted by the U.K. actuarial profession, something that we describe in more detail in one of our case studies.

2.3 Position of the U.K. Actuarial Profession

The U.K. actuarial profession has maintained a dominant position in relation to U.K. occupational pensions. It has, over time, increased its monopoly on statutory pension advice. Since 1997, almost all plans have been required to appoint a "scheme actuary." This appointment must be filled by an individual (rather than a firm), who is then responsible for

certifying (among other things) the plan's position under the MFR and the associated minimum employer contributions. This individual also has a statutory duty to report to the regulatory authority if he or she has cause to believe that any material legal duties have not been complied with by the trustees, the employer or any other professional adviser. This position is, therefore, potentially very onerous.

The U.K. actuarial profession's reach has extended significantly beyond purely actuarial advice. For instance, firms with actuarial roots are the dominant U.K. pension investment consultants and major providers of pension administration services.

3. Financial Economics Pension Primer

3.1 Expected Return and the "Long Term"

As actuaries, we have been taught (1) to value liabilities using expected returns and (2) to distinguish between "long-term" and "short-term" valuations.

Neither of these approaches is supported by financial economics. Our experience is that these traditional actuarial teachings make the path to understanding financial economics more difficult for actuaries, compared with individuals without actuarial training.

3.2 Price and Value

Financial economics does not make the distinction between price and value that many actuaries do. If an asset (or liability) has a price in a liquid market, then it is meaningless to state a value different from this because it would imply a money-making strategy is being ignored.

For instance, valuing a portfolio of equities that has a total market cash price of \$1 million at \$1.2 million implies that the valuer can pay \$1 million cash for assets worth \$1.2 million, which would be an arbitrage if it existed. The essence of pricing in a liquid market is that market participants have already optimized their portfolios to take account of their view of the future and, therefore, they already consider that \$1 million of equities is worth \$1 million of cash (otherwise they should adjust their portfolio until this is the case). It makes little sense to quote a figure other than market value.

A common actuarial approach is to treat market prices as "signal plus noise" and draw the conclusion that smoothing will reveal an underlying trend. The problem with this, and any other measurement that is off market, is that it implies that there is a money-making strategy. If smoothing market prices really did reveal an underlying trend of any significance, then it should be possible to use this trend to detect when market prices are "high" or "low" and make money from this information. If this were truly the case, then companies could take advantage of this without the need to set up the awkward paraphernalia of a DB pension plan.

3.3 Pricing

If there are two different prices for things that are, for all material purposes, the same, then the opportunity to trade them means that these price differences are unlikely to remain. This is sometimes called the "law of one price." If there is an opportunity to make a risk-free profit, then this is an arbitrage.

A simple example of arbitrage is pricing a "forward," that is, an agreement now to exchange a fixed amount of cash for a fixed number of shares at a specified date in the future. The instinct of pension actuaries who are unfamiliar with derivatives is to price a forward using the expected return on the underlying equity and then to worry about how much risk to take. However, because one can borrow money at a fixed rate to buy the shares now and then wait until the exchange date, the price of the forward can be determined now without reference to risk. If you sell or buy at a different price, your expected return may still be positive but it will be very risky, whereas the individual you sold to or bought from will have a risk-free profit. (This is how forwards are priced in practice.)

In practice, arbitrage pricing, while often useful, is subject to limits because there is always some risk—many assets and liabilities cannot be perfectly replicated by a combination of other traded assets. More general pricing results relate to equilibrium pricing, where there is an assumption that assets (and liabilities) that are similar in some sense will be priced similarly. A famous example is the capital asset pricing model (CAPM).

The lessons of the CAPM and other generally accepted equilibrium pricing models for pension actuaries is that they lead to the following concepts:

- Risk can be divided into two component types: *diversifiable* (or *unsystematic*) and *nondiversifiable* (or *systematic*) risk. In broad terms, diversifiable risk is uncorrelated with the rest of the market. For instance, investing in one stock takes risks specific to that stock that could be reduced by investing in a more diversified portfolio. Nondiversifiable risk is risk relating to the market as a whole that cannot be eliminated no matter what portfolio of assets is held, unless there is a perfectly matching risk-free asset.
- A higher expected return is a reward for taking nondiversifiable risk only.
- For any given total market value, the expected return on a portfolio of assets can be increased arbitrarily highly (for instance by borrowing cash to invest in equities or by using derivatives). In other words, value is independent of expected return.

3.4 The Shareholder and Member Points of View

A key lesson from financial economics in relation to corporate entities is to look through to the underlying individuals affected. In their famous paper, Modigliani and Miller (1958) showed that, under idealized conditions, the value of a firm is independent of its capital structure, that is, the mix of equity and debt finance used to finance the firm. This is one of the Modigliani-Miller "irrelevancy propositions". (We have referred both to the authors and to these propositions as "M&M" in this paper.) The fundamental point is that changing capital structure, for instance, buying back debt or issuing more stock, does not alter the total value of a firm. Even though it affects the expected returns on its issued stocks and debt, the underlying cash flows to be earned by the firm remain the same; they are just being parceled up in a different way.

In practice, second-order effects such as taxation, the costs of financial distress, and the signaling of the intentions and impact on the behavior of management need to be taken into account, and these are indeed the areas in which the practical application of M&M's work within corporate finance is to be found (see Chew 1999 for an overview).

DB pensions are simply another form of secured corporate debt issued, albeit in a complicated way, to employees, and therefore part of a company's capital structure. The extension of M&M and associated other work on corporate finance to pensions is fairly straightforward. Simple analysis suggests that, in relation to a company pension plan, the relevant individuals are the shareholders in the sponsoring company and the members of the plan. In practice, a more extended analysis is

required incorporating other individuals who have interests and whose behavior impacts shareholders and members, most critically management (including, in the United Kingdom, trustees).

3.5 Agency Cost

It would be naïve to assume that managers always act in the interests of shareholders or that trustees always act in the interests of plan members. In a financial economic context, this is known as the principal-agent problem, where principals are the individuals bearing the risks associated with decisions and agents are the individuals making the decisions. The costs of corporate governance, together with any reduction in value resulting from their agents not acting to optimize value for principals, are known as agency costs.

Economic contracts that are complicated and opaque, or those that leave more decisions in the hands of agents, are more likely to give rise to agency costs. DB pension provision is complicated and its disclosure to shareholders and members has traditionally been opaque. In addition, there is considerable discretion left with corporate managements (and, in the United Kingdom, trustees) as to how such plans are invested and funded. We should, therefore, expect a considerable element of agency cost in connection with DB pension plans.

3.6 Market Efficiency

The subject of market efficiency can be relied on to generate heated discussions. A generally accepted definition is that a market is efficient if no investor can earn risk-adjusted excess returns from trading rules based on any publicly available information. It is consistent with market efficiency that:

- Equity markets may be volatile,
- Equities may outperform bonds over long time periods,
- Some investors may be inactive or hold irrational views, or
- Markets may not be perfectly competitive.

The proof of market inefficiency is the existence of reliable ways of beating the market. If your contention is that markets are extremely inefficient then your natural course of action would be to take financial advantage of your insight yourself (for which a pension plan is not required).

In practice, debates over market efficiency are fairly marginal in a pension plan context because:

- Everyone agrees that markets are not so inefficient that money is seen to be growing on trees, and
- M&M means that shareholders can take advantage of market inefficiencies if they really do exist without needing companies to attempt to do so in their pension plans.

4. Blind Alleys

4.1 Summary

In this section, we summarize various blind alleys down which U.K. actuaries have traveled in trying to reconcile financial economics with traditional actuarial science.

4.2 Financial Economics Cannot Match Actuarial Judgment

It is easy to assert that actuarial judgment will always be able to take account of effects not allowed for by financial economics. This seems to arise from the irrefutability of actuarial judgment—it cannot be written down and, therefore, can never be tested. This is a confusion though; theories that are irrefutable have long been recognized in science as having little real predictive power and, therefore, little value.

We point out that, in practice, while financial economics may constrain actuarial judgment in its more fanciful areas, it is not a threat to the application of actuarial skills generally, as there are no liquid matching assets for DB pension liabilities. On the other hand, actuaries ceasing to provide advice based on their personal estimates of the patently unknowable return on equities over the next 20 years appears to us to be a good thing.

4.3 Risk and Long-Term Expected Returns

It used to be commonplace to read or hear actuaries assert that the risk associated with investment in equities declines in the longer term, typically backed up by tables showing that the annualized standard deviation of either actual returns or simulated returns decreases as the term increases. This is a deep-rooted concept among pension actuaries in particular. They often conclude that, because the bulk of pension payments are due many years hence, they can ignore the financial

position over the intervening years. Here are some reasons to question this assertion:

- There is not much long-term evidence. If the long-term is, say 30 years, then there are not many independent (i.e., nonoverlapping) 30-year periods to serve as data. Moreover, analysis of the data does not support the hope that equities are the natural long-term asset class. For example Shiller (2000) notes that stocks underperformed bonds in the United States over the 30-year period from 1831 to 1861. Shiller's view is that "the evidence that stocks will *always* outperform bonds over long time intervals simply does not exist" (p. 195).
- Annualizing standard deviations simply disguises the fact that the total standard deviation increases with term.
- As Bodie (1995) notes, although the likelihood of underperformance decreases with term, the magnitude increases. Bodie uses an option-pricing argument to illustrate that the value of the risk of underperformance increases with term.
- Pension plans may not be in a position to wait for markets to recover. In fact, sponsor difficulties are more likely to occur when markets are low, reflecting a generally more challenging economic climate. Ignoring the risks during the intervening years to get to the long-term is a form of bias.

It is nevertheless still common for actuaries to base their arguments on the unproven premise that "equities will outperform bonds over the long term." An even worse tendency is for actuaries to treat equities as a valid substitute where no matching asset exists, for example, for long-term wage inflation.

4.4 Equity Investment Saves Cost

The corollary that many actuaries draw from the false premise that equity risk reduces with term is that equity investment in pension plans must, therefore, save cost.

If a company is sponsoring a pension plan, its shareholders are ultimately liable for investment underperformance or ultimately benefit from investment outperformance. The shareholders can take these bets themselves. Another way of looking at this is to note that a similar effect can be achieved if a company issues more debt to invest in a diversified

portfolio of equities or if the company invests directly in a hedge fund that goes long in equities and short in bonds. We suspect that most actuaries would recognize that this would not create shareholder value. Accordingly, it is unclear how betting equities against bond-like pension liabilities within a company pension plan saves cost for shareholders in any meaningful way.

A deeper analysis would consider the net amount of tax paid and the impact of more variable cash-flow requirements on the company. In practice, equity investment can reduce shareholder costs, but only because risk is transferred from shareholders to plan members for the following reasons:

- Actuaries use it as an excuse to set lower funding targets.
- Equity investment will be correlated with the value of the company itself (i.e., one of the basic assumptions underlying the CAPM and other pricing models). This means that, for a plan with a material deficit, the cost of meeting a severe worsening of the deficit arising from equity underperformance will be correlated with scenarios where the shareholders lose all value in any case and, therefore, experience no additional loss, whereas the shareholders benefit fully from any upside.

4.5 Equities Match Benefits Depending on Compensation Increases

The evidence that equities match liabilities that depend on compensation consists principally of hand-waving arguments that productivity increases are shared in constant proportion between labor and capital and dubious arguments based on graphs of the relevant data. Empirical evidence that this relationship does not hold includes work by Smith (1998), who derives a model for pricing a U.K. national average earnings-linked government bond explicitly. Depending on whether 50 years or 75 years of data are used, he demonstrates that the role for equities in pricing such a bond is between 2 percent and 4 percent of the portfolio.

4.6 Company/Plan-Centric Approaches

It is natural to think of companies or pension plans as entities in their own right. However, this is difficult to justify when it is considered that these are really no more than groups of individual stakeholders. For instance, if a company chooses to gear itself by investing its DB pension

plan in equities rather than bonds, the shareholders can, if they are concerned, adjust their overall portfolios by holding slightly more bonds and slightly fewer equities. In broad terms, the effect is the same. So an analysis that, for instance, plots conventional risk-reward graphs for a company in relation to its pension plan makes little sense in shareholder value terms—shareholders are indifferent to first-order effects. There may be second-order effects such as taxation, credit risk and interaction with pension legislation that may indicate that the pension plan investing in equities is more favorable to shareholders than investing in bonds, but these have nothing to do with viewing the company as an individual. This type of M&M analysis of second-order effects is common when advising on other components of a company's capital structure and is described in Chew (1999).

A corollary is that when assessing whether a particular investment strategy has been beneficial, for example, to shareholders, it needs to be adjusted for risk and other M&M effects. For instance, U.K. companies with pension plans invested in equities, at first sight, benefited substantially from equity returns in the 1980s. However, in practice, some of these surpluses were given away as windfall discretionary benefit improvements for members, and that would not have happened if there had been no surplus. If the shareholders had held the equities directly, rather than in the pension plan, they would actually have made more money. So there is a strong case that investment in equities actually served to reduce shareholder value.

4.7 Actuarial Misperceptions of Financial Economics

4.7.1 Financial Economics is an Investment Subject

The first consideration of financial economics within the U.K. actuarial profession was by actuaries working in investment. This was natural enough, given that many of the first developments seemed to relate to stock selection and to traded markets, and pension liabilities are not traded directly. However, this image has been difficult to shake. Indeed a debate held at the Institute of Actuaries (Wilkie et al. 1993) on the subject was actually entitled "This House Believes that the Contribution of Actuaries to *Investment* Could be Enhanced by the Work of Financial Economists" (emphasis added).

We believe that it is partly because of this misperception that the U.K. actuarial profession has taken so long to come to grips with developments in financial economics that date back to the 1970s.

4.7.2 Financial Economics Relates to the Short Term

Financial economics does not restrict itself to short-term problems. There are sections in some financial economics standard texts on pensions, but these treat pensions within the same general framework as other corporate assets and liabilities.

4.7.3 Financial Economics is Based on Invalid Assumptions

It is true that financial economics often uses simple models. It is, however, a misrepresentation to state that financial economics stands or falls on any of these assumptions:

- Risk is always the same as volatility.
- Markets are perfect or perfectly efficient.
- Transaction costs are nil.
- All assets and liabilities can be traded (or be perfectly replicated by traded assets).
- Market processes follow normal distributions.
- Utility theory describes investor behavior.

David Wilkie, a respected and influential U.K. actuary, captured this well in closing the 1993 debate (Wilkie et al. 1993):

"So just as physicists or engineers have less elaborate models and more elaborate models, simple ones that you are taught at school and more elaborate ones that you must use in practice, so financial economists have simple and elaborate models. Unless actuaries understand what both the simple and the elaborate models are about, we will find that ... we will be left behind by those who actually know a great deal more about it" (p. 414).

4.8 Confusion of Cost and Contributions/Valuation and Funding

Because actuaries are so accustomed to carrying out funding calculations, it seems common to carry over confusions from funding to costing. For instance, an unfunded pension liability is clearly similar to unsecured corporate debt, and this is generally valued by reference to interest rates of the appropriate term plus an allowance for credit risk. In other words, it is valued at a risky bond rate. It seems very odd that pension liabilities that are funded might be valued at a discount rates reflecting the expected return on equities or that this discount rate might be higher. The lesson is that, in setting funding targets, bond discount

rates should be used and an agreed level of overall credit risk should be incorporated. This does not mean that using financial economics implies higher funding targets—it does mean that credit risk in the funding target should be explicit.

The other concern of actuaries used to using "long-term" valuation bases, with asset values smoothed either directly or indirectly by corresponding adjustments to the liability discount rate, is that financial economics will give rise to volatile contribution rates. However, although financial economics can help value different contribution smoothing strategies, it does not dictate whether or how company contributions should be smoothed. We contend, therefore, that the smoothing of contribution rates is a decision that is best made in the context of full information of the plan's financial position, rather than indirectly through complicated and opaque actuarial models.

5. Case Studies on Losing Credibility

5.1 Background

There have been two key long-running debates in which the U.K. actuarial profession has suffered:

- **Case A:** Debate with the accounting standards authorities on how to measure corporate pension liabilities.
- **Case B:** Debate with the U.K. government over how to improve the security of plan members' benefits.

In each case, the initial response of the profession was a "traditional" one based on a strategy for funding benefits, rather than a coherent methodology for valuing pension benefits, as outlined in the previous section. The latest responses of the profession in these debates were based on what the profession had learned from financial economists, but by then the damage to its credibility had been done.

If the U.S. profession can avoid public statements on important issues such as these before it comes to a consensus on financial economics, it will have avoided repeating an important failure of its U.K. counterpart. Sharing the experience of this section is, therefore, a key purpose of this paper.

5.2 Case Study A: The United Kingdom and International Accounting Standards

5.2.1 Initial Debate, 1995–1997

The U.K. standard for corporate pension accounting, SSAP24, published in 1988, has the following problems:

- The basis for assessing pension liabilities (and assets) is left up to each actuary in consultation with the company.
- There is considerable scope for delaying recognition of changes in the financial state of the plan over many years.
- The disclosure requirements are so weak that it is usually impossible for an informed reader of two companies' accounts to restate them on a common basis.

In 1995, the U.K. Accounting Standards Board (ASB) sought views on its review of SSAP24 with the publication of a discussion paper. Two approaches were outlined: a long-term "actuarial" approach and a market basis of measurement. The latter was included primarily because of the approach in the United States and the suspected preference of the U.K. ASB's international counterpart, the International Accounting Standards Committee (IASC).

The following year, the IASC published an exposure draft (E54) for its proposed changes to IAS 19. As the ASB had suspected, this proposed an approach based on market values and with relatively little protection from the underlying volatility of the assets versus the liabilities. The International Forum of Actuarial Associations (IFAA) submitted detailed arguments against these proposals in 1997. In summary:

- The use of market values for valuing plan assets "is, in our view, inconsistent with the treatment of the enterprise as a going concern" (from the Overview of the IFAA's submission).
- The use of a discount rate derived from fixed-interest bonds was deprecated in favor of, among other things, returns on property and equities.

The IFAA submission argued that equities were the best "match" for long-term salary-related liabilities. The emphasis on the long-term rather than current value is key: The submission confused the traditional actuarial reliance on expected returns with the need for a useful valuation from a shareholder perspective.

5.2.2 Rejection, 1998–2000

The response of the IASC was polite but robust. The evidence for a link between equities and salaries was slim and the use of a bond discount rate, as in FAS 87, was adopted into IAS 19's revision in 1998. This presented the U.K. ASB with a problem. Having supported the actuarial approach in 1995, should they continue to stand out against international standards?

Their response was a further discussion paper, in 1998. This was the high watermark of the influence of the profession on the U.K. ASB. Market values for assets and the use of market discount rates for the liabilities was now the preferred methodology. But the appropriate rate for current employees was expected to be "a rate that allows the implicit recognition of change in the economy through the incorporation of some element of expected equity return" (p. 18). It was buoyed in this view by the knowledge that "the actuarial profession [was] developing guidance on how to determine such a rate" (p. 18) and the strong opposition of many in the United Kingdom to the IASC approach.

The actuarial profession was moving on, however. No guidance on an equity-related discount rate was sanctioned by the profession and, by the following year, the ASB was able to publish an exposure draft (FRED20) that used a bond-derived discount rate for all pension liabilities. This was unchanged in its essentials when the new standard, FRS17, was published in 2000.

Furthermore, the view that pension liabilities should be marked to market value had gained ground. Immediate recognition of gains and losses in the period that they occur (although not necessarily in the primary profit and loss account) was introduced.

The impact on the U.K. pension environment was profound. Suddenly plans had to be measured on a bond basis, and this position disclosed with very little room for smoothing away unpleasant news. Not long after the standard became a mandatory disclosure, equity markets fell substantially and the funding crisis in U.K. pensions became plain for all to see. The timing could hardly be more damaging.

5.3 Case Study B: Minimum Solvency

5.3.1 Discussions, 1992–1996

In 1991, it was discovered that Robert Maxwell had raided the pension plans of his businesses to support his struggling media empire. The empire collapsed following his death, and there was a significant scandal. Although the plan beneficiaries did eventually receive their benefits in one form or another, this included the government having to step in and pick up some of the benefit. In June 1992, the government set up a Pension Law Review Committee (PLRC) chaired by Roy Goode.

The resulting report formed the basis for the Pensions Act 1995. The 1994 bill and its preceding draft presented in 1994 generated much discussion between the profession and government.

A key proposal of the PLRC had been for a minimum solvency standard. If plans could be forced to maintain sufficient assets to cover the benefits payable upon discontinuance, then members would be very well protected. But there was general acceptance that the burden this would place on employers would be severe. The discontinuance benefits of U.K. pension plans in the 1980s were often well covered by plan funding targets, but increased levels of guarantees imposed by government meant that this has ceased to be the case. In recognition that the new standard would not guarantee solvency, the bill was changed to refer to minimum *funding*.

The methodology with which plan liabilities would be measured under the new minimum funding requirement (MFR) was left to the actuarial profession to make proposals after 1995.

5.3.2 Minimum Funding Basis, 1997

The actuarial profession's agreed methodology for the MFR, which came into force in April 1997, was based on:

- Assets taken at market value.
- Discontinuance benefits (so no salary revaluation issue).
- Pensions in payment valued by reference to government bond yields.

- Pensions not yet in payment valued by reference to a formula based on the dividend yield on the U.K. stock market and a notional expected future return on equities.

The last feature produced an incentive for plans to invest in equities (in order to avoid unforeseen contributions upon breaching the MFR minimum).

5.3.3 Failure and Review, 1997–2000

The minimum funding basis was introduced in April 1997. In July 1997, the new government abolished a tax credit that had made dividends a tax-efficient way for companies to return value to certain groups of shareholders, principally pension plans.

The profession's initial response to government was to note that the expected return on equities should now be lower (as they were more highly taxed) and, therefore, that the MFR basis should be strengthened. However, a consequence of the tax change was that dividends did not grow (with some companies choosing to return value to shareholders by, for example, share buy-backs) and so dividend yields fell, resulting in the MFR strengthening substantially of its own accord. The profession, shortly after having recommended strengthening the MFR, therefore, embarrassingly, recommended to government that the MFR actually needed to be weakened to restore it to its initial strength. (In contrast, a funding requirement based on bond yields would have strengthened in the months following July 1997 as a result of falling long-dated bond yields, and so the recommendation to weaken the MFR was questionable, although this was not a common perspective at the time.)

Meanwhile the pension industry began to complain about being forced to make higher contributions because of the MFR. The profession was slow to realize that the underlying financial position of pension plans was deteriorating even more rapidly than the MFR was implying. The MFR was not protecting members' security as markets fell.

The government commissioned a review of the MFR by the U.K. actuarial profession in 1999, which resulted in the profession recommending a move to a bond-based standard, but this time, after the fiasco of the first MFR, the government felt able to ignore the findings of the profession and instead adopted a vague and still to be implemented approach based on a "plan-specific funding requirement." The U.K.

actuarial profession repeated its advice to the government in 2003, in the hope of restoring the true strength of the MFR, but was, again, ignored.

The MFR basis has become substantially less strong over time. By 2001 the MFR basis was 30 percent weaker than when it was introduced (for nonincreasing pension and ignoring the impact of its failure to take adequate account of mortality improvements), and it has continued to lose credibility as a meaningful measure of plan liabilities.

5.4 Case Study Conclusions

In both cases, the U.K. actuarial profession's lack of a rigorous, defensible and coherent approach has resulted in poorly considered recommendations followed by the need for embarrassing policy U-turns. Codifying what was considered good actuarial judgment at the time has proved disastrous in the case of the MFR. Advocating a general reliance on actuarial judgment to provide information to shareholders has been soundly rejected by accounting standards authorities. Unsurprisingly, the U.K. actuarial profession has lost credibility with influential bodies in areas of its core expertise

The U.K. actuarial profession would be in a much stronger position if it had been confident enough at its highest levels to adopt generally recognized principles from financial economics from the outset. One particular consequence of these fiascos has been to prompt many U.K. actuaries to reconsider the approach that they were taught and, in many cases, to conclude that financial economics offered a superior basis on which to give advice.

6. Lessons from the United Kingdom

6.1 Resistance to Change

- M&M and many of the other ideas in financial economics are not new. Although it is often called "modern finance," M&M's first paper dates back to 1958, and most of the key results were set out in the 1970s and 1980s. It seems to us that pensions and, in particular, actuarial advice on pensions has successfully resisted these ideas because of the following:
- *Some results are counterintuitive.* For instance, references to "higher expected returns" on equities compared with bonds make it sound very convincing that all the "long-term" investors, including pension plans should invest in equities. It is only by considering who bears

the risk of failure over the intervening period that it becomes clear that this is not necessarily the case.

- *Parochial and complacent culture.* Actuaries became so used to being the sole arbiters of pension financing and equity returns have been so good that actuaries seem simply to have relinquished the role of thought leadership to financial economists without even a struggle.
- *Emphasis on professional judgment.* Whatever your view of the future, financial economics makes it clear that there are constraints on what can be said reasonably. Just as a futures price cannot be independent of the price of the underlying share and interest rates, the value of a deficit in a pension plan cannot be independent of the value of the assets and long-dated interest rates. The U.K. actuarial profession has traditionally allowed for actuaries to hold different views and to reflect this in their advice. The problem is that it is taken as reasonable to extend this allowance for judgment-based advice even when this is blatantly contradicted by market values. It is one thing to bet equities against bond-like liabilities, but it is surely questionable to distort the up-to-date measurement of the financial position of this bet.
- *Misunderstanding financial economics and its implications.* There seems to be considerable misunderstanding of financial economics among actuaries. For instance, it is often assumed that valuing pension benefits at bond yields inevitably leads to higher and more volatile company contribution rates, which is an artifact of actuarial methods rather than a conclusion of financial economics. Financial economics might make underfunding more obvious but it does not prescribe a particular strength of funding.
- *Fossilized standards.* In the United Kingdom, the MFR is generally accepted to have been wrongly specified and to have become significantly weaker over the time since its introduction. Nevertheless, it has become, for pension plans with little trustee power to set company contributions, the *de facto* standard contribution rate for many plans where the company is unwilling to fund the plan. There is a general concern that U.K. actuaries may be avoiding their responsibility to consider the advice they give and simply fall back on the MFR as the government standard. In the United States, notions of expected return on assets are actually embedded within ERISA legislation and FAS 87, which seems to us likely to result in strong pressure to maintain the status quo and to constrain actuarial thinking.
- *Commercial concerns.* Changing advice is commercially difficult. From a litigation point of view, it is sometimes seen as being safer to stick with original albeit wrong advice rather than move to the correct

position. Clients, in most cases, will prefer to have actuaries delivering consistent advice and, especially, advice that minimizes the need for cash contributions or unpleasant financial disclosures. This inevitably creates a pressure to avoid change from the traditional and malleable expected returns-based actuarial approach.

6.2 Education

There has been a primary failure to educate actuaries in financial economics, based, as far as we can tell, on the perception that it was a subject of very limited focus and of little relevance to our core expertise. Even when financial economics was introduced as a subject in 2000, its impact on the pension specialist subject remained fairly minimal. As a result, the U.K. actuarial profession's pension specialist exam has fallen into disrepute within many firms—even where it presents financial economics arguments, these are presented jointly with the traditional view, which makes the reading confusing for students. These problems were expressed cogently in an open letter by Shuttleworth (2002), who stated that the "exam syllabus has reached its sell-by date" and that "trainee actuaries ... continue to be taught palpable untruths".

The contentious nature of the subject and the traditional requirement for some sort of consensus have meant that matters are unlikely to have moved forward significantly for the review of the syllabus due to come into effect in 2005.

Individual U.K. firms, in many cases, have conducted their own training in financial economics. Informal reports suggest that the success of these courses depends on:

- Who sets the agenda for these courses—if the intention at the outset is to deprecate financial economics, then they are unlikely to succeed.
- The culture and attitude to change within the firm.

It is notable that the drive for change within the United Kingdom came initially from young and relatively junior actuaries.

6.3 Impact on the U.K. Actuarial Profession

There has been a significant loss of credibility by the U.K. actuarial profession—with the government, with the accounting profession and more generally—that could have been avoided had the profession

moved to adopt the principles of financial economics. This is well summarized in the following extract from Carsberg (1997) responding as secretary-general of the IASC to the IFAA's proposals to use a more traditional valuation method for the international pension accounting standard (IAS 19):

"I think that the fundamental difficulty has been the lack, in the actuarial profession, of an authoritative conceptual framework, accepted internationally, setting out the objectives of the determination of the discount rate and within which professional judgment is to be exercised. If we had such a framework, I believe that the Board might have been willing to build its requirements about choice of the discount rate around the framework, always assuming that the framework was appropriate to accounting objectives."

Although our role within pensions remains fairly secure, pensions have limited growth opportunities for actuaries. In strategic terms, it seems a fundamental error for the U.K. actuarial profession to have suborned its ambitions to apply actuarial principles elsewhere in finance to resisting newer thinking in relation to pension finance.

Finally, it seems unlikely to augur well for the profession to have some MBAs and treasurers know more about pension finance than do many actuaries.

References

- Accounting Standards Board. 1995. Pension costs in the employer's financial statements. June 1995 discussion paper.
- Accounting Standards Board. 1998. Aspects of accounting for pension costs. July 1998 discussion paper.
- Bodie, Z. 1995. "On the risk of stocks in the long run," *Financial Analysts Journal* 51(3): 18-22.
- Carsberg, B. 1997. IASC/IFAA correspondence.
<http://www.actuaries.org/members/en/committees/IASBEB/documents>.
- Chew, D.H. 1999. *The new corporate finance: where theory meets practice (second edition)*. International edition. Irwin McGraw-Hill.
- International Forum of Actuarial Associations. 1997. Comments on International Accounting Standards Committee Exposure Draft E54.
http://www.actuaries.org/members/en/documents/submissions/iascp_e54.cfm
- Modigliani, F., and M.H. Miller. 1958. The cost of capital, corporation finance and the theory of investment, *American Economic Review* 48: 261-97.
- Organisation for Economic Cooperation and Development. 2001. Total assets of private pension funds within OECD countries.
<http://www.oecd.org/dataoecd/20/41/2768608.pdf>
- Shiller, R.J. 2000. *Irrational exuberance*. Princeton, NJ: Princeton University Press.
- Shuttleworth, J. 2002. Letter to the profession, *The Actuary* (April).
<http://www.pwcglobal.com/uk/eng/ins-sol/publ/pensions/pensions.html>.
- Smith, A.D. 1998. *Salary-related cash flows: Market-based valuations*.

Paper presented to the joint Institute of Mathematics and its Applications and Institute and Faculty of Actuaries Conference on Actuarial Valuations, Accounting Standards and Financial Economics.

Wilkie, A.D., J. A Tilley, T.G. Arthur, and R.S. Clarkson. 1993. This house believes that the contribution of actuaries to investment could be enhanced by the work of financial economists: A debate, *Journal of the Institute of Actuaries* 120(3): 393-414.