Original Article

Living with longevity

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ABSTRACT Increasing life expectancy is a positive trend for society that creates funding issues for pension schemes. This paper reports the results of a survey of 76 major UK pension schemes on their perceptions about longevity risk and the practicality of the solutions open to them for managing the risk. The schemes in the survey perceive longevity as the second biggest risk they face after investment risk. They are relatively optimistic about the trends in life expectancy, expecting medical advances to continue extending lifespans. However, they continue to use in valuations mortality assumptions that predict a slowdown in longevity improvements. The schemes report relatively high levels of awareness of the main methods of managing longevity risk, but few have implemented these methods. The main barriers to effective management of longevity risk are noted to be complexity, cost and lack of suitable products. Buy-out transactions, in particular, are perceived as expensive by many schemes.

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INTRODUCTION

One of the most significant risks borne by defined benefit pension schemes is that their members live longer and draw retirement income for longer than expected. Although mortality tables produced by the actuarial profession extrapolate mortality improvements, in recent years life expectancy has continued to rise more sharply than assumed in the past. This paper reports the results of a survey we conducted to better understand how major UK pension schemes are approaching the issue of longevity risk.¹

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ABOUT THE SURVEY

This research is based on the views and experience of 76 major UK pension funds with a combined 2.9 million members and £185 billion of assets. In the survey, the scheme representatives were asked for their views on the implications of longevity risk for their scheme and on the approach the scheme is taking to manage those risks.

Interviews were conducted in August and September 2008 by Richard Davies Investor Relations. All the schemes in the sample are either defined benefit or hybrid schemes. There is a mix of private (59) and public sector schemes (17) in the sample. Respondents were typically pension managers or scheme secretaries (Table 1).

Table 1: Survey characteristics

	Mean	Minimum	Maximum
Members	38 780	250	355 000
Assets (in million)	£2440	£27	£38 000
IAS 19 funding level (in per cent)	93	65	120
Schemes fully open	31	—	—
Schemes closed to new members	40	—	—
Schemes closed to future accrual	5	—	—

PENSION SCHEME RISK

Pension schemes and their sponsors face a wide range of risks that need to be considered, quantified and managed. The key risks involved in running a defined benefit or hybrid pension scheme we identified were:

- *Investment*: the risk arising from the variability and unpredictability of returns on the assets in which the pension scheme invests.
- *Interest rate*: the risk arising from volatility in the long-term interest rate used to discount expected future pension payments. As this rate comes down, the pension liability (that is, the present value of future pension promises) increases and vice versa.
- *Inflation*: the risk from the variability and unpredictability of future inflation rates. This affects the pension liability through its effect on pensionable salaries, revaluation of deferred pensions and rises in the value of pensions in payment, where these are indexed.
- *Longevity*: the risk arising from uncertainty over how long pensioners will live and, by implication, how long they will draw pension benefits from the scheme.
- *Covenant*: the risk arising from the possibility that the scheme sponsor may become insolvent and no longer be able to provide the necessary funding for the scheme.
- *Operational*: the risk of losses arising from failures in the administrative processes of the pension scheme, for example, the failure to pay the correct amount of pension on the correct date, perhaps due to missing data. Operational risk also encompasses the risk of fraud and regulatory change and intervention.

We asked schemes to rank the importance of these risks and the results are shown in Figure 1. Pension funds rated investment risk, longevity risk and interest rate risk as the most important risks. Most schemes will be accustomed to dealing with investment risk and the allocation between different assets to meet liabilities. The management of longevity risk may be less familiar.

Many schemes have adopted a liability-driven investment (LDI) strategy to manage interest rate risk. With the risks hedged, schemes using LDI approaches were marginally more likely than other schemes to say that investment and interest rate risk were not at all or not very important. Interestingly, inflation risk was deemed notably less important, despite the media coverage at the time of the survey of a pick up in inflation.

The low rating for covenant risk may be explained by responses from schemes that perceive their sponsor to be in good health. For schemes with a less robust sponsor, covenant risk should be a major issue. The view on the importance of sponsor covenant could also be related to scheme funding, with poorly funded schemes more aware of covenant issues, but we found no significant relationship in our research. As the economy slows, following the recent credit crisis, covenant risk may move up the rankings. The low level of importance given to operational risks reflects a view among schemes that, while the consequences of operational failures may be high, well-managed processes make such failures unlikely.

Arguably, the management of longevity risk is seen as more problematic than the management of investment, interest rate or inflation risk. Perhaps because some of the solutions available are relatively recent, they are perceived as complicated and potentially more costly.

PENSION SCHEMES' PERCEPTIONS OF LONGEVITY

Medical advances and improved nutrition have reduced mortality rates; people are living longer. Although mortality tables produced by the actuarial profession extrapolate mortality

Figure 1: Perceptions of pension scheme risks.

Figure 2: Government expectations for future longevity.
Source: Government Actuary's Department.

improvements, life expectancy has continued to rise more sharply than predicted. Figure 2 shows changes in male life expectancy at age 65 over the past 27 years and the Government Actuary's Department's expectations for future improvements.

In our study use of the PMA/PFA 92 mortality tables from the actuarial profession was common. Pension schemes using these tables to

predict future mortality can use three different extrapolations:

- the short cohort;
- the medium cohort;
- the long cohort.

The 'short cohort' approach assumes improvements in life expectancy through to 2010, the 'medium

cohort' to 2020 and the 'long cohort' to 2040. So, in an environment of improving life expectancy, the long cohort approach is the more conservative for valuation purposes.

Effectively, of these three projections, the long cohort estimates longevity at its highest rate, the short cohort at it lowest. But Figure 3, produced by Paternoster, shows that even the long cohort implies that improvements in life expectancy tail off significantly; Paternoster highlights that there may be many other plausible longevity projections with significantly higher longevity. Even pension schemes using long cohort may have much greater liabilities than they have calculated.

Longevity is obviously an inexact science. Cambridge University geneticist Dr Aubrey de Grey has indicated that the first person to live to 1000 may be 60 already. He believes that medical advances will be able to slow or even reverse ageing and has said 'the length of life will be much more variable than it is now, when most people die at a narrow range of ages (65 to 90 or so), because people won't be getting frailer as time passes'. If this is true, pension schemes would not only have extreme longevity to deal with, but also extreme uncertainty. Others think that ageing cannot be controlled and our bodies have a natural age limit that medical advances cannot alter. There is also some evidence that less healthy modern lifestyles could slow or even reverse longevity trends.

In our survey, we asked for pension schemes' views on future trends in longevity. A narrow majority is very optimistic on longevity and

expects medical advances to continue to extend human lifespans. This is a positive scenario for society, but it does have adverse consequences for the funding of pension schemes, which will have to pay pensions for longer. Only 3 per cent of schemes did not have a view, again reflecting the importance of this issue (Figure 4).

We also asked how schemes thought the mortality experience of their members would compare to that of the average pension scheme. Although we might expect that roughly as many schemes would note below average life expectancy as would note above average, rather more schemes thought their members would live longer than average, than below average. Among the respondents, financial services firms are more likely to indicate their members have above average life expectancy, and industrial companies are well represented among those who note their members have below average life expectancy. This pattern is consistent with existing research on the influence of job type and income levels on life expectancy (Figure 5).

The vast majority of schemes said they used standard mortality tables in scheme valuations, either unadjusted or with adjustments for scheme characteristics. Mortality tables set out the probability of an individual of a certain age dying within the next year. They are compiled based on historical data on death rates, but then adjusted to make allowance for future improvements in life expectancy (Figure 6).

We asked schemes that use standard mortality tables (with or without adjustment) which tables

Figure 3: Projections of longevity with different cohorts.
Source: Paternoster.

Figure 4: Pension funds' perception of longevity trends.

Figure 5: Pension schemes' views on life expectancy.

Figure 6: Mortality tables in use.

they use. Of the 62 schemes that said they used standard mortality tables, only 14 schemes (18 per cent) reported the standard tables they used. The large majority of these schemes (11 of the 14) stated they used the PMA/PFA 92 tables, which are based on deaths recorded in the early 1990s.

Most of the schemes that said they used the PMA/PFA92 tables noted using the medium cohort adjustment (7 of the 11). Only one scheme noted using the long cohort approach. A February 2008 consultation paper² from The Pensions Regulator (TPR) proposed that

valuations and recovery plans that used longevity assumptions less conservative than the long cohort would attract additional regulatory scrutiny.

In September 2008, TPR published the consultation response – a document outlining ‘best practice’ in choosing mortality assumptions.³ This response states that mortality assumptions will not be a primary trigger for scrutiny but will be considered as part of the overall assessment of prudence of assumptions by any scheme coming under additional scrutiny. However, it is clear that longevity is considered an important matter by TPR:

There have been significant developments over a number of years in our knowledge of current trends in mortality. Some projections which have been in common use are no longer likely to be considered reasonable assumptions.

(Tony Hobman, The Pensions Regulator, February 2008)

TPR’s preference appears to be for mortality assumptions that are more conservative than the valuation basis in use by most schemes. The regulator expects trustees to focus on the issue of rising longevity in setting their assumptions, whether this be through use of the long cohort (with an underpin) or the medium cohort (with a higher underpin). The report notes ‘concerns, as expressed by the Faculty and Institute of Actuaries, that the ‘short’ and ‘medium’ cohort projections imply a rapid tail-off in future rates of improvement in mortality and show a very

different pattern from the recent data published by the CMI and the ONS’.

In our survey, nearly 15 per cent of schemes used scheme-specific experience in creating mortality tables. The TPR report states that ‘while the baseline assumption may be scheme specific, individual schemes will not normally have the evidence to make a scheme specific allowance for future improvements and will need to base their choice on broader data’.

Only two of the schemes in the survey that report using scheme-specific mortality have fewer than 10 000 members. Smaller schemes can consider adjusting standard population data to take account of industry, location and salary details.

In the face of rapidly increasing longevity, it is common for schemes to have to update the mortality assumptions they use. Our research showed that many schemes also expect to make changes in the coming year. Figure 7 shows that:

- 46 per cent of schemes have changed the assumptions they use in the last 3 years (but not in the last year).
- 39 per cent have made changes in the last year.
- Over half of the schemes who have made changes in the past 3 years, but not in the last year, expect to make a further change in the next year
- However, less than 20 per cent of schemes who made a change in the last year expect to make a further change in the coming year.
- 8 per cent of schemes did not know when

Figure 7: Past changes in mortality assumptions.

they would make a change – these data are not shown in Figure 7.

Many UK pension schemes have embraced asset liability modelling to understand the range of potential future funding levels that result from the uncertainty in investment return, inflation and interest rates. With longevity risk high on pension schemes' agendas, the uncertainty of future life expectancy is receiving similar attention. We asked if schemes stress test valuations against alternative mortality assumptions. A significant 70 per cent of schemes said that they did, with 22 per cent saying they did not, whereas 8 per cent of respondents were unsure. TPR has noted that stress testing against alternative assumptions represents best practice.

Overall, it seems likely that schemes will devote increased resources in future to understanding longevity trends. This desire to share can be seen in the successful launch of Club Vita, run by Hymans Robertson. The firm invites trustees of large occupational schemes to access a range of analyses and pool their longevity experience. This initiative may help to produce an industry-accepted index of pension scheme longevity that could underpin longevity derivatives.

We have joined a club with other pension schemes looking at our mortality experience.

(Survey Respondent)

MANAGING LONGEVITY RISK

Pension scheme trustees face a big challenge when managing the impact of longevity risk on their scheme. There are a number of established mechanisms available to them, as well as a surge in new ones.

Key mechanisms for managing longevity risk are:

- *Full buy-out*: the transfer of the pension liability to an insurance company in return for payment of a premium to the insurer. In a full buy-out, all the liabilities of the scheme are transferred and the scheme may then be wound up. The insurer then bears the investment, interest rate, inflation and longevity risk associated with payment of the pensions and carries out all the

administration. The trust can be wound up and scheme members have a direct relationship with the buy-out provider.

- *Partial buy-out*: this is similar to a full buy-out, but only for part of the liabilities of the scheme. For example, recent deals have focused on pensions already in payment. The scheme will continue to operate to pay those members' benefits not bought out.
- *Buy-in*: the scheme purchases an annuity policy from an insurance company that matches all or a part of the pension liability. This can be treated like an investment held by the scheme, but is one that offsets the risk of providing pensions to the covered liability.
- *Longevity insurance*: the scheme purchases an insurance policy that provides financial compensation in the event that scheme members live longer than had been expected.
- *Longevity bond*: the scheme purchases a bond where the payments on the bond are linked to an index of the longevity of a defined population, either the actual scheme mortality experience or that of a more general population.
- *Longevity derivative*: the scheme enters an over-the-counter derivative contract, where the payments it makes and/or receives are linked to the difference between the expected longevity and some measure of experienced longevity. This would typically take the form of a swap, not dissimilar to an inflation swap and could be based on scheme specific or more general population longevity.
- *Risk sharing*: the scheme reaches an agreement with members whereby the financial impact of future changes in life expectancy is shared between the sponsor and the members themselves, for example, through changes in benefits or member contributions.

Some approaches to managing covenant risk may also include an element of longevity risk protection – for example BrightonRock offers covenant insurance where, for a regular annual premium, a buy-out is triggered on company insolvency. Therefore the value of the 'payout' on company insolvency is linked to longevity

improvements. However, annual premiums may also increase during the policy term if longevity increases.

In theory, the range of longevity products available should ensure that there is an approach to managing longevity risk that will suit all schemes. For trustees, the starting point must be for them to have good knowledge of the subject. The Regulator's guidance on Trustee Knowledge and Understanding requires trustees to understand the calculation of the pension liability ('technical provisions') which requires an understanding of mortality assumptions.

Figure 8 shows schemes' perceptions of their trustees' knowledge of longevity risk, whereas Figure 9 shows the extent to which schemes report receiving training on longevity risk.

Most schemes report either good (51 per cent) or reasonable (42 per cent) knowledge, with only

Figure 8: Pension scheme perception of trustee knowledge of longevity risk.

7 per cent reporting poor knowledge. A majority of schemes (64 per cent) report having had training on the subject, with a further 11 per cent planning training in the next year, but notably 17 per cent of schemes report their trustees as having good or reasonable knowledge of longevity risk, despite not having received any training on the topic.

We asked pension schemes about their level of awareness of the various different ways of managing longevity risk. The results are shown in Figure 10.

The levels of awareness of the various options are high, although relatively few schemes have actually used longevity risk management solutions as yet. It is unsurprising that levels of awareness are highest for buy-outs (full and partial) because they have been an available tool for over 20 years. The proportion of schemes that have considered using buy-outs is also correspondingly high. However, the take-up is low.

Although a relatively high proportion of schemes have also considered a buy-in, this option has more schemes noting they are unaware. It may be that some of these schemes are aware that annuities can be held by the scheme as an investment, but are unfamiliar with the terminology 'buy-in'. There is only marginally lower awareness of the newer and more complex options such as longevity insurance, bonds and derivatives.

Figure 9: Pension scheme training on longevity risk.

Figure 10: Awareness of longevity management techniques (prompted list).

Figure 11: Use of conventional investment strategies.
*The figure only shows schemes who knew whether they used LDI.

An alternative approach to managing longevity risk is simply to invest the scheme in growth assets in the hope that the returns are high enough to build up a funding buffer that will cover unexpected future longevity increases. We asked schemes if they thought longevity risk could be managed using conventional investment strategies, for example, equity investment. Although only 8 per cent of schemes said yes, a further 59 per cent said that longevity risk could be managed *partially* using a growth strategy (Figure 11). The use of conventional investment strategies to manage longevity risk was more common among schemes who stated they were not using an LDI strategy than among those who stated that they did use an LDI

approach. These are the schemes with trustee boards that are naturally inclined to favour equity investing.

Risk sharing is an option that 18 per cent of schemes say that they have implemented. We did not ask for details of risk sharing that had been put in place. Schemes may have linked benefits, amendments to retirement ages, or flexibility to adjust contributions to future changes in life expectancy, or moved to some form of hybrid scheme.

Longevity can be managed by transfer to members.
(Survey respondent)

We are looking at cost sharing and other initiatives.
(Survey respondent)

USING LDI TO MEET LONGEVITY RISK

An extension of the LDI approach may be an option for those schemes that feel uncomfortable losing the connection with their members through a full buy-out and would prefer to hedge mortality through an investment-led approach. This is exactly what a partial buy-in achieves but it 'bundles' the longevity hedge in with a full hedge of investment, interest rate and inflation risk. Some schemes may wish to hedge unrewarded risks (such as longevity, inflation and

interest rate risk) without giving up the equity risk premium.

Currently, LDI solutions typically allow pension funds to manage interest rate risk and inflation risks by investing in swap portfolios with different durations to match the interest rate and or inflation sensitivity of the pension scheme. Longevity immunisation could be included in an LDI solution. Some schemes may find that they are able to enter into an agreement with a counterparty to swap payments that represent the expected pension benefits (plus a risk premium) for a series of payments that represent the ultimate pensions that the scheme must pay based on actual longevity. In future years the difference between these cashflows would change hands, eliminating longevity risk and, where longevity was better than expected, providing a 'top up' to meet higher than expected pension payments. Such an arrangement may only be available to large schemes, could result in a significant counterparty exposure should longevity improvements exceed expectations and is likely to be highly illiquid.

Expected mortality in pension funds is calculated using a form of index and attempts at producing a suitable mortality index to underpin swap transactions have already been made by market participants, for example JP Morgan's LifeMetrics. If there is a suitably maintained index that is standardised and well accepted by the industry, then longevity swaps could also be

standardised. Although swaps on such indices would represent population rather than scheme-specific mortality, standardisation would have a number of advantages; standardised longevity swaps could be tradeable and even liquid, be incorporated by any scheme into an LDI portfolio and, with a transparent market value, longevity swaps contracts could be collateralised to manage counterparty risk.

ADVICE

In a complex area such as managing longevity risk, good quality advice is important. We asked about the role of different parties in scheme governance in driving the debate and about the role of advisers. Most schemes said that either the actuary or the corporate sponsor took the lead in terms of driving the discussion on managing longevity risk (Figure 12).

We also asked who was offering pension schemes advice on longevity risk. All the schemes we surveyed noted that they received advice on longevity risk from their actuary or investment consultant. Only 11 per cent of schemes noted receiving advice from their asset manager and 14 per cent from investment banks, despite obvious growing interest in this area from these types of firms. It may be that schemes did not regard input from these types of firms as 'advice' given their interests in generating transactions and maintaining assets under management.

Figure 12: Who is driving longevity risk management?

BARRIERS TO MANAGING LONGEVITY RISK

Pension funds perceive longevity risk to be important, but the extent of activity to manage the risk is limited. We asked schemes what are the most significant barriers to the management of longevity risk. The results are shown in Figure 13. Each scheme could nominate three choices from the options given.

Despite the reported knowledge on longevity management techniques, the most commonly mentioned barrier to effective management of longevity risk was the complexity of the issue. Schemes were also concerned about the lack of suitable products, the credit risks created by dealing with a derivative or insurance counterparty and the costs of solutions.

The general perception is that solutions are not affordable. (Survey respondent)
We need a practical and affordable solution. (Survey respondent)

Concerns about the implications of inherent credit risk in some of the solutions seem set to grow, following the recent financial crisis and the failure of major derivative counterparties, such as Lehman Brothers. Relatively few schemes were concerned by lack of available advice, weaknesses in their own governance capabilities and regulatory issues.

Given the competition now in the market and the recent convergence between the valuation of liabilities on a funding basis and the cost of buy-out, we asked schemes about their perceptions of the value of buy-out transactions (Figure 14).

Figure 13: Barriers to managing longevity risk.

Almost half of the schemes noted they viewed buy-outs as expensive. A further 28 per cent said they viewed buy-outs as fair value and only 4 per cent think they are good value. A relatively high proportion of schemes (18 per cent) say they do not know the value of buy-outs.

The relative scepticism of schemes as to the value of buy-outs is interesting against a background where the number of participants in the market has risen markedly and there are signs of much more vigorous competition for business. Some commentators have suggested that in recent months buy-outs have been written on terms that are up to 10 per cent less than economic fair value. Scheme perceptions may be affected by the fact that most buy-out business is priced at a premium to IAS19/FRS17 accounting liabilities.

Ultimately, the perceived value of buy-out may be linked to a scheme's ability to pay the necessary premium. It is notable that all the respondents who said buy-out is good value are funded in

Figure 14: Perceived value of buy-outs.

Figure 15: Who would manage any longevity derivative hedge?

excess of 100 per cent on an accounting basis, that is, they are schemes that can afford it.

Derivatives represent one possible way of managing longevity risk and may be attractive to schemes that view a buy-out as too expensive. This is particularly where the view on value is driven by a desire not to lock into long-dated bond yields rather than the cost of locking into a particular level of assumed mortality. Pension schemes need to be able to think about longevity as a separate risk instead of trying to tackle all risks at once. There are also signs that in current volatile markets schemes are reluctant to take any major steps to hedge or offload their liabilities, for fear of getting the timing of the decision wrong and securing poor terms.

There is concern at timing – the possibility of locking in low discount rates. (Survey respondent)

Longevity bonds and derivatives are new instruments and for the most part active markets do not exist yet. They are also complex instruments requiring careful management. Most schemes said that if they were to use longevity derivatives, they would delegate management of these to their asset manager. A surprisingly high number of 30 per cent did not know who would manage the derivative hedge on their behalf, indicating that both fund managers and consultants/actuaries need to offer this within a product that pension funds understand (Figure 15).

CONCLUSION

Pension schemes recognise longevity as an important determinant of future funding. In the survey, longevity risk was perceived as the second most important risk, after investment risk but ahead of interest rate risk. Longevity risk is likely to become more important to pensions schemes and the high reported levels of training on the topic indicate the desire to improve understanding.

Pension schemes are optimistic about medical advances improving life expectancy and more expect their liabilities to grow as scheme members live longer. Although many schemes have made recent changes in the mortality assumptions used in valuations, these do still appear to be lagging behind recent evidence on longevity and further changes are likely to be required.

There has been significant growth in the options to manage longevity risk – and a well-publicised growth in the number of buy-outs taking place. However, we found that while the awareness of the different options is high, few schemes have actually used them as yet. This is not due to a lack of knowledge among schemes as the majority of schemes rate their knowledge of longevity risk as good or reasonable. Schemes are aware of the options and many have seriously considered them. However, people tend to stick to what they know and the majority of UK pension schemes still believe they can manage longevity risk at least partially by conventional

investment strategies, such as investing in equities. This view is more common among schemes not using LDI strategies than among those who are using LDI.

The relatively low proportion of schemes that have used the various options for managing longevity risk may be simply an issue of timing – they may still be considering them. However, there are some perceived barriers. Despite their knowledge and training, schemes see options as too complex, or not suitable for their particular scheme. Credit risk was also cited as a significant barrier – a concern that has probably grown over the past few months due to recent banking collapses. Perhaps firms offering options to manage longevity risk need to be more transparent about the pricing of the transaction and look to develop tradeable solutions in which counterparty risk can be managed through collateralisation or other risk mitigation.

Despite the growth in buy-outs and the outward signs of competition driven by the arrival of many new players in the buy-out market, over half of the schemes say that they think the buy-outs are expensive. This view from schemes may be because buy-outs are priced at a

premium to accounting valuations of liabilities. Buy-out firms may need to find ways to price products even more keenly if the buy-out trend is to accelerate.

So, how will the longevity risk management evolve? This is an area in which asset managers may be able to help trustees by managing alternatives to annuity products. Although LDI is currently targeted at interest rate risk, the standardisation of longevity swaps, based on an industry-accepted longevity index, supported by all participants in derivative trades, would allow asset managers to manage longevity risk overlays within a traditional LDI portfolio.

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NOTES

- 1 This paper is based on the Pensions Intelligence report 'Living with Longevity' published by Aberdeen Asset Managers in November 2008.
- 2 The Pensions Regulator 'Good practice when choosing assumptions for defined benefit pension schemes with a special focus on mortality', February 2008.
- 3 The Pensions Regulator 'Mortality assumptions: Good practice when choosing assumptions for defined benefit pension schemes', September 2008.