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Longevity risk

A roundtable debate



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Foreword



I am delighted to welcome you to this special supplement to *The Actuary*, covering the important topic of longevity risk. Participants from a variety of backgrounds gathered for a roundtable discussion sponsored by Milliman and held at Staple Inn on 5 November.

The issue of longevity affects the majority of practice areas that actuaries are involved in and it was enlightening to compare and contrast the different viewpoints and perspectives. A lively debate covered areas including the key issues arising under Solvency II

for annuity writers, the impact of the financial turmoil on de-risking solutions, the challenges facing the further development of the capital markets and whether there is an increasing convergence of market-participant views for longevity.

Our guests provided insights from their areas of expertise and challenged the views of their peers. Thank you to the participants for an informative session and to Milliman for supporting this event.

Marjorie Ngwenya
Editor, *The Actuary*



Milliman is proud to sponsor this longevity risk roundtable debate comprising leading industry experts working in the field of annuities and longevity risk.

We hope that you enjoy reading this snapshot of views expressed from the full range of insurance, reinsurance, capital markets, academic, legal and medical perspectives.

We would like to thank everyone that participated and to the organisers of this event for encouraging such a lively debate!

Emma McWilliam
and **Philip Simpson**,
Milliman



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About our panel

Marjorie Ngwenya

Marjorie is the editor of *The Actuary* and chair of this discussion.



Alan Bradbury

Alan is head of annuities at Pearl Group and looks after longevity risk across the group.



Philip Simpson

Philip is a principal and consulting actuary at Milliman, working mainly in the life insurance field, focusing on longevity and capital market issues.



Guy Coughlan

Guy is managing director (global head, ALM Advisory, co-head, European Pension Advisory) at JP Morgan.



Paul Sweeting

Paul is professor of actuarial science at the University of Kent. His current research involves mortality and longevity and he was previously head of longevity strategy at Munich Re.



Simon Gadd

Simon is managing director, Legal & General annuities and is responsible for any longevity risk that the firm retains within or cedes from its annuity business.



David Melzer

David is professor of epidemiology and public health at the Peninsula Medical School, Exeter. He is researching genetic and conventional risk factors in longevity.



David Brand

David is managing director at Hanover Life Re UK. The firm specialises in life, health and annuity reinsurance.



Jennifer Donohue

Jennifer is a partner at Simmons and Simmons and is an experienced regulator and practitioner in the insurance and reinsurance markets.



Emma McWilliam

Emma is a senior consulting actuary at Milliman, primarily dealing with annuity and longevity risk assignments.



Eugene Dimitriou

Eugene is managing director in the RBS Global Banking and Markets division and leads on longevity issues for the bank.





Taking the long view

Our panel of experts discuss the major issues surrounding longevity in the context of Solvency II, diversification, capital markets and the financial crisis

Marjorie Ngwenya: Our first topic is economic capital, Solvency II and risk management. What will be the key issues arising under Solvency II for annuity writers?

Simon Gadd: The issue that's getting the highest profile is the asset side. Traditionally, annuity writers invest the

funds they receive from clients in a mix of assets and rely on getting a yield above risk-free in pricing those products. The current framing of the Solvency II consultation proposals suggests that you would not be able to allow for that in your day-one capital requirement and, if you decide to invest in anything other

than a risk-free asset, you will have to hold some extra, very punitive capital margins for that business.

That would mean a very big increase in the level of capital that annuity writers would have to hold. To earn the sort of returns that any shareholder or investor would want to earn on that business, it must mean that prices will go up. We've been quite public about trying to make sure that politicians and commentators understand the implication for the individual annuity business and customers that have saved

hard for their retirement who will find that the value when they convert it to annuities could be significantly reduced.

All aspects of the basis will require extra capital, including longevity.

Emma McWilliam: The key issue for longevity risk capital is the 25% longevity stress proposed to apply to the base level of mortality, which is particularly onerous at the older ages. Currently, for a typical portfolio you may have, say, 6% to 8% of your best-estimate liability required for longevity risk capital. However, the 25% stress at the much older ages may require longevity risk capital of approximately 10% to 15% of your best-estimate liability.

Alan Bradbury: It is a blunt instrument having just a 25% haircut and maybe it averages out. But a lot of the older ages are more likely to be in non-profit funds or subsidiaries. The younger ages are more likely to be in with-profits funds. If you structure your companies that way there could be some issues on who's actually bearing that capital burden.

Although common sense should prevail, particularly



'If the new stresses are implemented, it's going to raise the bar on capital even further than we thought maybe a year ago'
Philip Simpson

on the liquidity premium aspect, my concern is that it'll end up being some of political solution. We've got sound technical arguments but maybe we've gone beyond the technical discussion. It may end up with some compromise but not an ideal solution.

Philip Simpson: There is some feeling that CEIOPS has been going beyond the terms of the Directive in some consultation papers, so the Commission that is ultimately responsible may rein back some of the stronger stresses compared to QIS 4. Many observers thought QIS 4 was going to be a fair representation of what Solvency II might eventually look like. If the new stresses

are implemented, it's going to raise the bar on capital even further than we thought maybe a year ago.

Ngwenya: Would you like to share the reinsurance view?

David Brand: Reinsurers are also subject to Solvency II. We have a different mix of business and a worldwide network we can take advantage of. We concentrate more on longevity swaps than the asset side but it seems the capital requirements will go up for reinsurers as well.

Ngwenya: What are the main considerations around diversification benefits for longevity risk interactions with mortality risk?

Paul Sweeting: A lot of people think that if you write life insurance business then you should also write annuity business because it is clearly a diversifier or perhaps even a hedge.

There is some evidence that this has been reflected in premium rates in the US. But most of the life insurance sold is going to younger people, so you are looking at very different populations when compared to annuitants.

If health improves it's likely to improve at all ages but you've often got different diseases affecting each group and different policy considerations too.

The socio-economic groups are also important as you won't necessarily be selling annuities to the same people you'll be selling life insurance to. Mortality improvements affect different socio-economic groups at different times, which gives you less of a direct hedge — when treatments become available on the NHS that might have already been available privately, for example, and the lifestyle factors exhibited in the groups in terms of things like smoking and diet and exercise.

Jennifer Donohue: Adding to the longevity parameters, the extension of longevity won't just be based on age-related diseases. Elizabeth Blackburn has just won the Nobel Prize for her work in bio-molecular medicine which may eventually make it possible to stop the ageing of a cell. She's discovered the function of telomerase that operates to protect the DNA from degrading. So at 20 or 30, people could stop ageing. That could have some incredibly serious economic consequences. You could be looking at people having four or five careers and so on.

Sweeting: But who will pay for that research to extend life indefinitely? The difficulty in getting the current retirement age up from 65 to 67 probably isn't going to have much of an impact if the average life span is 250 years, so extending life is a major policy issue.

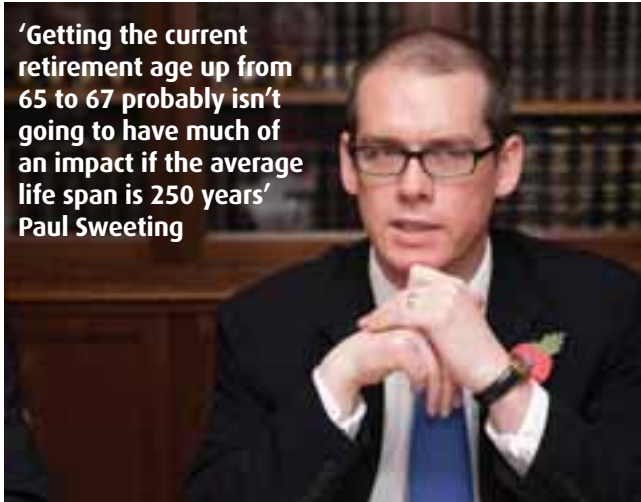
A lot of the research so far has been around expected longevity improvements and much less on the uncertainty surrounding them. One of the areas where it's stark is whether there is a rectangularisation of mortality or not. If you carry

on curing things, does that mean everybody lives to 120 and then falls off their perch? Or do you start curing old age? The uncertainty around your central estimate for improvement can change hugely which impacts how much economic capital you should hold.

David Melzer: On the scientific issues there are probably seven or eight known major ageing processes, of which telomeres are involved in only one. There have been fantastic results from very primitive organisms in fiddling with telomeres and genes but the effect decreases pretty dramatically when you get up to the higher organisms, the mammals and so on. The best life extension we've got in mice, for example, is about a third and the most powerful thing is actually caloric restriction, avoiding obesity.

Some of the cancer protection pathways are incredibly complex and the number of steps between the telomere breakthroughs and turning them into a treatment is enormous. Might it happen? Of course it might happen. Does it look likely? No, not really. So we probably need to

'Getting the current retirement age up from 65 to 67 probably isn't going to have much of an impact if the average life span is 250 years'
Paul Sweeting



be a bit more cautious.

On the other hand, we are living in an age of comprehensive biology where you can do the sort of work that would have taken thousands of research lives in a month, so it's impossible to know where that's going to lead in the future.

Ngwenya: Any other comments on diversification?

Brand: Paul's comments about the different portfolios of life insurance and annuities are interesting. Many companies are trying to sell life insurance to the older-aged market and one reason could be the diversification benefit. One

thing we have thought about is our ideal portfolio. How much annuity business do we need to write to get an ideal balance for our term assurance portfolio?

Guy Coughlan: We have done a number of studies looking at back-testing with hypothetical portfolios of life insurance and annuities. I think the reason you get this proxy hedging despite the fact that they're operating on very different age groups is simply that, in the major markets, you've seen a fairly uniform fall in the mortality curve through time. And you get a diversification that has been significant. It's not a perfect hedge, it's a proxy hedge but it's a bit more

than just diversification with an uncorrelated risk. Clearly the negative correlation is much less than one and it's greater than zero. It's somewhere in the middle.

The challenge is the time horizon over which you measure that benefit.

McWilliam: The advantage under Solvency II is that current proposals allow you to assume negative correlation between mortality and longevity risk, which gives rise to significant diversification benefits. Additionally, if you

look at the latest proposals for the catastrophe-risk stresses in cases of pandemics in CP 49, they have strengthened the stresses that would apply to protection business since QIS4. In particular, to an uplift of 2.5 per mille to mortality. However, they're also allowing you to take into account the offsetting impact of annuity business. So you actually get a benefit if you're writing both annuity and protection business under the cat risk stresses proposed. Although, as the stress was strengthened since QIS4, I think the offsetting impact will be a point of negotiation if a lower cat stress is ultimately applied

such that the ability to offset will be removed if CEIOPS moves back to recommending a stress of 1.5 per mille.

Eugene Dimitriou: I think that's an interesting point. I've always found this argument about the diversification bordering on hedging to be quite weak. If you look at the practical historical events that have occurred over the past 100 years, for example, two world wars, Aids, Spanish flu and the cohort effect, all affect old lives and young lives dramatically differently. So the problem with this argument is that the correlation might be there except in the tails but when you're calculating capital measures, insolvency

and those kind of things, it's the tails that matter.

Ngwenya: Moving onto risk management, with the Own Risk and Solvency Assessment (ORSA) requirements, how do you think management can better understand the longevity risks they are running?

Simpson: I think the ORSA will improve firms' abilities to manage their risks. They're going to have to set their capital levels based around their ORSA and, if they are large enough and opt to, an internal model or partial internal model. In terms of bottom-line cost, it's going

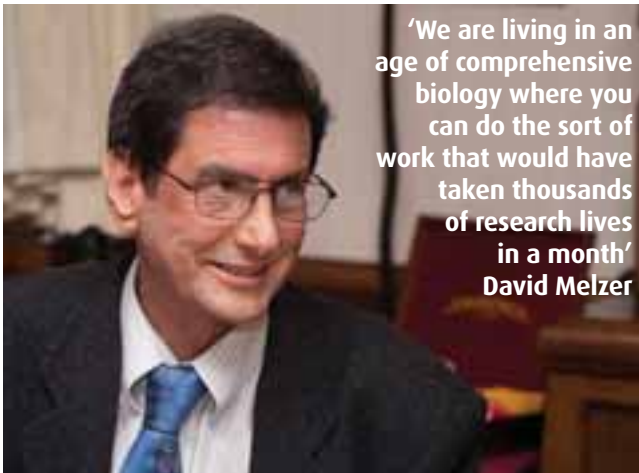
to help focus management attention particularly in managing risk on an economic basis rather than to the solvency capital requirement (SCR) which is a fairly blunt instrument.

The problem is going to be for some insurers, such as mono-line insurers, that have little diversification and are not using an internal model. Firms may also get quite a disconnect between how the SCR is going to impact compared with a tailored model, particularly when the company is using its internal model in its ORSA and to manage its business.

It's probably a good incentive for companies moving towards an internal model or partial internal model based around the insurance risk.

Coughlan: I would think that for mono-line insurers, annuity writers and pension insurers, there is a competitive imperative that they develop their own internal models, not just from a risk point of view but also pricing. I don't think they can survive without it.

McWilliam: Given that the ORSA requires the board to analyse the risks in their



business, another area that's helpful is cause-of-death analysis — in particular, to look at what the 1-in-200 scenarios are and to understand these and alternative scenarios in the context of various medical advancements.

This will help to provide a narrative context around explaining and understanding the alternative outcomes.

Gadd: Certainly when I've talked to our board about longevity, I prefer to avoid talking about cohort tables. If you convert it into life expectancies and cause-of-death, they can relate more.

Ngwenya: What role will the capital markets play in providing longevity risk transfer?

Dimitriou: The crucial role is providing capacity because, regardless of how many insurance and reinsurance companies come in and try and provide longevity protection, it ends up being a drop in the ocean. The jury is still out on how they provide that capacity. Is it by creating new countries that can take more annuity business? Is it through longevity swaps or some other instrument?

Coughlan: That, I think, is their only sustainable long-term role. Merely intermediating between pension funds or insurers and reinsurers is not a sustainable model for banks or financial intermediaries in general. The only way intermediaries can add value to the longevity market is by delivering a new set of end-holders of the risk — investors that can provide a different sort of risk-bearing capacity from the reinsurers and insurers. In this way, pricing cycles will not be completely in sync and there will be competitive tension between those two risk-holders over time.

Brand: Insurers and reinsurers understand long-term risk, and we're talking 50 years for some of these. For capital markets the length of the risk was the biggest problem initially and I'm not sure that has been solved yet.

Donohue: You need a cocktail of solutions where you incorporate the insurer, the reinsurer, maybe an ISPV transformer and then the capital markets and further carriers. So you diversify the investor base in this type of risk. There's not a one-size-fits-all solution.

Sweeting: There's real tension between what people buying these sort of bonds generally

'When I've talked to our board about longevity, I prefer to avoid talking about cohort tables. If you convert it into life expectancies and cause-of-death, they can relate more'
Simon Gadd



want, which is something over, say, a ten-year time horizon, and what the people trying to hedge the risk want, which is usually something over 50 years.

Also, who are ultimately going to be the buyers of this longevity risk? If it is still insurers and pension schemes, will the risk just be going round in circles? It's an important consideration when you're talking about capacity.

Brand: It comes down to the value to the policyholder buying the annuity. If everybody along the line wants a return on capital, the person buying an annuity's getting an even worse deal. How's that going to work?

Sweeting: By people moving away from annuities when it comes to their retirement income.

Gadd: That's a very dangerous trend. Most people underestimate how long they're going to live. And even if they knew, not everybody lives as long as the average. And so people need to have that benefit of insurance which is the pooling of risk to avoid outliving their savings.

Bradbury: Who ultimately bears the basis risk? Those who



'You need a cocktail of solutions where you incorporate the insurer, the reinsurer, maybe an ISPV transformer and then the capital markets and further carriers'
Jennifer Donohue

want to hedge a risk would probably want to hedge it completely if they could but the capital market wouldn't necessarily want to have such bespoke solutions.

Ngwenya: How successful have the release of longevity indices been and do you think that indemnity or parametric-style solutions will become more prevalent?

Coughlan: We will see a range of different solutions depending partly on the organisation and partly on the nature of the risk. With Life Metrics, we achieved our goal in terms of educating the market and, particularly, the investor base, by providing an

index that has increased the visibility of mortality rates and life expectancies. And let's not forget, the first ever longevity swap in capital market format was index-based.

We will see many more kinds of solutions that we haven't even envisaged coming to market, both parametric — index-based — and indemnity.

At the moment an index swap is likely to be more appropriate and more cost-effective for hedging deferred risks whereas an indemnity swap is probably better for hedging pension risk.

Gadd: There's a role for the insurance company to take the basis risk, understanding the

difference between individuals but aggregating to get a diversified pool of risks. What insurers can't manage is the population longevity trend. If they could get reinsurance on that through the index approach then you could see that the intermediary between the capital markets and those needing bespoke protection is the insurance company.

McWilliam: If insurers are able to track and understand the difference between the population longevity risk and their own insured portfolio longevity risk then they're potentially able to access cheaper terms in the capital markets by transacting on a population index basis rather than on an indemnity basis.

Coughlan: Insurers perform another important role — the aggregation of exposures from different pension schemes. It's very difficult to sell the bespoke risk of a small pension plan to the capital markets but, once aggregated with other schemes, it becomes much easier.

Sweeting: Similarly it's important that smaller pension schemes deal with their bespoke risk because the uncertainty around who's



'If everybody along the line wants a return on capital, the person buying an annuity's getting an even worse deal'
David Brand

going to die when means that index-related solutions probably won't give them the protection they need.

Ngwenya: Are there any other challenges faced in developing capital markets?

McWilliam: The development of a secondary market that is liquid will be important for capital market solutions to fully develop.

Coughlan: We need a broad group of market players for standardisation to facilitate secondary market trading, so you know what you're getting.

Dimitriou: The concept of liquidity is crucial and it's mostly a challenge for the banks to create that liquidity.

The perceived trouble with it being a very long-dated risk is not in itself a problem — if there was liquidity, that's fine. So the challenge to Guy's organisation, mine and the longevity community is to find ways of injecting liquidity into the market and creating a price-discovery mechanism that is much more efficient than the current one.

Sweeting: Some people say it's the government's role to get that going and start issuing longevity bonds but they probably have enough longevity risk already.

Simpson: A lot of it is chicken-and-egg but the development of a diversified investor base for purchasing these

securities, which will come with increasing liquidity, is the key to developing the market. Investment and other banks can contribute here with their distribution capability.

Ngwenya: How useful do you think the capital markets will be in addressing the needs of pension fund trustees?

Bradbury: With the bespoke longevity swaps we've seen, both from insurers and pension plans, you have a product which is, in economic terms, almost identical to an insurance or reinsurance contract, except perhaps that it's got a finite maturity. So I think it can be as effective as insurance.

Donohue: I wrestle with this dilemma daily because the impact on clients is dramatic. The market is not well regulated and there is a debate in the States about whether these instruments should be brought under the more severe prudential supervision of the insurance market if we're to start trading more significantly.

Ngwenya: What has been the impact of the financial crisis

on the major transactions to de-risk longevity?

Sweeting: Well it's made it more expensive. It's also a shame that some of the structured products which did a very good job of slicing and dicing risk up into suitable packages for different risk appetites are no longer available.

McWilliam: For bulk annuity and pension transfers, the financial turmoil has reduced the risk appetite of some players and this has meant reduced capacity for asset-backed transactions.

There are also concerns around security. There's been an increasing interest in longevity swap-type

transactions which don't require the initial premium to be paid up front, so for pension schemes that are also struggling from a cash-flow perspective, this may be perceived to be an easier way by some to transfer the risk as it is settled on a net basis at a time when affordability to buy out is low.

Gadd: I think that's quite dangerous because they're locking into a series of liability cash flows that their investment strategy has now got to deliver on.

They're probably paying more for pure longevity risk than they would be paying for an aggregated asset and longevity risk. So I just wonder

'If insurers are able to track and understand the difference between the population longevity risk and their own insured portfolio longevity risk then they're potentially able to access cheaper terms in the capital markets'
Emma McWilliam



whether they've really understood that.

Sweeting: A lot of trustees might regard longevity risk as being an unrewarded risk, not recognising that when they pay to get rid of their risk, they are paying a risk premium to reduce that risk.

Bradbury: In pension schemes, the perceived underlying longevity cost tends to lag behind that of insurers so, with a straight longevity swap, it's not only got the risk premium but any difference in the perceived cost.

McWilliam: That's where we're starting to see some convergence between the pension scheme view, the

insurance company view and the capital market view and this is evidenced by certain trades starting to happen now.

Ngwenya: What role do you believe reinsurers have in de-risking longevity?

Brand: Our business is to take mortality and longevity risk and we're very comfortable with that. We have a healthy risk appetite although, ultimately, capacity is finite. There's enough risk out there for everyone so it's a matter of structuring deals so that each party can select the risks that are right for them.

Five or ten years ago we quoted for companies on reinsuring a block of annuities

and came up with something perhaps 5% above their reserves. And they would say, "No, the price is miles too much." They may wish they had accepted our terms now; we've all learnt such a lot since then.

Not all reinsurers are comfortable in the annuity market. We've segmented it as well in that we've been very active in the area of enhanced annuities for those who are perhaps not going to live as long as others. I'm slightly worried about Jennifer's comments on the research to stop ageing. We have a saying in our company that the rate of mortality is very simple — it's one per person — I'm now a little worried whether that's still the case!

Ngwenya: Do you think we're achieving a convergence of views on longevity assumptions?

Bradbury: We are getting there. There may be lots of different tools but most insurers, for example, will probably adopt something fairly simple such as one of the interim tables having assessed the risk using whatever internal models



'The concept of liquidity is crucial and it's mostly a challenge for the banks to create that liquidity'
Eugene Dimitriou

they have. It will be interesting to see whether the new CMI models will help. I don't think there are many companies intending to adopt them, for this year anyway, but most will be looking at it.

McWilliam: In longevity assumption benchmarking analysis we've conducted, whilst companies may use different projection methods, underpins and old-age adjustments, the overall impact of the bases used is closer than expected.

Gadd: The transparency of individual organisations with longevity assumptions has greatly increased. In some ways the market forces convergence because any outlier, particularly somebody that's being less prudent, will get criticised by the markets to say you're under-reserving against your peers. And to some extent that's been happening with pension schemes as well.

Simpson: For capital modelling there are a range of opinions on the optimal projection method. If everyone uses the same projection model, you're not going to see a market developing. Part of this is the range of models that

'In pension schemes, the perceived underlying longevity cost tends to lag behind that of insurers so, with a straight longevity swap, it's not only got the risk premium but any difference in the perceived cost'
Alan Bradbury



exist, be it P-Spline, Lee Carter, Age-Period-Cohort or others. The interim Cohort tables are a way of communicating the longevity improvement basis but that's not generally how companies would calculate their longevity risk capital internally.

They would back-fit their internal basis and describe it as a percentage of the cohort or a blend of cohorts plus a particular base table.

Sweeting: For pension schemes especially, the populations are going to be very different which means that the base tables are different. Also, with different socio-economic groups, you're not necessarily going to be converging towards the same set of improvements.

Gadd: An insurance company

will be focused on precise understanding of the difference between individuals and different groups so that the risk they're selecting in the market is the one where they think they're going to have an edge. But in terms of the way mortality improvement is communicated, I think there will always be a need for uniformity. If we're all using different methods, investors will say, "Well, what does this mean? I can't compare you." **Coughlan:** But people often ask if your improvement assumption is medium cohort or long cohort. Even if they know nothing about mortality, they still ask that!

Ngwenya: Thank you all for your contributions and a thought-provoking discussion.

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