



On August 9, 2011, SCOR SE, a global reinsurer with offices in more than 31 countries, acquired substantially all of the life reinsurance business, operations and staff of Transamerica Reinsurance, the life reinsurance division of the AEGON companies. The business of Transamerica Reinsurance will now be conducted through the SCOR Global Life companies, and Transamerica Reinsurance is no longer affiliated with the AEGON companies.

While articles, treaties and some historic materials may continue to bear the name Transamerica, AEGON is no longer producing new reinsurance business

The Messenger

Transamerica Reinsurance Risk Management Newsletter

Longevity - The Next Growth Market

EDITOR'S NOTE: Longevity protection – or living benefits – is emerging as a growth opportunity for life insurers. In the following article, Michelle Moloney explores the British market, which has been an early mover in transferring longevity risk associated with private pension plans to the insurance industry, as well as implications and opportunities in the U.S.



**By Michelle Moloney,
FSA, CFA**

*Executive Managing
Director, Corporate and
Strategic Development*

Without a doubt, demand for living benefits will be substantial. The macroeconomic factors driving this – demographic shift, steady increase in life expectancies, rising sovereign debt and corresponding uncertainty with public programs – aren't news. What may be news is that U.S. consumers and private industry are increasingly valuing longevity protection and sales are beginning to develop.

Life insurers are well positioned to gain from growth in this market given their actuarial expertise, willingness to assume long term guarantees, and existing mortality business that provides a natural hedge against longevity risk. In the wake of the financial crisis, this may prove to be one of the few areas capable of generating meaningful growth that the industry needs to offset the impact of low interest rates on asset yields. The scale of the opportunity is vast. In 2009, Americans held \$16 trillion in retirement assets in private-sector defined benefit plans, government pension plans, defined contribution plans, annuities and IRAs.¹

Lessons from the U.K.

In Britain, retirement is funded largely through employer defined benefit pensions with estimated liabilities of \$2 trillion. Pensions must measure their funding requirement every three years and arrange for full funding over 3-5 years, and funding is strictly enforced. Additionally, international accounting standards now require mark-to-market valuation on the balance sheet. Even before the financial crisis, some U.K. companies had pension plan deficits that exceeded their total annual earnings, introducing bottom line volatility that was completely extraneous to their core business. As a result, addressing the risks associated with pensions, including longevity risk, is now a key corporate agenda item.

Buy-outs and buy-ins. Solutions for managing these risks have evolved over the years, reflecting both the changing needs of the market and greater innovation on the part of insurance companies and pension sponsors. The original way pension sponsors transferred longevity risk was with a pension buy-out, whereby 100 percent of the pension liabilities were ceded to an insurer through a bulk annuity. But affordability has been a big issue with buy-out solutions, and pension sponsors facing large funding deficits cannot always afford the cost to transfer the full amount of risk. For such companies, another solution – the pension buy-in – provides a measure of de-risking at a lower cost. With a buy-in, plan sponsors purchase an insurance contract that

Continued next page

Share Your Thoughts!

Look for a readership survey on The Messenger and Forecaster in the latest NewsBreak e-mail. Your opinions are important to us.

Contents

*Useful Tools for Assessing
Claims Fluctuation.....4*

*Underwriting Audits:
Improving Results and
Delivery6*

Longevity - The Next Growth Market (cont.)

guarantees a portion of the benefits for a subgroup of the participants. This contract becomes an asset of the pension fund.

Swaps and synthetic buy-ins. More recently, new structures have emerged that hedge specific risks – longevity swaps and synthetic pension buy-ins. In a longevity swap, the seller (private pension sponsor) makes payments based on life expectancy (LE) assumptions for the pension lives, plus a risk premium of approximately six percent, roughly a one-year increase in LE. In return, the buyer (insurer) makes payments based on the actual experience of the lives in the plan. The seller now has a fixed and known cash flow liability, and the buyer assumes the LE volatility. Only the net difference in payments changes hands. Longevity swaps are an attractive alternative to pension buy-ins because they require lower up front capital. Also, by locking in LE, the duration of the longevity risk is fixed. This paves the way for the development of synthetic buy-in structures that enable the transfer of other market risks (e.g., investment risk and inflation) to different buyers, generally the capital markets.

Market interest in longevity swaps is taking hold. In 2009, £4.1 billion of longevity risk was transferred through swap transactions. Activity is projected to more than double – £10 billion is anticipated in 2010². Still, demand for longevity swaps is twice as large as the supply of capacity for these transactions. The range of solutions allows market participants to choose risks within their appetite and budget. Longevity swap structures in particular are now being adopted worldwide with transactions completed in continental Europe, Asia and Latin America. While the U.S. has been slower to follow the U.K. market, discussions are underway and longevity swap transactions are expected to be completed by early 2011. Even if just a small portion of the U.S. \$3 trillion corporate pensions market transfers its longevity risk, the opportunity will be significant.

Understanding Life Expectancy

The LE estimate can be broken into two components: the base table and the LE improvement assumption. The base table is the starting assumption – what LE is today for the consumers of a given product. The LE improvement assumption is a forecast of how longevity will change over the likely duration of the liability.

Base table assumptions. Developing the base table is a challenge, especially since longevity risk products (i.e., individual annuities, pensions, long term care) are not individually underwritten in the U.S. No one doubts that medical-related factors are a big driver of longevity. Less obvious, though perhaps just as important, are lifestyle factors. Recognizing this, market participants in the U.K. have developed a proxy for lifestyle using postal codes. While U.S. zip codes are less effective as lifestyle predictors, this type of segmentation may become essential for the development of competitive base tables.

The effect of anti-selection is an important consideration in the development of base tables. Buyers of individual annuities are healthier and longer lived than participants in group pensions.

Figure 1: Types of Transactions and Market Evolution



Moreover, Boston University scientists recently announced the discovery of 150 genetic markers associated with extreme longevity. Sooner than many expected, insurers may need to develop ways to contain anti-selection based on consumer's knowledge of their own genetics.

LE improvement assumption. The LE improvement assumption is even more difficult to set than the base table due to the duration of guarantees. Looking back, we have seen improvements in LE from non-smoking, treatment of diseases, changes in diet and advances in medicine. Yet, over the past several decades LE improved faster than the industry expected, and recent findings suggest further improvements are likely. A 2007 British study compared population experience from seven developed countries for LE causality. While Japan is the longest-lived of the major developed countries, the study finds that residents of the island of Okinawa have even longer LE than the rest of the Japanese population despite negative lifestyle factors such as low income and a high rate of smoking. Analysis indicates that 93 percent of this difference can be explained by diet. Using simple extrapolation, if Americans did nothing more than alter their diets, life expectancies could potentially improve five or more years.

An enormous amount of data is needed to observe LE differences and isolate for causality. The Society of Actuaries is beginning to gather industry and population data from countries around the world. Once available this data should improve understanding of the differences in LE and support development of base tables and LE improvement scenarios going forward. The industry data in particular could begin to shed some light on the selection effect.

Ultimately, future longevity improvements cannot be predicted accurately by trending historical data. In general, medical advancements will likely be the primary drivers of change in LE. Improving confidence in assumptions will require analysis of current causes of death, the likelihood of cures being developed, and determining the revised LE based on the new causes of death (substitution). There is little market consensus on ultimate LE. Some believe obesity, infections, lifestyle and economics will lead to shorter LE while others believe medical advancements will lead to longer LE. Ironically, both may be right!

If you would like more information, you may contact the author at Michelle.Moloney@Transamerica.com or 704.344.2791.

The Life Insurer Advantage

Life insurers have a competitive advantage in providing longevity risk solutions because of their large blocks of business with mortality risk. Some basis risk will always exist because the lives are different and the product cash flows perform differently. But the long mortality positions held by U.S. companies provide a partial offset to unfavorable experience on the longevity side and vice-versa. This implicit hedge makes insurers natural buyers. Understanding the sensitivity of the combined blocks of business (mortality and longevity) to LE assumptions – and how this affects cash flow – will help determine the volatility and, in turn, risk appetite and capacity.

Market demand for longevity risk protection is also beginning to arise directly from consumers. Unlike in the U.K. where payout annuities have been the product of choice, U.S. consumers

Continued page 8

Longevity Swap 3rd Generation

- Locks in life expectancy
- Fraction of cost of buy-out
- Fees payable over life of the swap

Synthetic Buy-In 3rd Generation

- Combine longevity, inflation and other swaps
- Fraction of cost of buy-out
- Fees payable over life of the swaps

Useful Tools for Assessing Claims Fluctuation

As a research actuary, I sometimes am asked if the statistics used in my work have any basis in the real world. Or, in other words, how does applied statistical theory stack up against experience? A case in point is year-to-year death claims analysis – where actual claims often deviate from expected. These claims deviations can be simply the result of statistical variance about the mean, or they may indicate the need to revise expectations. To demonstrate the statistics used in determining whether a change in expected claims is warranted, we incorporate proprietary Transamerica Experience Database (TED) experience into an experiment comparing historical claims variance against theoretical predictions.

The Theory

In my series of articles on credibility theory (in the March, July and October 2008 issues of *The Messenger*) I indicated that mortality can be thought of as a binomial process, where the number of claims in any given calendar year follows a binomial distribution with an easily calculated mean and variance. The standard deviation, which is the square root of the variance, is a measure of the inherent claim count random variability. To determine the theoretical variance, we simply need the size of the population (n) and their average mortality rate (q). From these two values, we calculate the mean claim count $[n \times q]$ and the variance $[n \times q \times (1-q)]$.

For this article, we recognize another layer of complexity by considering the random variation in claim size as well as claim count. This is needed because the total dollar amount of benefit payments in any given year depends not only on how many policyholders die but also on their respective policy face amounts. Combining these two random variables produces what is called a compound Poisson distribution.

The Experiment

For this experiment, we examined mortality experience from a closed block of reinsured level premium term policies issued from 2000 through 2003. Our expected mortality basis was the Society of Actuaries 2001 Valuation Basic Table. To measure this block's actual annual mortality variance, we evaluated annual mortality experience from 2004, 2005, 2006 and 2007 as a proxy for four independent and identical mortality events. The standard deviation of the claim amounts from these four trials then could be compared to the value

predicted by the compound Poisson distribution. In order to capture as many data points as possible, we compared the

actual versus theoretical values from 38 independent client studies. Figure 1 presents the raw results from one of these studies.

Since we did not repeat the exact same mortality event four times, we adjusted claim counts and amounts to normalize for exposure and other cohort differences for the different



By David Wylde,
FSA, MAAA, CLU, ChFC
Research & Development
Actuary, Life Solutions

Figure 1

Exposure Year	Exposure Amount	Exposure Count	Total Claim Amount	Total Claim Count	Expected Claim Amount	Expected Claim Count
2004	15,770,092,806	293,222	14,480,151	364	25,514,901	517
2005	14,894,032,371	278,097	17,050,466	391	28,536,868	586
2006	14,140,963,576	265,519	16,301,047	399	31,651,927	659
2007	13,366,029,288	252,596	17,659,860	452	34,182,693	724

Actual versus expected values for a sample client study, derived from our proprietary Transamerica Experience Database (TED).

exposure years. We used exposure year changes in expected claim count and amount to normalize actual claim count and amount. The actual claim counts and amounts were adjusted by the ratio of the expected values for the given exposure year to the 2004 expected values. For example, we adjusted the 391 claims in 2005 by the factor (517/586) to arrive at the 345 claims used in the experiment.

In a compound Poisson model, we can approximate the increase in variance due to random fluctuations in average claim size by analyzing the distribution of face amounts in a closed block. The factor arrived at during this analysis is then applied to the claim amount variance calculated

from simple binomial theory. We determined this severity factor for each of our 38 studies, since each client has a unique distribution of face amounts. The factors ranged from a high of 2.46 to a low of 1.43 and averaged around 1.92.

Figure 2

Exposure Year	Adjusted Actual Claim Count	Adjusted Actual Mean Count	Adjusted Actual Claim Amount	Adjusted Actual Mean Amount	Adjusted Actual Std Dev Amount	Severity Factor	Theory Std Dev Amount
2004	364		14,480,151				
2005	345		15,244,874				
2006	313		13,140,420				
2007	323		13,181,805				
2004-07		336		14,011,812	892,751	2.3805	1,179,141

Claims data after adjustment for normalization and severity. This information allows for more accurate trend analysis and year-by-year comparisons of claims information.

Figure 2 shows one study’s final results after the normalization and severity factor processes. The adjusted actual standard deviation is simply the standard deviation of the four adjusted actual claim amounts. The theoretical standard deviation is the adjusted actual mean amount divided by the square root of the adjusted actual mean count times the square root of the severity factor.

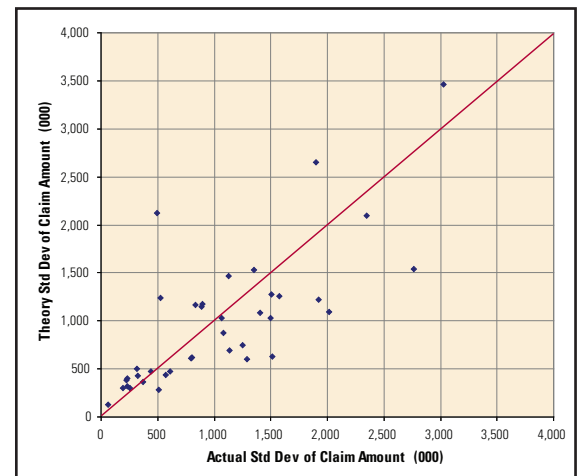
The Results

Figure 3 compares the actual versus predicted results for all 38 studies. If our predictions were absolutely perfect, all of the data points would fall along the diagonal line and would produce a correlation coefficient of 100 percent. In reality, the data shows a correlation of around 75 percent, which indicates a very strong linear relationship. In other words, we can safely use our compound Poisson model to explain how much of the annual variation in total claim payments is likely due to random chance.

Using the Model

Understanding when mortality results are outside the bounds of reasonably possible outcomes can help senior management decide when resources should be delegated to further investigation. Appropriate confidence intervals can be created around annual expected mortality experience. Then, if actual experience is outside, for example, a two standard deviation interval, we would know that there was only a five percent chance that this was due solely to random fluctuation. The need for additional research could be triggered by this threshold. ■

Figure 3



If you would like more information, you may contact the author at David.Wylde@Transamerica.com or 704.344.2816.

Underwriting Audits: Improving Results and Delivery



By Kenneth Conners

CLU, FALU, FLMI

*Vice President and Chief
Underwriting Officer*

Carriers use a number of tools to measure the performance of their underwriting shops, ranging from periodic internal reviews to using third-party consultants to audit operations. In its purest intent, the reinsurance underwriting audit is just one of these third-party reviews.

Most underwriters recognize the value that reinsurance audit feedback can provide. When concern arises, it usually is directed at the process, which has changed little since the first underwriting audit was conducted decades ago. While an audit can help an underwriting shop improve its processes and outcomes, companies may find on-site audits distracting and resource intensive. A recognized advantage of traditional audits – the personal interaction that it helps foster between direct company and reinsurer underwriters – has eroded with the growth in remote underwriting.

Giving Clients the Remote Control

Technology advances have improved underwriting effectiveness through developments such as remote underwriting, rules-based engines, and use of third-party evidence databases. We're beginning to see some of those benefits accrue to the auditing process. For instance, we have piloted a program to conduct audits remotely by capitalizing on technology. Underwriting reviewers randomly select cases to review and request access to documentation involving these cases. The key difference is that the carrier provides the documentation electronically to the reinsurer, eliminating the need to be on-site and manage physical documents.

The results of the pilot affirm that remote audits are as reliable as on-site visits, providing comparative outcomes without the time and logistical constraints of traditional on-site audits. We plan to offer this option increasingly to clients in the future.

The Future: Partnership

The audits described above are still a retrospective review of procedures, staffing and decisions. Like traditional on-site audits, remote audits occur after the policy is in force – or worse, after the contestability period has expired. While the value of audits is in identifying potential underwriting or pricing differences, some of the issues identified through the audit may be mitigated by addressing any underwriting training issues or post-issue changes in decisions.

As part of our commitment to provide increasing value-added services to our clients, Transamerica Reinsurance's Underwriting and Mortality Solutions departments have taken the next step in implementing underwriting audits. For fully underwritten business, Mortality Solutions clients use state-of-the-art technology, including rules-based engines, to capture all application data electronically, from application to issue.

We teamed with a trusted client to fully develop this next generation of audits where the client allows our underwriters to review cases in real time. The client underwriter assesses a case online, and the reinsurance auditor can review that decision as it is made. This combines the technological advances associated with remote auditing with the internal review that carriers already perform as part of their own quality assurance processes, providing a near-instantaneous review of decisions before policy issue.

The Messenger

The Messenger is produced by the Marketing Communications department of Transamerica Reinsurance. Matthew Hughes and Christian Kendrick are the editors. If you have questions or would like to be added to or removed from the mailing list for *The Messenger*, please send your inquiries with name, company name and mailing address to Matthew.Hughes@Transamerica.com or Christian.Kendrick@Transamerica.com.

Only outlier cases are flagged for audit. The underwriting auditor can provide thorough documentation to highlight areas of concern, including producer issues, areas for future training or issues involving third-party or remote underwriters. Many of these flagged cases may be resolved easily once other pertinent information is considered, while others may lead the auditor to recommend a different risk classification. In some instances we discovered that the underwriter's decision actually was more conservative than company guidelines allowed. This information has enabled the carrier to reapprove the policy with a more favorable decision, making the client's action more competitive. Equally important, this new process has helped foster more regular and open dialogue between our underwriters and the client's, leading to a stronger relationship that extends beyond just the audit.

From Analysis to Action

The real-time feedback incorporated in this format has allowed underwriters to take immediate action in reevaluating cases based on feedback from our experienced underwriters. More importantly, this new process has allowed the carrier to tailor its risk guidelines more quickly to meet expectations. Feedback on an individual case decision can be helpful, but the real value of this process is in the strategic metrics that it provides. These analytics can be used by the direct writer to examine the profitability of a book more effectively and quickly. Discrepancies between actual and assumed can be identified during this process and allow the insurer to take action necessary to ensure the business performs as expected.

Technology is the lynch pin to this partnership. It allows our underwriters to work in tandem – in real time – with our client underwriters to place better business. If you would like to learn more about how we are using underwriting technologies to make your business more profitable, please contact your account executive or regional underwriting director. ■

If you would like more information, you may contact the author at Kenneth.Conners@Transamerica.com or 704.344.7694.

How would you rate us? We want to know.

Transamerica Reinsurance
Publications Survey

Thank you for taking the time to share your thoughts with us and help us make Transamerica Reinsurance's newsletters more useful for you. The feedback you provide will help guide us in future content and delivery plans. This survey should take less than five minutes to complete. In gratitude for your participation, we will enter your name in a raffle for a [Kindle Wireless Reading Device](#) and Amazon.com gift card.

Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Articles in Transamerica Reinsurance's newsletters are thought provoking and give a fresh perspective on issues that confront my business.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I share ideas taken from the newsletters with my coworkers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate the following article topics on the basis of your interest.

	Not At All Interested	Somewhat Disinterested	Somewhat Interested	Very Interested
Actuarial - Pricing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Actuarial - Valuation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Capital Markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data Quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medical Research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Products - Acquisition/Opportunity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What's your view of *The Messenger* and *The Forecaster*? Take the survey in the latest *NewsBreak* and be entered to win a Kindle wireless reading device. You can't win if you don't participate.

If you did not receive the latest *NewsBreak* release or would like a link to the survey to be sent to you, please contact the editors at either Matthew.Hughes@Transamerica.com or Christian.Kendrick@Transamerica.com.

Longevity - The Next Growth Market (cont.)

likely will still favor variable annuities where they can retain control of their assets. However, following the financial crisis, consumers are placing greater value on guarantees including life contingent coverage. Per recent studies, about two in three participants in defined contribution plans would prefer an option to annuitize their assets.⁴ 401(k) plans have responded by introducing living benefit wrappers (riders); as of year-end 2009, 22 percent of employers offering defined contribution plans now offer annuities options, and another 10 percent are considering doing so.⁵ Introducing annuities to 401(k) plans could increase retail sales by as much as \$1 trillion.⁶ Based on what consumers are saying and what 401(k) plans are providing, demand for longevity solutions will increase quickly.

As top-line pressure increases, will life insurers be disciplined and recognize the inherent risks of these long-term agreements? In addition to longevity uncertainty, these contracts will require companies to hold long-term assets, which could complicate asset liability management. Uncertain fund values and duration in variable annuities will make asset-liability management even more difficult, and indexing can leverage risk further. Liquidity could be critical to pricing, particularly if contagion effects are considered. If negative experience emerges without provisions for adverse deviation, the present value of an assumption change over a 50-year contract will be costly. Lastly, insurers must not assume that consumers will make poor choices and lapse at inopportune times.

Demand for longevity risk solutions outstrips capacity to provide them. Market participants holding risk (pensions/specialists) are advocating new entrants to improve this trade imbalance. Two potential arenas being pursued are government and capital markets. However, governments are already financing long-term living benefits through Social Security, public pensions and health care programs. Capital markets, in addition to lacking diversification, do not support long-term illiquid assets effectively. Life insurance companies are likely the only natural buyer.

Insurance companies need to value what they bring to the table and not be blinded by the “pot of gold” that the retirement market represents. Rational pricing will benefit not only stockholders but consumers as well, because companies that get their LE assumptions right are more likely to be around in 50 years to pay the benefits. ■

Footnotes

1. “The U.S. Retirement Market, 2009”, May 6, 2010.
2. “£7.7 billion of pension scheme risk transfer deals completed in 2009, despite challenging financial landscape”, February 17, 2010.
3. “Two-Dimensional Mortality Data: Patterns and Projections”. March 19, 2007.
4. “Prudential Experts Discuss America’s Retirement Income Challenge”, April 5, 2010.
5. “More Employers Considering Annuities in 401(k) Plans, Watson Wyatt Survey Finds - December 2009”, December 17, 2009.
6. “Insurers Test Market as Obama Opens Door for 401(k)s”, February 9, 2010.



Visit our web site at www.TransamericaReinsurance.com

Main Marketing Office
Transamerica Square
401 North Tryon Street
Charlotte, North Carolina 28202
704.344.2700

Asia Pacific Head Office
58/F One Island East
18 Westlands Road
Island East, Hong Kong
852.2877.6222

Latin America Head Office
Transamerica Square
401 North Tryon Street
Charlotte, North Carolina 28202
704.344.2700

Europe Head Office
7 Place de la Defense
92974 Paris La Defense Cedex
France
33.1.49.67.81.60

The information conveyed and the views expressed in this newsletter are provided for informational purposes only and are based on opinions and interpretations made by Transamerica Reinsurance. The opinions and interpretations expressed by Transamerica Reinsurance may not be the only interpretation available. This publication should not be copied or shared with any other company, reinsurer or consultant without obtaining prior approval from Transamerica Reinsurance.

Transamerica Reinsurance, a division of Transamerica Life Insurance Company.

an  company