



Product Matters!

ISSUE 80 | JUNE 2011

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A Brief Look at the Phase 2 Experience Analysis Results From the SOA/RGA Post-Level Term Research Project

By Tim Rozar and Scott Rushing

Recently RGA completed an in-depth study looking at assumptions and experience for lapses and mortality at the end of the level premium period for level term business. This study was completed on the behalf of the SOA's Product Development Section Council and Committee on Life Insurance Research.

This study was divided into two phases:

1. The Phase 1 report¹ summarized mortality and lapse assumptions of 41 companies used for pricing and modeling level premium term products. A brief overview of the Phase 1 report was provided in the June 2010 edition of *Product Matters!*²
2. The Phase 2 report³ provided lapse and mortality experience between 2000 and 2008 for 26 companies with level term policies beyond the end of the level period. The focus of the studies was the "shock lapse" and the mortality deterioration that follows.

Both full reports are available in the Research section of www.soa.org. This article will summarize the Phase 2 report and will focus solely on the results of the 10-year level term product.

Phase 2 Lapse Study

For 10-year level term business, the study included over 200,000 duration 10 lapses occurring between policy anniversaries 2000 and 2008. The goal of the lapse study was to better understand the magnitude of the shock lapse as well as key drivers involved.

The aggregate initial shock lapse at the end of duration 10 was 61 percent with a smaller secondary shock lapse in duration 11. These results varied significantly by company, product structure, and policy attributes. For the policies with premiums jumping to an ART scale (a much more common design on new products), the initial shock lapse at the end of duration 10 was 66 percent.



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Articles Needed for the Next Issue of *Product Matters!*

While all articles are welcome, we would especially like to receive articles on topics that would be of interest to Product Development Section members based outside of the United States.

Please e-mail your articles to Christie Goodrich or Paul Fedchak by 7/19/2011.

Question to the Editor



I found your article “Is this Correction Good for Life Insurance?” in the recent issue of *Product Matters!* very interesting. My feeling is that ‘hope strategy’ you refer to is driven by more than just general optimism, but by companies’ fear of pricing themselves out of their desired competitive position. Do you have any comments on balancing the strong tensions between beginning the de-risking process ahead of the market versus maintaining a competitive product?

Product Matters! Reader

Response from Ross Zilber, author of “Is this Correction Good for Life Insurance?” published in the February 2011 issue of *Product Matters!*

Insurance distribution systems have steadily moved away from the captive channel. This move reduced distribution costs but had a profound effect on producer loyalty and cost of underwriting. Placement ratios (percent of underwritten applications that were actually placed) in the Brokerage space are in the range of 25- to 40-percent, while in the captive force it is still about 70 percent. In the brokerage channel about 30 percent of business is placed with their number one carrier. The strategy of “keeping the foot in the distribution” does not agree with the paradigm of the Brokerage channel. Just ask your loyal BGA how much your NLG sales will drop off if the product loses a competitive position.

I believe your question touches more on psychological biases. There is an interesting reading on the third CFA exam about heuristic biases by Hersh Shefrin. These psychological biases tend to stand in the way of making objective decisions. I will comment on two biases—overconfidence and loss aversion.

Overconfidence materializes when management places too much confidence in their ability to predict the future. I have dealt with predictions about interest rates in the article. But there are also predictions about inefficiency of policyholder behavior. These assumptions are usually not based on credible data, and extrapolate future policyholder behavior from the period of benign economic environment. Assuming inefficient policyholder behavior would greatly reduce value of interest rate options in the products. These assumptions provide management with the tools to show better profit and risk profiles of the product, and hence remain in the market.

Loss aversion is the reluctance to accept a loss. This should not be confused with risk aversion, as often loss aversion actually leads to taking more risk at underpriced levels. Management is often reluctant to reduce competitiveness of the product, as sales stop coming in. This usually implies that expenses need to be brought down as well, which leads to difficult decisions. There might be negative short term financial and career consequences. ■

Chairperson's Corner

By Mitch Katcher



Mitch Katcher

Greetings to All,

It has been a while since I, as chairman of the Product Development section, have had the privilege of speaking to all of you. It has been a very productive period since we last spoke. In my prior letter I discussed the section council's need to hear from the section members on your ideas, and we asked for your input on education and research that would be of greatest value to you. Based upon feedback we received from you and our own input, here are the activities we have undertaken to date:

Research

RESEARCH THE SECTION HAS INITIATED:

Market Consistent Embedded Value (MCEV)—It is becoming ever prevalent and is not well understood by many on how it compares to other profit measures many are accustomed to using. This research will include case studies on three types of annuities and three types of life products along with discussing many other issues like assumptions and surplus impacts. *(Sponsors are the Product Development Section and the Committee on Life Insurance Research (CLIR))*

Premium Persistency—We are reviewing bids to select the researcher for the study. This research examines premium persistency assumptions companies are using for their flexible premium UL products. The project will also gauge companies' willingness to participate in a full data study. *(Sponsors are Product Development and Financial Reporting Sections)*

RESEARCH THE SECTION IS COSPONSORING:

Implications of Perceptions of Post Retirement Risks—This study examines the impact of public perceptions on post-retirement risks to life insurance, product development, and marketing strategies. *(Sponsors are the CLIR and the Product Development Section)*

Mortality Improvement in the United States and Internationally—This project examines historical life insurance and annuity policyholder mortality improvement trends and/or mortality improvement rates and how they compare to that of the general United States and international populations. *(Sponsors are Reinsurance, Product Development, and Financial Reporting Sections and CLIR)*

2011 Living to 100 Call For Papers and Research Symposium—The Product Development Section was a sponsor of this fourth international research symposium held Jan. 5–7, 2011 that brought together actuaries, demographers, physicians, gerontologists, and others to discuss advanced age survival and its implications to social, financial, retirement, and health care systems. Approximately 35 papers were presented on such topics as mortality modeling, measurement and trends, obesity, and other factors that may affect mortality, mortality compression, predictors of exceptional longevity, and slowing the aging process. In this issue there is a more detailed article about this symposium from Douglas Doll. *(Sponsors are International, Long-term Care, Pension, Product Development, and Reinsurance Sections and the Committee on Knowledge Extension Research)*

New Medical Markers—The purpose of this project is to systematically identify laboratory tests that are not currently widely used in the life insurance industry but could have a potential use in the underwriting process. *(Sponsors are Reinsurance, Product Development, Committee on Life Insurance Research, Association of Home Office Underwriters and the Canadian Institute of Underwriters)*

Stochastic Modeling Efficiency—In collaboration with the Academy's Modeling Efficiency Work Group, this study investigates various modeling efficiency methods as they might be applied to the required stochastic modeling

under a principle-based framework for determining reserves and capital. (*Sponsors are Financial Reporting and Product Development Sections and CLIR*)

Webinars

The PD section sponsored a webinar on **April 20** titled **Economic Cost of Obesity**. This webinar was a review of the Society of Actuaries study, *Obesity and its Relation to Mortality and Morbidity Costs*. This study was released earlier this year and received national media attention. While much research has been conducted on obesity, the SOA study looked at the economic costs of increased need for medical care, and loss of economic productivity resulting from excess mortality and disability. Lead researchers for the study, Don Behan and Sam Cox, presented the results of the study.

The PD section is in the process of planning two additional webinars that will occur in 2011.

Life and Annuity Symposium

Sessions—The Product Development Section sponsored seven sessions in the Product Track, five of which were repeated in an additional time slot. The Product Development Section also co-sponsored five other sessions in the Product Track, one of which was repeated. The Section developed these sessions by taking the survey input received from you last year along with a review of the attendance at all of the sessions sponsored and co-sponsored by the Product Development Section at last year's Life & Annuity Symposium and SOA Annual Meeting to determine the sessions that would be most interesting to you.

Breakfast Speaker—The topic was **Innovation is the Name of the Game in Product Development. Bringing New Ideas to the Table May Not Be Easy**. We were very excited to have Dr. Cherie Courseault Trumbach from the University of New Orleans discuss an accelerated innovation approach utilized in technology industries. This approach is based on incorporating external information sources into the innovation process. I can't help but editorialize here. I love speakers who are passionate and knowledgeable enough about their subject that when asked how much time they need the response is, "I can speak for as long as you give me!"

The "Day After" Seminar—The seminar was called, "**Insights into the Pricing of Policyholder-Related Assumptions**." Industry experts from many types of firms (consultants, insurers, LIMRA, SOA) shared their knowledge about how policyholder-related assumptions are evaluated and set, including mortality, lapsation, partial withdrawals, funding patterns, and more. Speakers provided up-to-date experiences and techniques, including some views on how the financial crisis impacted us all, and the impact of today's historically low interest rate environment.

Product Development Newsletter

Letters to the Editor—We received our first letter to the editor. Again I must editorialize. I am surprised that more of us do not take advantage of this forum. It is a venue to speak to what sessions you liked and didn't, what articles you liked and didn't, learn more about the subject by asking the presenter or author additional questions or share your own experience with respect to a topic. It is also a great venue to give us additional feedback on the types of research and session you would like to see in the future if we are missing the mark.

So, as I look back upon everything we have accomplished this year to date and plan to do for the rest of the year, I have to thank the members of the Product Development section for all of their efforts. This is a real working section! In addition, I want to thank section members who have reached out to us to give us input or support our efforts.

CONTINUED ON **PAGE 6**

And to those section members who do not fall into either group above, you would be surprised how rewarding and fulfilling getting involved is. We still value you!

Upcoming Elections

It seems like just yesterday but it is time for us to start recruiting new candidates to run for the Product Development section. Here are a few key dates:

- Candidate bios are due July 1 (SOA staff will work directly with the candidates on this)
- Voting will be open from August 8 – September 2

Please take this opportunity to get engaged and help mold the future of the section. There is time and effort that is required. But nowhere near the amount might you otherwise think due to the outstanding support we get from the staff of the SOA.

It is our goal to make the committee as relevant to you as ever. We do not need a lot from you, but to succeed we do need your engagement.

Please feel free to contact me anytime with your thoughts or suggestions to help us build an even more relevant Product Development section or if you are interested in running for the council. I look forward to receiving your e-mails and to seeing and talking to you at the upcoming Life & Annuity Symposium.

In closing, I want to thank you all for the opportunity to serve you. I'm looking forward to hearing from you and also what promises to be a very interesting and impactful rest of the year! ▣

Best Regards,
Mitch Katcher

SOA '11 ELECTIONS!

Mark your calendar and let your voice be heard!



CALLING ALL ELIGIBLE VOTERS

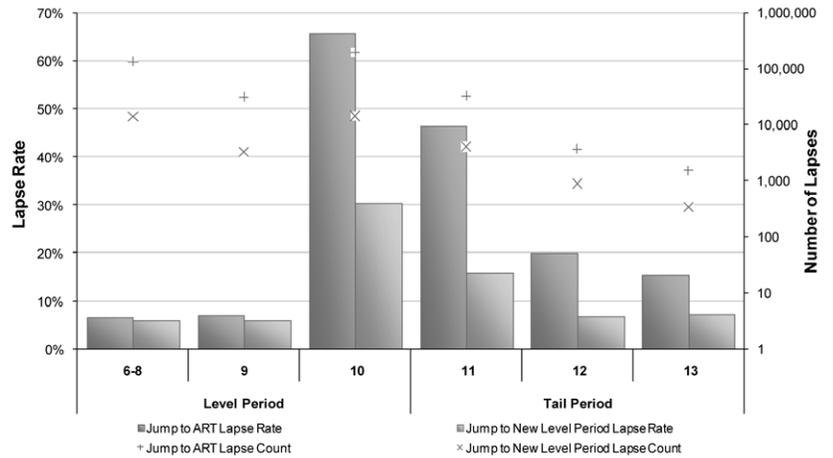
This year, elections open **August 8** and will close **September 2 at noon Central time**. Complete election information can be found at www.soa.org/elections. Any election questions can be sent to elections@soa.org.



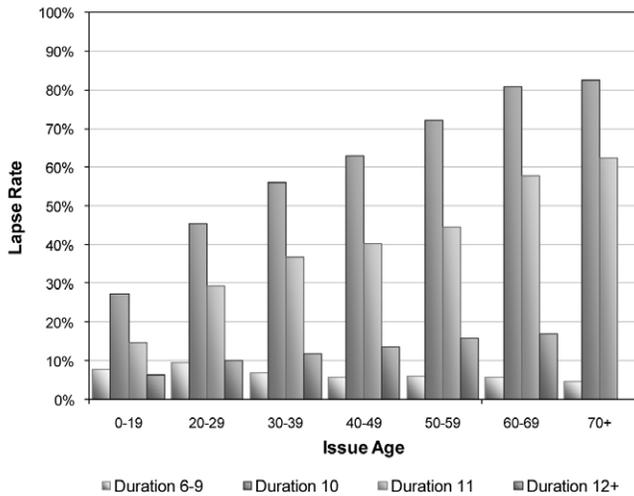
Highlights of the 10-year level term lapse study results include:

- By Issue Age—the shock lapse increased substantially as issue age increases.
- By Premium Structure—the shock lapses were much larger when the level period rates transitioned to an ART scale rather than to a new level period, although it is unclear whether this is driven by the product structure or by other company-specific dynamics.
- By Premium Jump—the larger the premium jump ratio (the duration per \$1000 premium rate divided by the level period premium per \$1000 rate), the higher the lapse rate. This factor proved to be a significant driver of shock lapses.
- By Premium Mode—the shock lapse was smaller as the frequency of premium payments increased.
- Lapse Skewness—the distribution of lapses throughout the policy year was drastically different for duration 11 than it was during the level period. The paper further points out differences by premium mode.

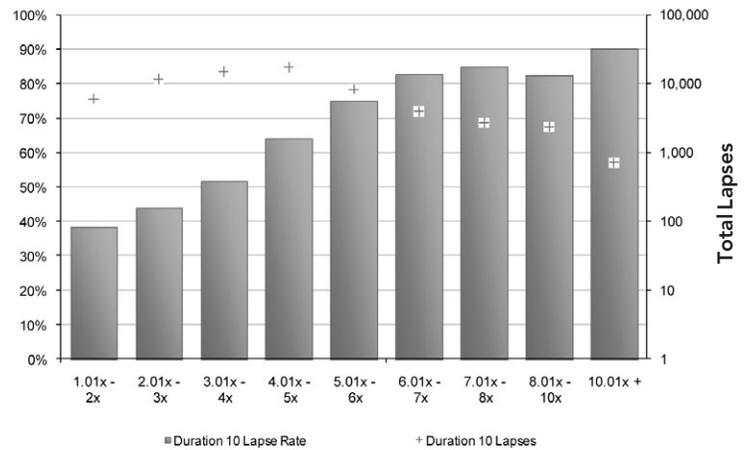
T10 Lapse Rates by Duration and Tail Period Premium Structure



T10 Lapse Rates by Issue Age

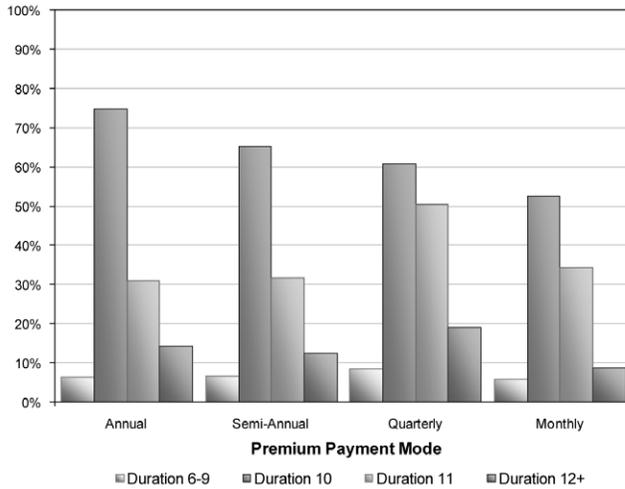


T10 Duration 10 Lapse Rate by Premium Jump Ratio

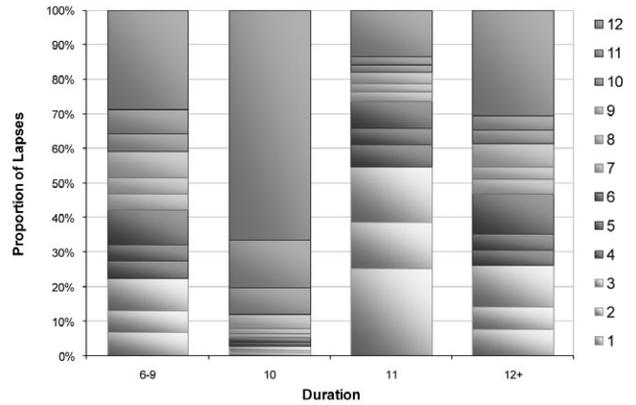


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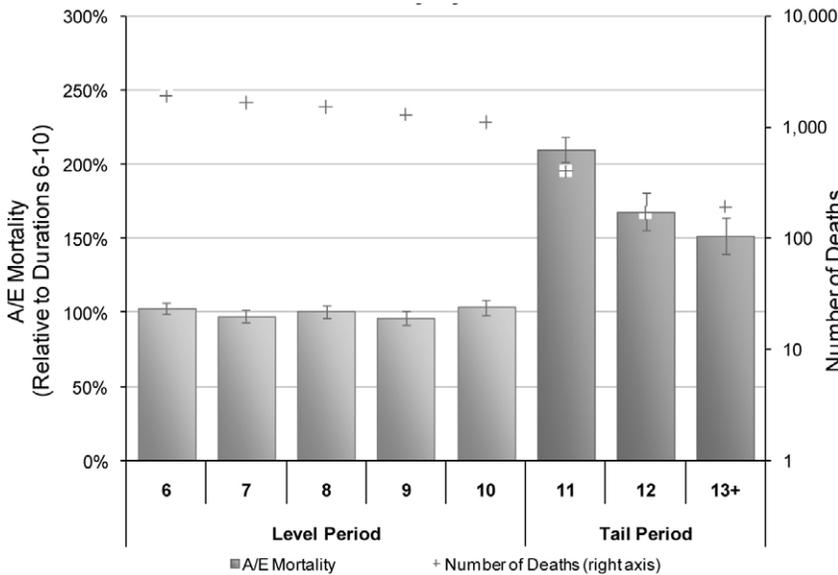
T10 Lapse Rates by Premium Payment Mode



**T10: Lapse Skewness by Month
Companies without Grace Period Adjustments**



T10 Mortality by Duration



Phase 2 Mortality Study

The mortality study results were based on seriatim calendar year experience from 2000 to 2008. The goal of this mortality study was to quantify the mortality deterioration due to the large shock lapse and to better identify a few key drivers of post-level period mortality. The results of the study were calculated on a few different industry mortality tables, but the main focus was on “relative” ratios, which expresses the post-level period mortality as a percentage of the level period results for durations six–10, using 2008 VBT as the basis for calculations. For 10-year level term business, the study included nearly 800 deaths beyond the level period.

For all 10-year level term business, the mortality beyond duration 10 was 182 percent of the level period mortality. The aggregate duration 11 results were 210 percent of the level period, but the median company result was 275 percent of the level period. For the policies with premiums jumping to an ART scale, the mortality beyond duration 10 was 230 percent of the level period and duration 11 was 257 percent of the level period. There was much less anti-selective behavior demonstrated for policies with premiums jumping to a new level period.

Highlights of the 10-year post-level period mortality study for the “jump to ART scale” products include:

- By Issue Age—while the level period mortality was a fairly level percentage of 2008 VBT, the results beyond the level period increased slightly by issue age.
- By Premium Jump—post-level period mortality increased as premium jump ratio increases.
- By Gender—mortality deterioration beyond the level period was slightly higher for males.
- By Cause of Death—the overall rate of cancer increased beyond the level period, suggesting anti-selective persistency.

Phase 2 Experience Compared to Phase 1 Assumption Survey

The experience studies covered in the Phase 2 study focus on products issued more than 10 years ago. The assumption survey from Phase 1 highlighted term products issued at the end of 2008. It is important to understand this disconnect when comparing the results of the two phases, especially as it relates to the size of the premium jump at the end of the level period.

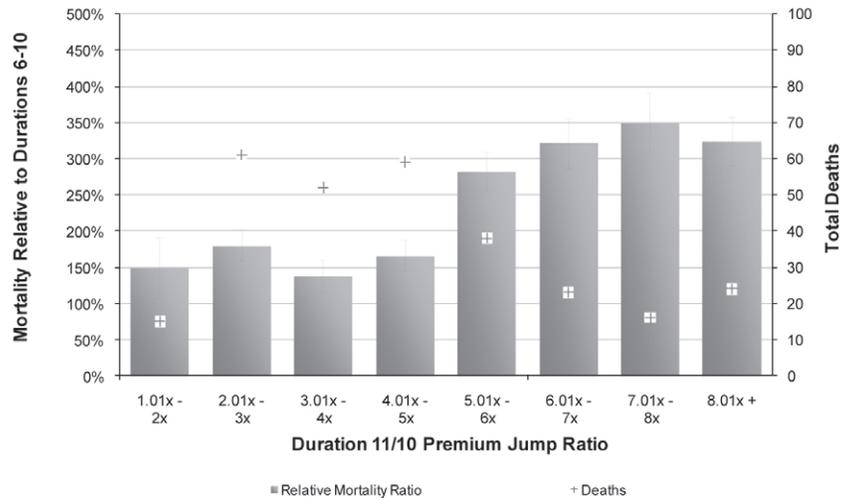
The average T10 shock lapse from the Phase 1 assumption survey was reported to be quite a bit higher than observed results in the Phase 2 experience analysis. This is consistent with the higher premium jumps on more recently issued products.

The most significant difference between the Phase 1 assumptions and the Phase 2 experience results was the shape of the shock lapse by issue age. Most company responses did not directly vary pricing assumptions by issue age, while the experience study results showed a significant increase in shock lapse rates by issue age.

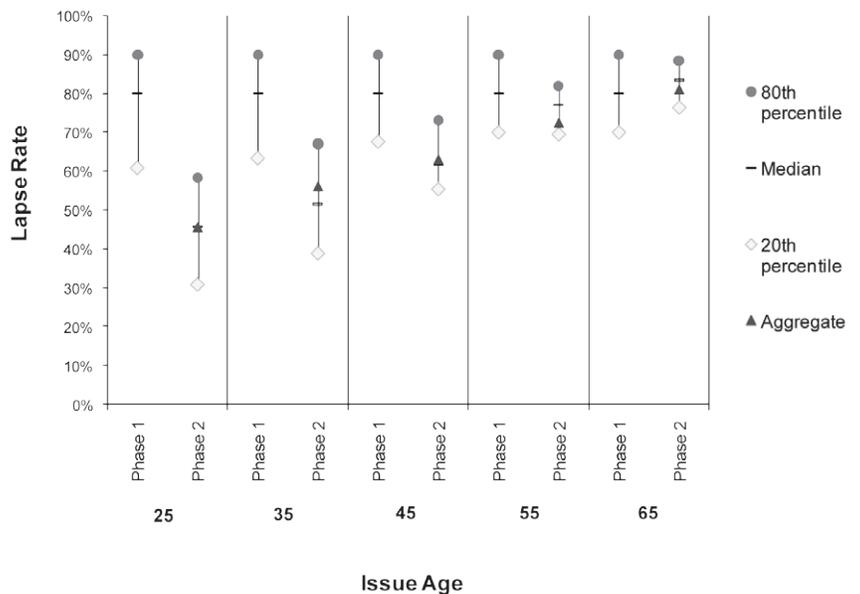
The median level of mortality deterioration was higher in the Phase 2 experience study than in the Phase 1 assumption survey, although a small number of larger companies experienced lower mortality deterioration than the median.

Both the Phase 1 assumption survey and the Phase 2 experience results showed a generally positive correlation between the size of the shock lapse and the level of mortality deterioration that followed. These relationships are

T10 Jump Art
Post-Level Mortality relative to Level Period
by Premium Jump Ratio



T10 Duration 10 Lapse By Issue Age Phase 1 vs. Phase 2



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illustrated in the following graph which plots the duration 10 shock lapse on the x-axis and the 2008 VBT mortality ratio for durations 11+ on the y-axis. In general, it appears that for a given level of shock lapse, the average Phase 2 mortality deterioration experience is higher than the corresponding Phase 1 pricing assumptions.

Shock Lapse Model

The shock lapse at the end of the level period is influenced by several factors, many of which are correlated. For this reason, the paper concludes with a simple logistic regression model in an effort to identify the key drivers of the shock lapse. The models presented in the paper suggest that variables issue age, premium jump and premium mode are among the most important factors identified of the ones used in this study.

Conclusion

Assumptions surrounding the policyholder behavior at the end of the level period have proven very important to

the development of level term insurance products. Only recently have companies been able to support these assumptions with credible experience. The Phase 2 report provides an important industry benchmark of the experience results for term shock lapse rates and mortality rates beyond the level premium period which should support the development of future level-term products.

We'd like to express our sincere thanks to the SOA, the PD Section, volunteers on the Project Oversight Group, RGA and all participating companies for their support of this research project. □

END NOTES

- ¹ The full Phase 1 report is located at: <http://www.soa.org/files/pdf/research-2009-post-level.pdf>
- ² The June 2010 Product Matters article is located at: <http://www.soa.org/library/newsletters/product-development-news/2010/june/pro-2010-iss77.pdf>
- ³ The full Phase 2 report is located at: <http://www.soa.org/files/pdf/research-shock-lapse-report.pdf>



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Don't Be Left Behind!

SOA Members

Have you attested compliance with the SOA CPD Requirement? As of March 1, if you have not attested your status is now listed as "Pending" in the SOA directory.

THERE ARE THREE EASY STEPS:

- 1.** Log on to the SOA membership directory and click the SOA CPD Requirements button on the main page.
- 2.** Indicate whether you have met the SOA CPD Requirement.
- 3.** Identify which method of compliance was used.

You must attest or be considered non-compliant. Go to SOA.org/attestation for more information.



2011 Living to 100 Symposium—A Product Development Attendee’s Notes

By Douglas Doll

I had not attended prior Living to 100 Symposiums, but the meeting content always looked interesting, so I accepted an opportunity to speak at a session at this year’s symposium last January in Orlando. This article is based on my notes from sessions that I attended, with a focus on possible applicability to life and annuity product mortality assumptions. I did not attend all sessions, because some time slots had concurrent sessions, and I missed the final morning.

Overview

This is the fourth version of this symposium, which has been held every three years. The main sponsor is the SOA research committees and sections including the Product Development Section, but many organizations support this event. In fact, there were about 50 other actuarial and other organizations from around the world involved. The participating organizations help promote the event while sponsors help fund it. The Platinum sponsors this year were Milliman, Hannover Life Re and The Actuarial Foundation. Other sponsors included Munich Re, SCOR, Swiss Re, Gen Re and Optimum Re. Numerous funding sponsors means high quality breakfasts and breaks (one with ice cream!).

There were just more than 150 attendees—a mix of academics and actuaries. The actuaries included a number of pension actuaries. There were a lot of attendees from reinsurers. And, there were many countries represented.

Most of the sessions are based on pre-submitted research papers, with authors presenting the papers and then someone discussing the papers/presentation. There were also some sessions with presentations not associated with papers.

Handouts and Papers

The following links take you to: 1) Monographs of papers and discussions, and 2) The presentation slides.

<http://livingto100.soa.org/monographs.aspx>

<http://livingto100.soa.org/sym-presentations.aspx>

A few sponsors had displays with interesting literature. Here are two articles I think are worth quoting from:

- 1) A Swiss Re article “Ageing & Longevity,” dated March 2009 [see www.swissre.com/library, and search for risk dialogue magazine compendium], has a good summary of current state of longevity views and research into aging. I quote liberally:
 - “Criticisms of demographers by other demographers generally consist of accusations that trends observed in the recent past have been extrapolated unjustifiably into the future.”
 - “Pessimists postulate that human life cannot be extended beyond a soft limit (120-125 years). Optimists state that contrary to general expectation, human life expectancy has not bumped into a ceiling but continues to increase by about two years per decade. [I note that life expectancy and life span limits are two different things, and you can continue to improve life expectancy without increasing the limit. However, at some point you bump up against the maximum life span which is called “compression of mortality”.]”
 - “Most pessimistic demographers come from the United States. ... Prominent U.S. demographers predict that life expectancy ... will level off or decline ... as a result of obesity. ... Another important factor ... might be a widening gradient of socio-economic status. ...”
 - “The optimistic camp of demographers, mostly from Europe, are critics of the continuing belief in imminent limits of life expectancy. ... If current life expectancy were close to a maximum, then the increase ... should be slowing, which is not the case. ... The question remains whether biological sciences can free us from upper limits of human lifespan.
 - (After describing several research areas with potential to reduce aging) “There is no scientific reason against a possible cure for ageing, similar to what we try to do for cancer and chronic disease. However our current understanding of basic ageing mechanisms is still incomplete and makes it impossible to know whether indefinite postponement of ageing is feasible.”



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- 2) A position paper from the CRO Forum on Longevity. [See www.croforum.org/publication/eri_longevity.] This succinctly states the limited lifespan vs. non-limited lifespan arguments, and concludes that, “there remains, nonetheless, significant uncertainty on mortality on shorter timeframes which will affect current pensioner populations.” The bulk of this paper describes mortality modeling techniques and risk mitigation solutions. Regarding recent efforts to create longevity hedges, it says: “Defined benefit pension plans, insurers, and prospective capital markets investors in all markets currently have substantially differing views on future mortality improvement trends ... current capital markets models of longevity risk tend to incorporate spreads which are considerably higher than the levels at which insurers are carrying solvency capital. As a result, there has been a general failure for longevity risk transactions to clear in capital markets.”

General Session I: “Recent Advances in Slowing Aging in Mammals and What This Means for Humans”

Steven Austad described testing different diet and drug affects on animals (mostly mice). He noted that restricted calorie diets have lengthened life spans of rats, but that this is not practical for humans. However, there is a group of people that practice this, the Calorie Restriction Organization. More promising is a drug called rapamycin, an immunosuppressant drug that is already being used on humans for certain cancer and transplant treatments, and which has significantly increased mouse life spans. Next test for this is on monkeys. He predicted a medical impact from this or other drugs on human aging as soon as 10 years.

Concurrent Session 1B: Mortality Compression

Mortality compression is what we life actuaries generally refer to as the “squaring” of the survival curve. The probability of surviving to, say, age 80 or 90, continues to increase and is becoming quite high, but the survival curve then drops off rapidly thereafter. A lot of this session was devoted to discussing additional measurements for mortality and the dispersal of mortality. Actuaries are familiar with life expectancy,

but other measurements discussed included the modal age at death, standard deviation of age at death above the mode, the Lorenz Curve and the Gini Index. Based on applying these measures to different countries’ mortality statistics, they concluded that, yes, mortality compression is occurring. I don’t see how these measures are directly applicable for product development. In the Q&A for another session, an audience member lamented that too many of the speakers used these statistical measurements or even just used life expectancy, whereas using mortality ratios or differences in mortality rates would be a lot more useful/illuminating. I agree with this comment.

Concurrent Session 2A: Effects of Obesity and Other Controllable Factors on Survival

One paper concluded that active elderly have lower mortality—not unexpected. Sam Gutterman’s paper gives a nice overview of the obesity trend in the United States and potential impact. There was also a paper on impact of obesity on the long-term care population.

Conclusions on obesity:

- Current obesity in elderly (over age 65) is associated with large increases in diabetes, but substantial decreases in mortality (increased resources of body to fight attacks).
- Obesity at age 50 is associated with large increases in diabetes and disability, but non-significant increases in mortality among elderly.
- It remains to be seen what effect childhood obesity will have on mortality.
- Of course, there is obesity (BMI>30) and there is extreme obesity (which is a small part of total, but growing rapidly).

As an aside, the SOA just came out with a research paper on obesity:

<http://www.soa.org/research/research-projects/life-insurance/research-obesity-relation-mortality.aspx>

This paper seems to show consistently higher mortality for obesity, except for merely overweight persons over age 60.

Concurrent Session 3A: Comparison of U.S., U.K. and Canadian Annuity Mortality Tables and Studies

This is the session for which I was one of the speakers. It wasn't really a comparison. The three speakers talked about annuity mortality tables in their own countries. I talked about the Academy of Actuaries' development of a new 2012 individual payout annuity basic and valuation table, which was recommended to the NAIC at their March meeting. The basic 2012 table was derived from the SOA's 2000–2004 individual payout annuity experience study, projected to 2012. A future improvement scale was developed, based primarily on historical population improvement rates. The tentative name for this is Scale G2, since it replaces Scale G used to develop the 2000 table (50 percent of Scale G was used for females). A comparison of Scale G2 to Scale G and to Scale AA (used for group annuities) is shown below:

Sex/Age	Annual Improvement Rates		
Male	Scale G2	Scale G	Scale AA
45	1.0%	1.8%	1.3%
55	1.3%	1.6%	1.9%
65	1.5%	1.6%	1.4%
75	1.5%	1.2%	1.4%
85	1.1%	1.2%	0.7%
95	0.4%	1.0%	0.2%
Female		50% G	
45	1.0%	1.0%	1.6%
55	1.2%	0.9%	0.8%
65	1.3%	0.9%	0.5%
75	1.3%	0.8%	0.8%
85	1.0%	0.8%	0.6%
95	0.4%	0.6%	0.2%

Bob Howard and Nick Dumbreck spoke about annuity tables, with a focus on mortality improvement rates, for Canada and the U.K., respectively.

General Session II—The New Retirement: Phased Retirement and Phases of Retirement—Adopting to Longer Lives and Different Support Systems

This was an informal session, mostly about changes in working as you get older.

General Session III—Slowing the Aging Process

This had three different presentations:

- Rob Brown, Andrew MacKenzie and Steven Prus researched various determinates of loss of good health in Canada. Interesting items include: above age 65, never married and divorced persons had better results than married persons (this is reversed at younger ages). The same pattern held for those with low vs. high social support (but lower social involvement at higher ages had higher risk). And, regular alcohol drinkers had the lowest risk at all ages. (Sounds good for me. Suggestion: next year, serve red wine instead of ice cream at the break.)
- Leonard Hayflick gave his views on why we are unlikely to be able to slow aging—one being the aging process is inherent in our genes. We can increase life expectancy up to a limit, but the limit is unchanged. He then went on to argue that slowing aging would not be a good thing, anyway. He noted that we actually are spending quite little on researching the aging process. Factoid: half of the National Institute on Aging (NIA) budget is spent on studying Alzheimer's disease, the resolution of which would add only 19 days to life expectancy.
- Jay Olshansky spoke about a paper that is now under review, so was not yet available to attendees. The title is "Two Americas at the Dawn of the Aging Society: Health Disparities, Race and Education." He noted that there are large differences in health between those with some college and those with less but that this difference goes to zero at high attained ages. I will be interested in seeing this when it comes out, as it may help in developing mortality assumptions at high ages.

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General Session IV—Predictors of Exceptional Longevity

Some results of research on centenarians:

- Centenarians in Quebec: both siblings and spouses of centenarians live longer than the general population. Siblings living longer suggests an effect of genetics and/or childhood environment on longevity. Spouses living longer suggests an effect of adult environment on longevity.
- Early life predictors of exceptional longevity in the United States: study of centenarians' families suggests that having a younger mother increases longevity, and being born in September or November increases your longevity.
- Increasing genetic contribution to exceptional longevity with increasing age: Genetic research among centenarians has indicated a correlation with certain "good" genes. This correlation is stronger with super-centenarians (those who have obtained age 110).

Concurrent Session 4B: Mortality Analysis and Trends

- Mortality Improvement in the United States: Analysis, Projections and Extreme Scenarios. Joseph Lu used population data for 1995–2006 and different modeling techniques. He concluded that Projection Scale AA is inadequate overall, i.e., his projected improvement rates in some cases are significantly larger than Scale AA rates. I think this is caused by the limited number of data years chosen. Some of his models apparently projected accelerated future improvement based on higher improvement rates in the 2000s vs. the 1990s.

“Genetic research among centenarians has indicated a correlation with certain “good” genes. ... ”

- Recent Adult Mortality Trends in Canada, the United States and Other Low Mortality Countries. To me, the most interesting part of this presentation by Nadine Ouellette was the discussion about smoothing mortality with P-Splines. The charts before and after smoothing were quite impressive, especially 3-D maps of improvement by time and by age. The results of the smoothing applied to the data concentrated on modal age at death and standard deviation above the mode, which are two statistics that do not readily translate to product development mortality assumptions.
- Mortality Experience of Three Populations. This paper includes life settlement mortality experience. Vincent Granieri, of 21st Services, studied three population groups: 1) Medicare recipients, 2) 21st Services' database of 77,000 life settlements, and 3) 2008 VBT mortality table.
 - He limited the study to lives age 70+, so that they could identify five years of medical records from the Medicare recipients (which begin at age 65).
 - I think the settlement data included both impaired and standard lives.
 - Survival curves were calculated. For this purpose, both the Medicare data and the 2008 VBT mortality were converted to match the age and gender mix of the life settlement data.
 - There is a huge difference in mortality in the early years. Eyeballing the graph, during the first three years, the settlement mortality is nearly 200 percent of 2008 VBT and the Medicare mortality is more than 300 percent of 2008 VBT. Of course, the 2008 VBT table represents fully underwritten select mortality.
 - After six years, the differences in mortality are very much less, and after eight years the differences are almost zero.
 - He also divided the Medicare data into 10 groups based on income levels of zip codes. Defining “life expectancy” as time to 30 percent deaths, the difference in months between income levels decreases as attained age increases - does this mean that the correlation of mortality with income wears off at older ages? However, it

appears to me that the ratios of life expectancies between income levels remain similar as attained age increases.

- He concludes that some of the difference between settlement mortality and Medicare mortality is wealth effect and the rest is antiselection. He also concludes that 2008 VBT mortality is representative of settlement mortality for durations 10+.

General Session V—Factors Affecting Mortality

- Is Raising the Age of Eligibility Fair to All? This question regards whether raising the starting age of social security is actuarially fair to all, where the presenter defines “actuarially fair” as equal percentage change in value of benefits. He compared values using New Zealand mortality for Maori and non-Maori groups.
- Patterns of Aging-Related Changes on the Way to 100: An Approach to Studying Aging, Mortality and Longevity from Longitudinal Data. Longitudinal data is data captured over a long period of time, such as the Framingham study, which has been following a group of lives over 50 years. The main point of this paper is that worthwhile information about mortality can be captured by looking at characteristics such as blood pressure over time, in addition to snapshots at single points in time, which is what today’s underwriting does.

As previously noted, there were a number of sessions that I did not attend

A few sessions whose papers may be of interest to product development actuaries are as follows:

Concurrent Session 1A: Long-Term Care. One of the papers, “The Relationship between Cognitive Impairment and Mortality Rates among Long-Term Care Insurance Applicants” could be of interest for both long-term care and life insurance mortality assumption setting.

Concurrent Session 2B: Mortality Modeling I—Modified Lee-Carter Methods; and Concurrent Session 3B: Mortality Modeling II—Other Methods. These two sessions covered different models for projecting future mortality improvement rates. They typically parameterize using historical data, and so assume continuation of past patterns, which is a critical assumption. (Another critical factor being which years’ historical data is used.)

Concurrent Session 5B: Mortality Measurement. One presentation addresses issues with data for measuring mortality rates above age 100. Another discussed credibility issues with data, and smoothing results among different ages. The third also addressed mortality above ages 100 and suggested methods for deriving the underlying curve. Papers one and two both addressed the oddity that U.S. mortality rates flatten out above age 100—the argument is that this is due to errors in age reporting.

Summary

Work remains to translate results from academic studies into mortality metrics that are easily usable by product development actuaries. Product development actuaries must be aware of the leading research as it does have implications into the pricing assumptions, so this research should be further analyzed. The industry should seek to discover more about mortality improvement differences by socioeconomic class, as this has obvious implications for insurance products.

My main takeaway from the symposium is that the debate continues as to whether there is a significant chance of finding a way, over the near- or medium-term, to slow the aging process. I lean towards the speaker who said we can continue to mitigate the **effects** of aging, but aging will continue nevertheless, with the inevitable result of major organ failure. But, many speakers disagreed with him. Regardless, while we may not change the aging process, I expect to see continued decrease in mortality rates. ▣

Market-Consistent Pricing as the Market (Sort of) Normalizes

Separating the permanent from the temporary grayness Part 2 of 2

By Eric Clapprood



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In Part 1, we discussed the following:

- There are gray pixels in the area of market consistency that make insurance products particularly difficult to fair value.
- There will, theoretically, always be a consumer market that outstretches the horizon of the liquid, observable traded market.
- For the next 20 years, it will be impossible for global insurers to avoid conflicts among regulators and between regulators and market consistency.
- As promised this follow-up article will address the issues of short-term volatility, the non-equivalency of traders and, most importantly, how product development is being impacted by market consistency.

Short-term volatility and acute market metrics in the insurance industry

“Sometimes,” says one insurance executive, “I wish the market would just stay still for a while so we could figure it out.” He quickly adds, “but then, this business would be easy.”

Life insurance is a long-term business dealing with the reality of short-term volatility. These two concepts collide at the intersection of procyclicality and mean reversion. When things are going well (stocks are rising moderately, interest rates are moderate to high, credit spread are not so low as to limit yield but not so high as to stall liquidity and give a reflection of market panic, etc.), Economic Capital (EC) is very low for many life and annuity products; yet, after a downturn, after suffering losses (sometimes “accounting” only, e.g., reserves; and other times cash-based), additional capital can be sky-high, reflecting the chance of a “crash after a crash.” Two phenomena are occurring. One is the disappearance of liquid markets, credit and transparency. The other is the absorption of capital for its intended purpose, a market tail event, followed by an EC “requirement” that capital be held for another crash on top of the first one, or, in many cases, an unprecedented ignorance of mean reversion by the economy. Consider what happened in the 2008–09 crisis, for instance, with long-dated guarantees. We’ll take a

hypothetical 20-year GMAB as an example, because it is simple to price with a Black-Scholes model but generally too long to purchase liquid puts with which to hedge. We’ll use simplified modeling and assume that the product is 100 percent invested in the S&P, for the sake of illustration, which would result in a cost for the product higher than that seen in the marketplace otherwise, based on the concentration of risk. We’ll assume a 1 percent annual lapse rate, which translates to an ultimate persistency of 82 percent. (We’ll avoid dynamic lapses in the modeling, but comment later on their complexity.)

We’ll look at a two-year cycle that begins with a period (similar to that of early 2008), experiences a bad year (that lands in a position similar to that of early 2009), and then sees a two-year recovery (ending with conditions similar to those of early 2011). (Note that we are using “similar” conditions but not claiming to have exact measurements of where a firm, for instance, might label 20-year volatility. Actual assumed market levels shown below are similar to those of the time periods mentioned.)

Thus, we assume that, as shown below, the S&P starts at 1,390, crashes by almost 40 percent to 872 and then recovers to 1,304; the 20-year swap rate goes from 4.85 percent down over a point to 3.68 percent and almost fully recovers; and the 20-year vol (estimated by the five- to 10-year vols in the marketplace extrapolated) does a round trip from 25 percent to 40 percent and back again:

Point in Time	SPX	20y Swap	20y Vol
Time 0 (Sale)	1,390	4.85%	25.00%
End of 1st year	872	3.68%	40.00%
End of 3rd year	1,304	4.78%	25.00%

Priced at issue, the fair value of the charge is just about 30 bps. To those familiar with the marketplace, where GMXBs invested less than 100 percent in equities and priced in the 50–80 bp range have been criticized as underpriced, this might seem low for a 100 percent S&P 500 product. This is due to three reasons.

1) Excluding dynamic lapses. The story we will show here is exacerbated when including dynamic lapses, which—whether the assumption is right or not—wreak havoc on the perceived notion of the put the firm is short. The debate around dynamic lapses will continue for quite some time, but can be summarized as that between the camp that says, “it makes no sense to assume that no customers who were otherwise going to lapse will change their mind when the option becomes more valuable,” and that which says, “the evidence shows that those making efficient decisions consistent with dynamic lapse formulas are offset by those who, in a downturn, need access to liquidity; and this is supported by the results of the 2008–09 crisis.” We won’t resolve the dynamic lapse debate here but note two key takeaways. First, more work needs to be done identifying the efficient customers versus the inefficient ones (and this is progressing in the industry to some extent); and, second, it is essential to realize that being conservative regarding a given liability value at a point in time is not necessarily desirable if that position is being hedged: The amount lost due to overly conservative assumptions when the market improves is the same as the amount lost due to overly aggressive assumptions when the market worsens.

2) Ignoring the problems with dynamically hedging the risk. This is a much more complex subject that hedging experts can dedicate day-long sessions to, but the essence here is that if the “risk-neutral claims cost” of a product is X, and it is hard to hedge (that is, it must be hedged dynamically because a perfect offset at issue does not exist) then the expected hedge cost will be greater than X. This is, in simple terms, due to the asymmetry of options.

3) Not taking statutory or economic capital into consideration. While, as we pointed out in Part 1,



statutory (AG43 reserves and C3 Phase II capital) and EC approaches are divergent, they have similar impacts on fair value accounting. Each is based on a subjective shock, and that shock does not become less onerous after a first shock. While considered to be market-consistent, EC is actually a hybrid, as it looks at the change in market-consistent pricing over the course of a real-world, subjective tail event. The EC component of this product is what we’ll focus on next.

Let’s take a look at the EC requirement of just the liability side of this equation, keeping in mind that this example is illustrative quantitatively of other, more complex and longer-dated life and annuity instruments that either cannot be hedged or can be hedged only with short-term, dynamic programs that easily “fall apart” during a dislocation event like that of the 2008 crisis. For simplistic modeling purposes we’ll assume that a 99.5 percent event is represented by a 40 percent equity drop, a 1 percent rate drop and a 10 percent vol rise. In these calculations, we presume an appropriately-priced product at issue that is therefore collecting 30 bps.

For \$1 billion of sales, at issue, about \$54 million is the level of expected fees at issue and the fair value of the

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liability at issue. On a GAAP SFAS157 basis therefore, these two figures offset and the reserve is zero. On an EC basis, however, about \$167 million in capital would be allocated to this product due to the chance that the market crashes.

After the crash indicated a year later, the fair value reserve would be around \$201 million, representing a present value of \$232 million in liability less \$32 million in fees. In other words, this “ate through” the capital allocated to it and then some (an additional \$34 million more than the \$167 million set aside). This is now the new GAAP and fair value “reserve.” Capital, however, assumes the S&P falls from 872 to 523 (another 40 percent drop), the 20-year rate falls to 2.68 percent and the 20-year vol climbs to 50 percent. This results in additional capital of \$174 million. Along with the reserve, we now see an asset requirement of \$375 million, or almost 38 percent of the account value guaranteed.

To put this in perspective, if priced on a fair-value basis at this time, one year in after the crash, the price would be 190 bps, or over six times the charge being collected.

After two more years—essentially recovery ones—the reserve drops to \$25 million (from more than \$200 million) and the EC is now \$176 million—essentially

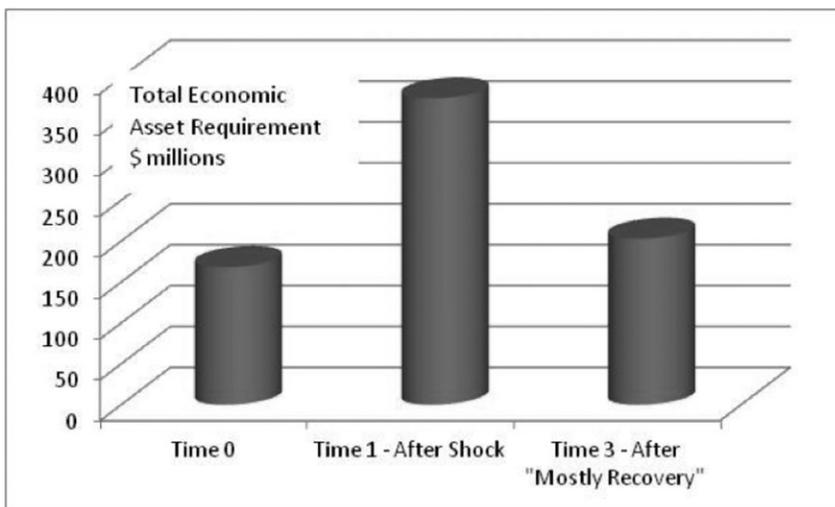
the same as before the recovery, except that now the total asset requirement is around \$201 million instead of \$375 million. The fair value cost of this now 17-year option has fallen to 48 bps—still more than 50 percent higher than the initial price, but less than one-third of the cost at the nadir of the crash.

The first question asked here is whether the insurer should have seen corresponding offsets in its asset portfolio. This, however, presumes that “perfect” or near-perfect assets are available. Certainly in some cases, the decision to avoid assets that match is that of a risk-seeker. In other cases the assets are non-existent. The gray area is where assets may exist if generated—meaning, bankers produce market-based offsets that are illiquid and expensive—but are produced for this product only. In the case of our example, the 20-year put is illiquid and would be created for this sole purpose, thereby requiring a high bid-ask spread. In the case of GMXBs and UL guarantees reaching into 40- to 50-year horizons and longer, there are limited hedge instruments available to match the liability tenor.

The next question is whether or not the same shocks should be applied after a shock that were applied prior to that shock in order to determine EC, or, more appropriately, Economic Total Assets Required, which includes economic reserves.

Currently, general industry practice would not adjust the shocks in the above case. The arguments for this are: (1) the shocks are based on long-term views and not adjusted constantly for the tactical position of the markets at any given point; and (2) the guarantee is on the full account value, which after lapses, is about \$820 million, and holding \$375 million of that amount after such a shock when the future is uncertain is not unreasonable.

The arguments for incorporating mean reversion into the shock are: (1) there is reasoning behind the idea that after a 40 percent down shock, there is less chance that there will be another 40 percent shock on top of that (than there was that the original shock would occur); and (2) in the example above, which is very similar to the 2008–11 cycle and others, insolvency would have



occurred at the nadir, while riding it out alternatively allows for the firm to survive and, perhaps, better serve policyholders.

The above debate is being played out in the Solvency II and other landscapes (such as the NAIC’s Solvency Modernization Initiative), but within a given firm’s product development area, the key question needs to be answered internally. What strategy is being employed from a risk management standpoint? If the product is not going to be fully hedged (perhaps because such an option is not available; or perhaps because it is cost-prohibitive), what capital will be held? After a shock of the magnitude seen in 2008–09, is the intent to remain solvent, and, if so, by what standard?

The non-equivalence of traders

The second large challenge posed by market-consistent pricing on this backdrop is the lack of equivalence among traders. With liquid instruments like S&P 500 shares and t-bills, transparency is easy, although even with the most liquid of all bonds, the matching of assets to liabilities in a hold-to-maturity fashion will create different views of a given security.

As with the volatility issue above, this too has both regulatory and economic components. From a reporting standpoint, there is sometimes a need to value instruments with imagination—that is, in a world where transactions would occur, as opposed to the real world where those transactions are not occurring. By definition, such an assumption requires mentally changing something about the world, and the change one decides to make to the world to force a market price can determine what that price ends up being. As a product development actuary, understanding when this will occur and how it will be handled is important. Further, this mental exercise forces key questions, such as what potential risk management solutions (e.g., transfer) might be available and why there is an illiquid market. It is not always a bad thing, for instance, to have no benchmark: It may be the hallmark of innovation.

When encountering a true “black hole” of transparency and observable market reads, the product development actuary next should:

1. Decompose the product into its components, those that are observable and those that are not.
2. Price the components that are observable.
3. For those that are not observable, “map” them to “nearest observable” component parts and estimate the difference in price to the nearest analog.
4. Determine the “whole” value inclusive of diversification and interaction within the components.

Complexity of Risk

Transparency of Risk:	Insensitive to Entity’s Other Risk	Sensitive to Entity’s Other Risks
Observable	market determines price	While the market determines price, different firms will see this as more or less attractive
Unobservable	Different firms should produce relatively similar results	Due to differences of approach, firms may produce relatively different results

This process—the last two steps in particular—can lead to different results for different participants due to risk profiles, strategies, synergies, efficiencies and diversification with other components of the business. It is the combination of unobservable components and sensitivity to writer issues that leads to the most subjective valuation and pricing. In other words, if we return to our 20-year volatility example above, while we know this level is generally not observable, we also know that we can plot out vol in an observable space shorter in tenor than 20 years and have a decent framework for extrapolation. With the volatility of mortality, however, there is much less concrete in the platform from which we can jump off.

How product development is being impacted by market consistency

Post-crisis tackling of market consistency by life insurance product development can be thought of as focusing on two ever-changing and all-important drivers:

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economics and regulation. To paraphrase our executive friend noted above, if the world’s economic conditions could just stop changing, it would be a lot easier for us to price, project and report. On the regulation front, what must be understood is that the complexities of world markets and how they impact financial products are still being embedded into hundreds of governments across the world, and our examples above—how to view the chance of a crash after a crash, and how to report on the market value of an instrument whose only transaction is conducted by the market participant itself.

The keys to success are:

1. **Establishing a product pricing strategy for adding shareholder value that reflects the firm’s risk/reward philosophy.** Derivatives are priced on a risk-neutral basis, which is a lens (a market-consistent one) all products should be viewed through—but not the only lens. Hedging all risk away would result in avoiding any returns in excess of risk-free returns. Similarly, in lieu of hedging, capital is held to cover risk: Holding capital to the extent that it is equivalent to hedging the risk fully means holding so much capital that the return should theoretically not exceed risk-free levels. However, supplying shareholders with ROEs in excess of risk-free rates requires not hedging all of that risk away and not holding so much capital that the same profile as treasuries is returned. Striking that balance and assessing

whether a clear relationship between ROE guidance, ownership of capital within the product line and the appropriate pricing metrics is essential.

2. **Assuring that risk, capital and profit reporting are appropriately designed, funded and operational.** Here we include “projections” as part of reporting. Managers need the appropriate data and analysis with which to make decisions. The more complex the product, the more care must be put into planning the reporting, which can become exponentially complex and cause corresponding increases in the challenges of technology and people.
3. **Aligning incentives of management with the firm’s objectives (as stated to stakeholders) and policies.** What objectives exist for new product and in-force product performance, and how do they vary across economic conditions and regulatory regimes? Two dimensions of performance measurement are crucial. One is risk adjusting. If product family A returns greater than product family B, was that because it took greater risk? If so, either a risk-adjusted capital base needs to be implemented such that the denominator of the return metric reflects risk appropriately; or—less likely—it needs to be recognized that product development and management is being incentivized to take greater and greater risks.

How did the product perform?



The second is benchmarking. If risk capital is appropriately determined at the start of a given fiscal year (such that the above risk-incentivizing problem does not occur), and an equity-based product thrives because the markets soared, is that “credit” given to the business unit managing that product? If so, a benchmarking incentive process is likely desired to replace this. For broad-based indices, unless the firm specifically chooses to “double down” on an economic bet, product management is best rewarded when compared to a benchmark, not when market forces happen to deliver a positive scenario.

Once all three of the above have been achieved, two key triangles can be connected. One assures that the capital policy (how capital is invested, including products approved), management incentives and reporting (which allows management the tools to make smart decisions with) are aligned; and the other assures that product design, risk management and capital are connected, such that if one changes, one or two of the others respond in kind.

4. ***Finally, ensure that the firm is strategically positioned to dynamically address regulatory and economic change.*** Establishing a framework for capital and risk management, product strategy, reporting and incentives is a necessary but insufficient step to assure a complex financial institution is prepared for change.

We showed above that a shock to the market that absorbs most of the capital that was intended to protect from such a shock is followed by the question, what capital is required for further shocks? Said differently, what is the plan for remaining solvent? Given that the definition of solvency is dependent not only on an internal view but on that of regulators, answering these key questions required preparation and war gaming on two dimensions: the economic one and the regulatory one.

Insurers today deal with multiple balance sheets: GAAP, IFRS, Tax, MCEV, Solvency II and potentially more than one statutory regime. The ability to explain how an underlying economic strategy translates through multiple regulatory filters has become paramount. For example, when translating an accounting basis’ return for a given product to the firm’s own view, there may be six starting points but one end point; all six income statements make adjustments to the numerator (profit versus benchmark) and denominator (a risk-adjusted capital metric). Making these adjustments allows for a definition of difference in bases as well as provides the qualitative narrative executives need to speak to analysts, agencies, regulators and investors.

IFRS, Solvency II, the NAIC’s Solvency Modernization Initiative (SMI), the Dodd-Frank bill, health care reform and the Foreign Account Tax Compliance Act (FATCA) are just the start of what will be a decade of regulatory change impacting insurers. Instead of addressing regulatory change piecemeal or in a wait-



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and-see fashion, insurers today are well-advised to establish a dynamic strategy that is prepared for a decade of regulatory change ahead, no matter what the economic dimension brings. Multiple tools and methodologies are available for this purpose, but a general approach will take the above three principles and assure that success is achieved in each key functional area as shown below. The paragon of success is shown for each. □

Paragons of Success for a Dynamic Regulatory & Economic Strategy

Component		Product & Marketing Structure	Capital & Risk Management Strategy	Technology & Operations Solution
1 Value & Growth	Pricing strategy for adding shareholder value consistent with the firm's risk/reward philosophy	Growth plans based on distribution, product value and customer relations with specific pricing strategies	Projection of capital use and contribution from in-force and new business, inclusive of risk management plans	Well-defined and understood process for setting assumptions, assessing scenarios and running analysis on systems
2 Reporting & Projections	Assuring that risk, profit and capital reporting are appropriately designed, funded and operational	Profitability guidelines for in-force and new business, including scenario analysis, sales targets and limits and in-force management tracking plans	Capital allocation impact assessment and tracking consistent across product and project approval processes	P&L projection capabilities for in-force and new business consistent with profitability and capital allocation policies
3 Incentives & Governance	Aligning the incentives of management with the firm's stated objectives and policies	Ownership of product capital-strain decisions connected to ROE guidance	Risk-adjusted and benchmark-adjusted performance management for products and projects	Clear responsibility for translation of firm's internal economic view to each accounting basis

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Reflecting Risk in Pricing Survey

By Donna Megregian

In September 2010, the SOA published an update to the 2005 Reflecting Risk In Pricing survey. This Survey is focused on how companies are trying to price for and understand the risks inherent in the products they sell. The survey focused on various product lines—life and annuity, health, and property and casualty insurance and showed results for various countries of location and business focus. The survey report can be found at <http://www.soa.org/research/research-projects/risk-management/research-reflecting-risk-pricing.aspx>. The focus of this article is to highlight some of the life and annuity results from the report. In general, direct writers and reinsurance companies will be lumped together except

where noted. The full report breaks out reinsurers, life and annuity writers separately.

Profit Measure Ranking

The most common profit measure used by companies issuing life and annuity products was IRR, but was closely followed by premium margin. Life products fairly consistently ranked IRR, premium margin and break-even year as their top three choices. Annuity writers and group insurance writers had more variability as shown in the charts below:



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Profit Measure Ranking – Life	Whole Life	Endowment	Term Life	Universal Life	Variable life	Variable Universal Life	Life Total
Return on Investment	7	9	6	6	10	7	6
Return on Equity	5	8	5	5	10	5	5
Return on Liabilities	16	14	15	16	13	15	15
Risk-adjusted Return on Capital	9	7	9	10	7	9	9
Premium Margin	1	1	1	2	1	2	2
Embedded Value/Economic Value Added	4	4	4	4	4	4	4
Expected Loss Ratio	14	15	13	14	15	14	14
Combined Ratio	15	16	16	15	15	16	16
Break Even Year	3	3	3	3	3	3	3
Internal Rate of Return	2	2	2	1	2	1	1
Return on Assets	13	13	14	11	8	11	12
Return on Capital	10	11	10	9	9	12	10
Contribution to Surplus	6	6	8	7	6	8	8
Revenue Margin	12	10	12	13	14	13	13
Market Consistent Embedded Value	8	5	7	8	5	6	7
Other	11	12	11	12	12	10	11

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Profit Measure Ranking - Annuities	Fixed Deferred Annuity	Variable Deferred Annuity	Fixed Immediate Annuity	Variable Immediate Annuity	Annuity Total
Return on Investment	7	10	7	9	7
Return on Equity	6	6	6	11	6
Return on Liabilities	12	12	12	14	12
Risk Adjusted Return on Capital	9	7	10	7	10
Premium Margin	2	3	2	4	2
Embedded Value/ Economic Value Added	5	5	5	5	5
Expected Loss Ratio	15	15	15	14	15
Combined Loss Ratio	15	16	15	14	15
Break Even Year	3	4	4	2	3
Internal Rate of Return	1	1	1	1	1
Return on Assets	4	2	3	6	4
Return on Capital	10	9	9	3	8
Contribution to Surplus	8	11	8	8	9
Revenue Margin	13	13	14	13	13
Market Consistent Embedded Value	11	8	11	10	11
Other	14	14	13	12	14

Profit Measure Ranking – Group/Other	Group Life	Group Annuity	Other
Return on Investment	7	9	13
Return on Equity	5	2	7
Return on Liabilities	14	11	15
Risk-adjusted Return on Capital	12	6	6
Premium Margin	1	7	2
Embedded Value/Economic Value Added	4	5	4
Expected Loss Ratio	3	11	5
Combined Ratio	8	11	9
Break Even Year	6	3	3
Internal Rate of Return	2	1	1
Return on Assets	15	4	15
Return on Capital	11	15	12
Contribution to Surplus	9	10	11
Revenue Margin	13	14	14
Market Consistent Embedded Value	10	8	8
Other	15	16	10

Those reporting use of capital allocation for reflecting risk generally determine allocations through a regulatory formula but an increasing number of companies reported using economic capital relative to the previous study. Companies that reported using assumption PADs generally use recent experience to determine those PADs. Companies using risk-adjusted profit targets and assumption stress testing reported using judgment to determine the parameters.

Direct life and annuity writers that reported using stochastic scenario analysis are split between CTE and percentiles when analyzing results of the scenarios. Re-insurers primarily use CTE to analyze results.

Comfort with Incumbent Profit Measure and Risk Assessment Practices

About half of the companies in the survey indicated they feel their profit measure is not substantially differ-

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ent from their competitors. About 25 percent feel that it is different, and the rest are generally unsure if it is substantially different. Most companies were neutral in their assessment of their profit measure relative to other companies. Of the companies that believed there was a difference, more assumed to be at a disadvantage than an advantage.

The survey asked if companies had changed their profit measure in recent years. More than 70 percent of respondents indicated they had changed their primary profit measure in the last three years. Companies that reported a change indicated they moved away from predominantly IRR and premium margin in favor of Market Consistent Embedded Value (MCEV) and Embedded Value/Economic Value Added (EV/EVA).

Responses were fairly evenly split between those reporting a change and reporting no change with regard to risk assessment practice given the recent economic environment. Larger insurers reported more changes relative to smaller insurers. More than 65 percent of responses indicated they do employ an ERM actuary or have enterprise risk management areas in their company, more so in larger companies than smaller companies.

Other Areas of Interest in the Survey

The survey also asks how companies capture risk associated with:

- Asset default in pricing,
- Interest rate changes,
- Volatility of equity returns,
- Adverse claims deviation/severity,
- Short-term fluctuation/frequency,
- Modeled customer and agent/broker behavior,
- Expenses,
- Operational risk,
- Mix of business/distribution of policyholders, and
- Reinsurance.

It is important to note that the results provided herein come from a variety of insurance companies with unique areas of practice, product structures, target markets, distribution methods and regulatory environments. As such, these results should not be deemed directly applicable to any particular company or representative of the insurance industry as a whole. Results shown based on the demographic data include only those respondents who filled out that portion of the survey. These results may vary from aggregate results shown in the various lines of business—life and annuity, health, and property/casualty. □



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