

Product Matters!

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Chairperson's Corner: The Truth is Out There

by Dale Hall

As members of the actuarial profession, we might all be able to recite Ruskin by knowing that one of the goals of science is "to substitute facts for impressions." With the recent rebirth of *The X-Files* as a major motion picture, some of us might also be able to recite Special Agent Fox Mulder's approach to science and research from the original film 10 years ago. In his deadpan approach, Mulder bluntly states: "If we fail to anticipate the unforeseen or expect the unexpected in a universe of infinite possibilities, we may find ourselves at the mercy of anyone or anything that cannot be programmed, categorized or easily referenced." Firsthand research, using a variety of methods, was always an important part of the way Agent Mulder operated.

It has been exciting to see both the Product Development Section and the Society of Actuaries live up to their strong commitments to education and research during the past year. In the next few months, there will be many additional research projects that we will actively support.. With product development a necessary centerpiece to the way life insurance and annuity products are brought to market, it becomes increasingly important for our Section members to have access to top-notch market and technical research that they can use in their work. Here's a quick look at some research projects the



Product Development Section will support in the coming months:

- A literature survey on longevity risk, where we'll learn more about longevity product contingencies and risks, identify risk mitigation methodologies and identify areas of future growth and research.
- Research on public perceptions of longevity and an assessment of how these perceptions line up with facts on retirement data.

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- An update of the Post-Level Term Shock Lapse Study, which will include data on an ever-increasing amount of policies reaching their 11th or 16th duration.
- Research on the impact of product development under principle-based valuation techniques, as well as the use of credibility theory to set product assumption margins.
- Consumer research on the need for individuals to receive financial advice to plan and maintain their own personal financial security.

Be on the lookout for more information and updates on these projects as they come to fruition. I know they'll be helpful to many of us as we develop products in the future. Research is a core commitment of the Product Development Section to its members, and I'm glad to see that we'll continue that process for many years to come. ■



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Three More Years! Three More Years!¹

A follow-up to the article *Comfort Food for an Actuary: Cognitive Testing in Underwriting the Elderly*, published in the May 2006 edition of *Product Matters!*

by Eric D. Golus, Laura Vecchione and Thomas Ashley

Having just come off a hotly contested presidential primary season and with the presidential election just around the corner, many conversations have considered who will be taking up residence at 1600 Pennsylvania Avenue next year. We admit that the title of this article is a bit misleading since the appropriate saying is four more years, not three more years and that it is more appropriate when an incumbent president is seeking re-election, which is not the case in the upcoming election. However, we are excited to report updated results based upon three more years of data in our Delayed Word Recall (DWR) Test mortality study. The mortality study was originally presented in the May 2006 edition of *Product Matters!* in the article titled, *Comfort Food for an Actuary: Cognitive Testing in Underwriting the Elderly*. The article can be found at <http://www.soa.org/library/newsletters/product-development-news/2006/may/pdn0605.pdf>. Since many of the concepts still apply, some of the text in this article is taken directly from the prior article.

The current article will:

- refresh the reader as to the background of the DWR Test mortality study, the mortality study population and mortality study methodology,
- present the results of the updated mortality study,
- introduce a Cost-Savings Analysis, and

- discuss the results of a recent survey of life insurance companies concerning their underwriting of the elderly.

Background

It has been shown that in community dwelling elderly populations, cognitive dysfunction is a predictor of mortality.² We decided to study the use of a cognitive test, the DWR Test, as a potential underwriting tool in an insured population because a DWR Test is simple to administer, objectively scored and easily validated. We will show that as the population ages and more life insurance is being applied for at the older ages, performing a cognitive test such as a DWR Test on elderly applicants can help life insurance companies become comfortable with writing large amounts of elderly business.

A DWR Test uses a predefined and validated list of 10 words. The examiner presents each word to the subject visually on a flash card. The subject reads the word aloud and then uses it in a sentence, after which the process is repeated. Following the process, the subject is administered other tests during a five-minute period. When this five-minute period is over, the subject is asked to recall as many of the 10 words from the first test as possible. The subject does not have a time limit on the recall period and the resulting test score is the number of words the subject recalls.³

¹ This article is based on an article that was published in the *Journal of Insurance Medicine* that similarly updated an earlier article on the Delayed Word Recall Test mortality study. *J Insur Med* 2007;39:264-269.

² Fried, L.P., et al. Risk Factors for 5-year Mortality in Older Adults: The Cardiovascular Health Study. *JAMA* 1998;278(8):585-592.

³ Knopman, D.S., et al. Development and standardization of a new telephonic cognitive screening test: the Minnesota cognitive acuity screen (MCAS). *Neuropsychiatry, Neuropsychology, and Behavioral Neurology*: 2000;13(4):286-296.

Mortality Study Population and Methodology

We performed a mortality study on a population of applicants ages 70 and older underwritten for an employer-sponsored long-term care insurance (LTCI) program where a DWR Test was utilized. Companies that sell LTCI routinely test applicants ages 70 and older using a variety of cognitive tests for evidence of cognitive dysfunction. We recognize that we used a population underwritten for LTCI, not life insurance. However, we thought this was the best surrogate population available since this population represented a group of (mostly) retired workers who share many of the characteristics we would expect in a population applying for life insurance.

After being underwritten, each applicant was accepted for LTCI (12,928 applicants), declined for cognitive impairment (1,703 applicants) or declined for medical reasons (7,477 applicants). The mortality study included all those who were accepted for LTCI or declined for cognitive impairment since both of these groups include applicants who we judged to be acceptable for life insurance.

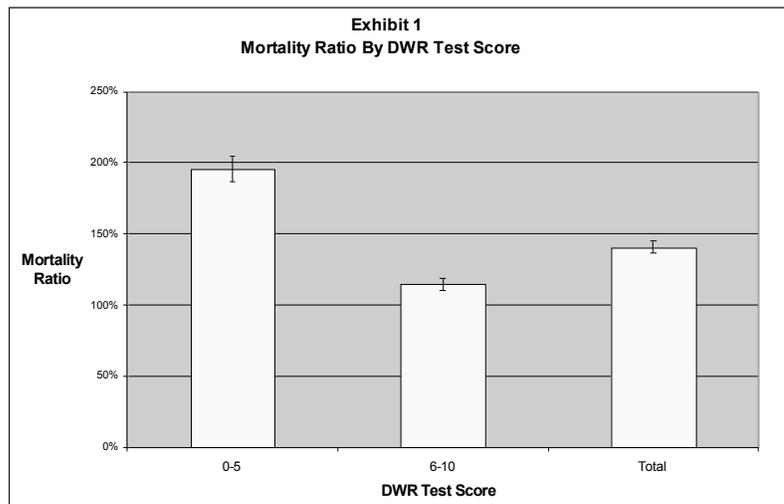
For the updated study (2006 Study), the exposure period for each applicant started at the date of underwriting and continued until May 2006 or death. This is an additional three-plus years of observation over the original study (2003 Study) which ended the exposure period in March 2003.

For the 2006 Study, applicants underwritten from March 1995 to May 2006 were included. This is an additional three-plus years over the 2003 Study which ended with applicants underwritten before March 2003.

Mortality Study Results

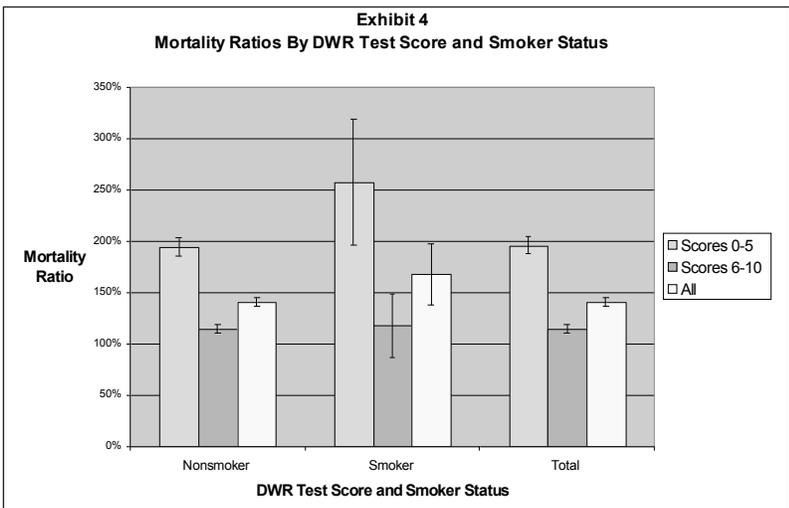
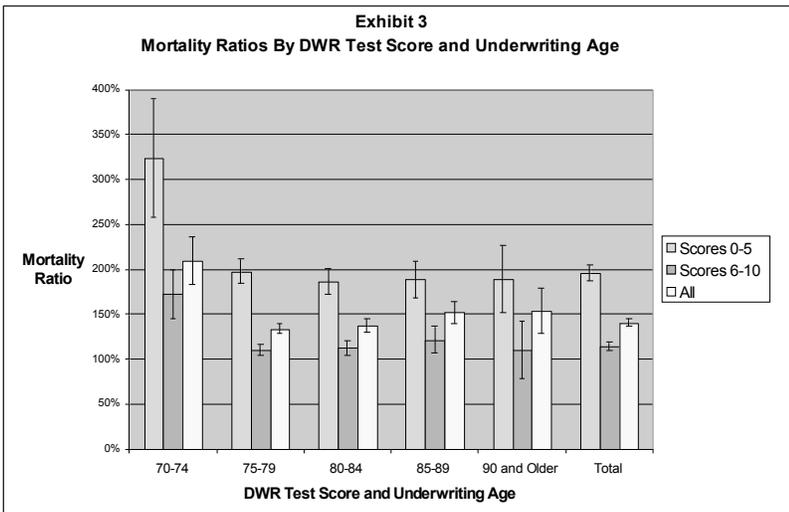
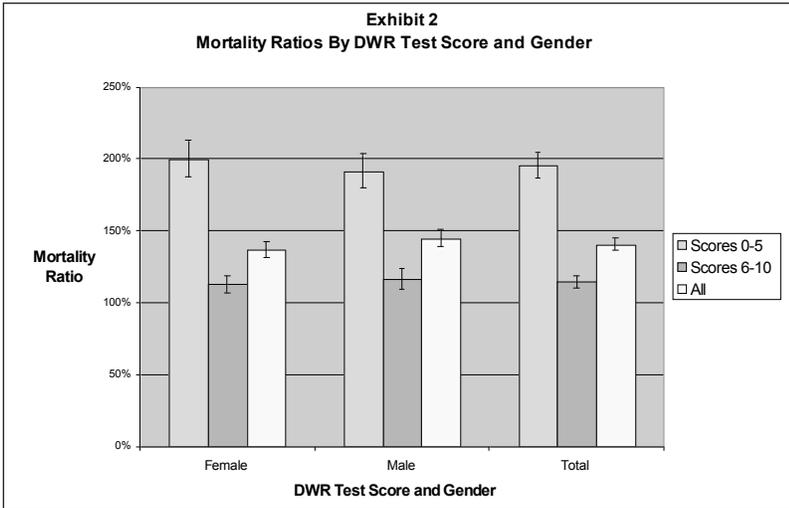
For the 2006 Study, the overall mortality ratio was 141 percent where expected mortality was based upon the 2001 VBT Select and Ultimate Smoker Distinct, Sex Distinct Tables. For those in the group recalling zero to five words (poorer scoring

group) on the DWR Test, the mortality ratio was 196 percent while those in the group recalling six to 10 words (better scoring group), the mortality ratio was 114 percent. The results show that the mortality ratio for the poorer scoring group was significantly higher than the mortality ratio for the better scoring group. Thus, **DWR Testing can be used to differentiate the mortality risk associated with elderly applicants.** Exhibit 1 shows these mortality ratios and 95 percent confidence intervals of the mortality ratios. The whiskers on the mortality ratio boxes in the exhibit represent the confidence intervals.



The results are further divided by gender, underwriting age and smoking status in Exhibits 2 to 4, respectively. The results show that when the data was dissected by the groupings for these variables, the mortality ratios for the poorer scoring groups were significantly higher than the mortality ratios for the better scoring groups. (For example, for males and females separately, the poorer scoring group had significantly higher mortality ratios than the better scoring groups.) Thus, **DWR Testing can be used to differentiate the mortality risk associated with elderly applicants for all the breakdowns of the variables examined.**

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To quantify the difference between the mortality of the poorer scoring group and the better scoring group, we calculated the

ratio of the mortality ratios for these groups. Overall, this ratio was 171 percent (= 196 percent/114 percent), meaning that the poorer scoring group had 71 percent higher mortality than the better scoring group. Exhibits 5 to 7 display the ratios of the mortality ratios of the poorer scoring groups to the better scoring groups for the various groupings of gender, underwriting age and smoking status, respectively.

Exhibit 5
Ratio of Mortality Ratios of Poorer Scoring Group to Better Scoring Group By Gender

Gender	
Female	178%
Male	164%
Total	171%

Exhibit 6
Ratio of Mortality Ratios of Poorer Scoring Group to Better Scoring Group By Underwriting Age

Underwriting Age	
70-74	188%
75-79	180%
80-84	166%
85-89	155%
90 and Older	171%
Total	171%

Exhibit 7
Ratio of Mortality Ratios of Poorer Scoring Group to Better Scoring Group By Smoking Status

Smoking Status	
Nonsmoker	170%
Smoker	219%
Total	171%

In the original article, the mortality ratios overall, for the poorer scoring group and for the better scoring group were 71 percent, 136 percent and 35 percent, respectively. These results are noticeably different than the results in Exhibit 1. This difference is due to an error in the data we were provided for the 2003 Study. The error involved the exclusion of data points which were not representative of the 2003 Study as a whole. The 2006 Study included all the data points.

Two conclusions can be drawn from the 2006 Study when compared to the corrected

2003 Study. First, the ratio of the mortality ratios was not materially different (171 percent vs. 174 percent). Second, **the additional three years of exposure in the 2006 Study shows that the power of DWR Testing persisted to the end of the exposure period in policy year 12 but diminished with duration.** This can be viewed in Exhibit 8.

Policy Years	Corrected 2003 Study	2006 Study
1 to 4	201%	198%
5 to 8	149%	165%
9 to 12	0%	150%
Total	174%	171%

We also note that the three additional years of underwriting in the 2006 Study had roughly the same ratio of mortality ratios of the poorer scoring group to the better scoring group as the other years of underwriting (233 percent vs. 203 percent).

Cost-Savings Analysis

As another avenue to highlight the power of DWR Testing, we performed a Cost-Savings Analysis. The Analysis focused on the Savings part of the equation. It examined the present value of death benefits paid to the mortality study population who died during the mortality study. It assumed that the death benefit paid was \$500,000 per person and the discount rate was 5 percent. It then split the present value of death benefits into groups based upon DWR Test score and underwriting age. Exhibit 9 shows this information. The exhibit also provides the percent reduction in the present value of death benefits paid had the poorer scoring group been declined for insurance due to their low DWR Test scores. **The percent reduction increased with age showing that the mortality savings associated with DWR Testing increased with age.**

DWR Test Score	Underwriting Age					
	Total	70-74	75-79	80-84	85-89	90+
0 to 5 (poorer scoring group)	783	36	324	251	131	41
6 to 10 (better scoring group)	927	58	469	285	97	18
All	1,710	94	793	536	229	59
Percent Reduction by Declining the Poorer Scoring Group	46%	39%	41%	47%	57%	70%

In our Analysis, out of \$1,710 million of total death benefits paid, \$783 million was saved due to declining the poorer scoring group. When the savings is compared to the number of people underwritten, we find that the maximum testing cost per person underwritten is \$35,000. In other words, DWR Testing was an effective means of reducing mortality costs as long as the cost associated with performing a DWR Test is less than \$35,000. Obviously, the cost is less. Note that the number of people underwritten that we refer to here (22,108) is larger than the mortality study population (14,631) since it includes applicants who would have been underwritten and had DWR Test performed on them but would not have made it into the mortality study population since they were declined for medical reasons.

Our Analysis assumes that a DWR Test is the only way to pick up cognitive dysfunction and the extra mortality associated with it in the elderly insured population. While this is not 100 percent true, there is evidence that other underwriting tools do a much poorer job of identifying cognitive dysfunction. Attending physician statements, for example, are ineffective since physicians typically misjudge cognitive function and neglect to record cognitive status in the record. In one study of office-based care, the record accurately reported only about 20 percent of cases of mild dementia and 80 percent of severe dementia. Overall, the record neglected detection of over 60 percent of dementia cases.⁴ The reader is welcome to use a discount factor he or she

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⁴ Valcour VG, et al. Arch Intern Med 2000;160:2964-8



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thinks is appropriate to recognize that other underwriting tools may pick up cognitive dysfunction. Even a very large discount preserves substantial savings from use of a DWR Test.

Elderly Underwriting Survey

The Society of Actuaries recently published the results of a survey that was taken in August/September 2006 that asked life insurance companies about their elderly underwriting practices. Since that time, we have noticed changes in the way in which life insurance companies were assessing elderly risks. To get a better feel for the changing climate, Gen Re LifeHealth sponsored a similar survey where we surveyed 41 companies in January 2008. The following is a discussion of the results of the survey. It is similar to the discussion presented in our survey report.

Nearly half of the companies participating reported they use cognitive function tests on elderly applicants as a standard practice, or are planning to implement in 2008. Of those companies that are currently using cognitive function tests, six out of the 11 companies use either the DWR Test or the Clock Drawing Test (CDT), which measures the ability of a subject to draw a clock face. While six out of these 11 companies reported using one test, five companies use multiple tests, most frequently teaming the DWR Test and the CDT. These two tests also appear to be most popular with the eight companies that are planning to add cognitive function tests in 2008.

When asked why they use cognitive testing, companies most often cited that they are unable to obtain relevant information through existing requirements. Following this response, companies then cited that the problems are too common to ignore and that they are able to offer more competitive premiums to those that pass the test.

As indicated earlier, just over half of the participating companies reported neither

using cognitive function testing with elderly applicants nor planning to add it in 2008. Twelve out of these 21 companies cited as their reason, that the information can be obtained from other requirements. This judgment contradicts that of companies that use cognitive function tests, and could be the primary explanation for differences in underwriting strategy.

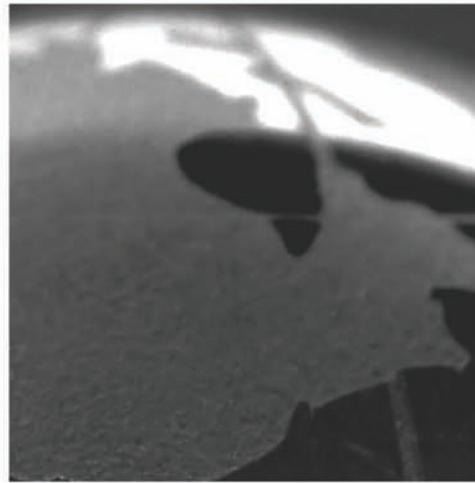
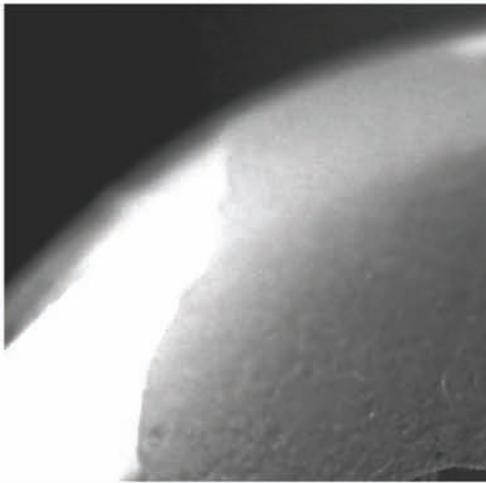
Conclusion

The results of our mortality studies and Cost-Savings Analysis make the power of DWR Testing apparent. The mortality studies have been cited as, “important first steps in an attempt to quantify the mortality impact of cognitive screening.”⁵ Life insurance companies have begun to recognize that different or additional tools are needed to underwrite elderly risks versus non-elderly risks. Recent information has shown that life insurance companies are beginning to introduce these tools into the marketplace. We encourage life insurance companies to endorse the new protocol sooner rather than later. Waiting to see how all of this unfolds runs the risk of being selected against by applicants who would be unacceptable to companies that have started DWR Testing.

One practical consideration that needs to be addressed before DWR Testing becomes a more universal underwriting tool for the elderly is the administration of the DWR Tests by parameds. We challenge the life insurance industry to make paramed training a priority.

People often try to predict the outcome of the presidential election using unconventional means. We would like to throw our hat into the ring with something we hope will become more conventional, at least in the life insurance world. We would like to use the DWR Test scores of the presidential nominees to determine the winner of the election. If only politics were so simple. ■

⁵ Margolis, B. Cognitive Testing in the Elderly—A Predictor of Mortality? J Insur Med 2007; 39:237-238.



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U.S. Population Mortality Continues To Improve in 2006 and 2007

by Douglas Doll

The National Center For Health Statistics recently came out with preliminary 2006 U.S. population mortality statistics—showing lower mortality and a record life expectancy! Furthermore, the death count for 2007 indicates that 2007 statistics will show continued improvement.

Here is the Web site of the press release dated June 11, 2008 and the report covering the 2006 results:

<http://www.cdc.gov/nchs/pressroom/08newsreleases/mortality2006.htm>

The overall age-adjusted death rate decreased by almost 3 percent, after a smaller decrease in 2005. Below is a table I

created comparing population death rates for selected age groups and years. I calculated some annualized improvement rates for the different age groups, and also, for a mix of attained ages in a hypothetical insurance company, calculated the weighted average population death rates and improvement rates.

You might wonder why the overall population rate in 2006 decreased by almost 3 percent, when the improvements in the above table have a weighted average of only 2.0 percent—it's because ages 85-plus (not shown in the table below) improved by 4 percent, and this category is more than half the total population deaths. I note that the

Sex/Age	U.S. Death Rates per 100,000					Annual Improvement				Life Ins. Weight
	1987	1997	2004	2005	2006	2004-2005	2005-2006	1987-1997	1997-2006	
Male										
25 -34	189	163	140	143	146	-2.1%	-2.1%	1.5%	1.2%	10.0%
35 - 44	290	275	244	243	238	0.4%	2.1%	0.5%	1.6%	25.0%
45 - 54	638	548	544	548	540	-0.7%	1.5%	1.5%	0.2%	20.0%
55 - 64	1,626	1,343	1,129	1,131	1,109	-0.2%	1.9%	1.9%	2.1%	10.0%
65 - 74	3,636	3,170	2,645	2,612	2,515	1.2%	3.7%	1.4%	2.5%	2.0%
75 - 84	8,206	7,055	6,394	6,350	6,180	0.7%	2.7%	1.5%	1.5%	1.5%
Female										
25 -34	74	68	64	64	64	0.0%	0.0%	0.8%	0.7%	6.0%
35 - 44	135	135	144	144	142	0.0%	1.4%	0.0%	-0.6%	13.0%
45 - 54	367	310	314	320	317	-1.9%	0.9%	1.7%	-0.2%	8.0%
55 - 64	910	806	707	698	686	1.3%	1.7%	1.2%	1.8%	3.0%
65 - 74	2,070	1,937	1,761	1,736	1,679	1.4%	3.3%	0.7%	1.6%	1.0%
75 - 84	5,102	4,832	4,522	4,520	4,390	0.0%	2.9%	0.5%	1.1%	0.5%
Wt Avg	702	612	555	554	543	0.1%	2.0%	1.4%	1.3%	100.0%

Year	Population Death Rate Per 1,000	Population Improvement	Age-Specific Improvement
2004	8.15		
2005	8.20	-0.6%	0.1%
2006	8.08	1.5%	2.0%
2007	7.99	1.1%	???

rate for the 85-plus category (as well as for the other categories) can be influenced by whether the mix of ages within the category changes over time.

In July, the National Vital Statistics Report (Vol. 56, No.21) released the “Births, Marriages, Divorces, and Deaths: Provisional Data for 2007.” The document can be found at this Web site:

<http://www.cdc.gov/nchs/products/pubs/pubd/nvsr/nvsr.htm>

It is interesting to compare the population death rates per thousand to earlier years, and to compare the improvement to the weighted average age-specific improvement rates from the above table. This is shown in the table above.

The age-specific improvement rates are larger than the overall population rate, because the population is aging, so that we would expect an increase in the overall popu-

lation rate even if age-specific rates were unchanged. It appears from the above table that we will also have large improvements in 2007 when the age-specific rates come out several months from now, although it's always possible that all the improvement in 2007 is at ages 85-plus.

Based on the above table, it seems like a weighted average improvement of at least 1.0 percent for age-specific rates should be expected in 2007. ■



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Nested Stochastic Pricing: A Case Study

by Craig Reynolds and Sai Man



In the last issue of *Product Matters!* we discussed the environmental factors that motivate the development of stochastic and nested stochastic pricing, as well as the associated logistical complications. In this issue, we illustrate the practical and financial implications of applying nested stochastic techniques to a sample product.

You might choose to think of this as a pricing exercise in a world with a Principle-Based Approach (PBA) to reserves and capital, but we have made only minor attempts at implementing the precise U.S. PBA requirements as they now stand. To do so would be of limited value, as the landscape is shifting as we speak, and will likely shift again as we write this and the time this article is in your hands. Instead, view this as an illustrative exercise for one hypothetical PBA regime where nested stochastic functionality is required to project future reserves and capital along the scenario at each year-end. Detailed results will no doubt vary as PBA requirements develop. In particular—for the sake of simplifying the models and the presentation—we have ignored the impact of the deterministic scenarios.

An SGUL Example

Secondary Guarantee Universal Life (SGUL) is one product that has been the subject of considerable reserve controversy in recent years. As such, it seems appropriate to develop an initial case study to analyze the impact of one hypothetical PBA regime on a SGUL plan. To keep the analysis simple, we will focus on one cell for a hypothetical plan with the following key attributes:

- Male, preferred non-smoker, issue age 45 with a \$250,000 face amount.
- Shadow account design with premiums set to fund the shadow account to maturity. Premiums and shadow account provisions are set to be competitive in the current market.
- AG38 valuation mortality: 2001 CSO Table.
- Anticipated mortality experience equal to 50 percent of the 2001 CSO table.
- Anticipated lapse rates by policy year of 6 percent in years one through three, 3 percent in years four through ten, and 2 percent thereafter.
- Anticipated expenses of \$200 per policy for acquisition expense, and \$40 per year for maintenance expense.
- First year commissions of 70 percent, with 3 percent renewal commissions.
- No reinsurance.
- “Interim Solution” reserves at 4 percent interest, and interim solution lapse rates.
- New money invested at 200 basis points over the 10-year Treasury rate in 10-year AA callable corporate bonds.

- Market based crediting strategy of 50 basis points over the 7-year Treasury rate.
- Required capital of 5 percent of reserves, 5 percent of premium, and 0.15 percent of net amount at risk;
- Tax rate on operating gain of 35 percent.
- Nested stochastic reserves calculated at the end of each year in a 50-year projection using 25 inner paths along 200 outer scenarios;

In a base case level scenario with reserves and capital set non-stochastically as described above, the secondary guarantee comes into the money only at the tail, and the plan is somewhat profitable, with an after-tax, after-cost of capital internal rate of return (IRR) of 10.0 percent.

We can then extend the analysis to capture the cost of the guarantee by modeling interest rates stochastically. For this purpose, we use a real-world mean reverting three-factor (short rate, slope and curvature) lognormal interest rate model, with parameters that are largely consistent with historical experience over the last 30 years.

In addition, we expand the model to include a simple lapse function that is sensitive to “in-the-moneyness” by applying the following logic:

- Set lapse rate to zero when policy is in-the-money.
- In-the-money is defined as the situation where the current account value drops below zero while the shadow account remains positive.

Given this, we can rerun the above model through 200 scenarios and obtain a mean IRR of 19.2 percent. The fact that this is higher than the base case may seem counter-intuitive, but it appears to be an inevitable result of the mean reversion assumption in our scenario generator which trends towards a long-term mean for the short-term rate of

4.5 percent. In fact, the post-1960 average of the short-term Treasury rate is 6.0 percent, so the 4.5 percent rate is somewhat conservative for this product relative to the long-term experience. In recent years, the rate has been much lower. Clearly this assumption will have a large impact on product profitability and should be subject to sensitivity testing.

Table 1 below shows the associated distributions of Present Value of Profits (PV Profits) at a 10 percent discount rate. The average PV Profits under the AG38 Interim Solution Reserving methodology is \$7.0 with a sigma of \$2.94.

<u>Percentile</u>	<u>Adj Aft Tax</u>
0%	(0.8)
10%	3.3
20%	4.2
30%	5.7
40%	6.4
50%	7.1
60%	7.9
70%	8.5
80%	9.9
90%	10.9
100%	13.8
Average	7.0
Sigma	2.94

SGUL with PBA

Now we would like to enhance our model to see how a PBA approach to reserves and capital might impact the expected profits and the distribution of profits. For this purpose—though PBA requirements are clearly still evolving—we will calculate PBA reserves using CTE 70 and capital using CTE 90. Both will be based on the greatest present value of accumulated deficiencies. Reserve calculations ignore income tax and capital calculations will reflect income taxes. As mentioned earlier, for the sake of simplicity, we will ignore the impact of the deterministic reserve, though this would appropriately be reflected in actual pricing.

continued on page 14

The selection of assumptions for a PBA calculation is worthy of a series of articles in and of itself, so for now we will test using the prudent anticipated experience assumptions in the model, with 10 percent margins on mortality and expenses, and a 50 percent reduction in lapse rates. In this case, there is no surplus strain and the IRR is thus undefined. Table 2 shows the resulting distribution of PV Profits.

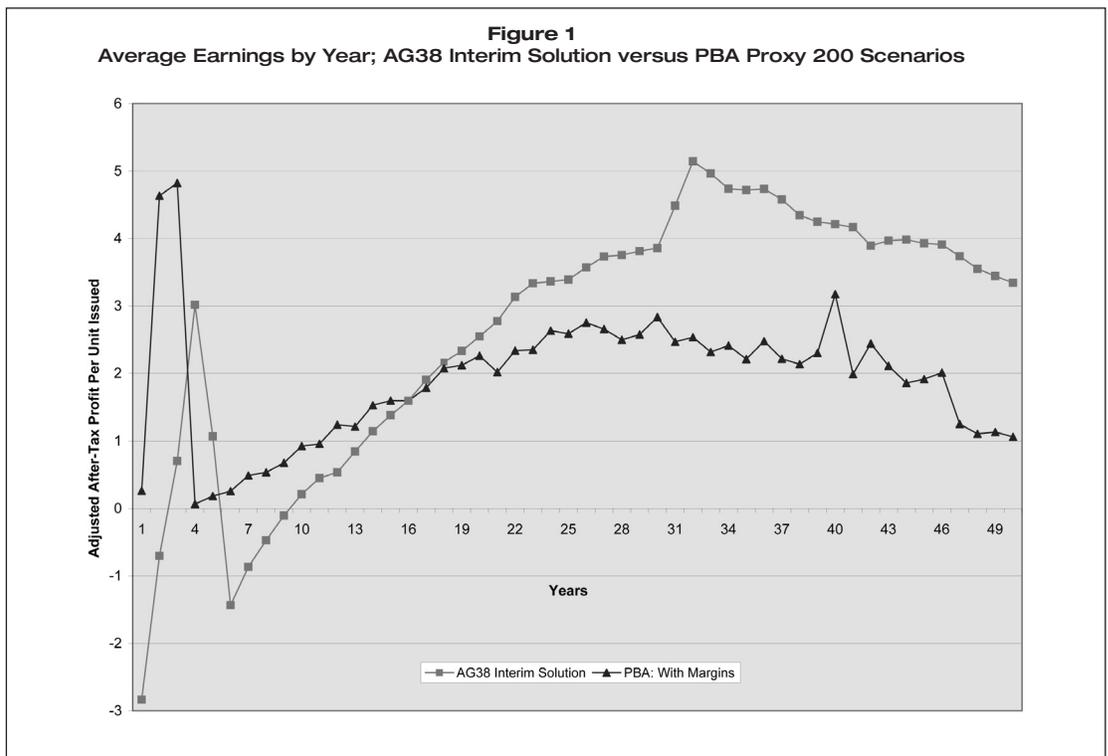
Interestingly, the PV Profits are now considerably higher, with an average PV Profits of \$16.1. If one accepts the margin levels, experience assumptions and scenario parameterization as appropriate, this suggests—that for this product at least—the AG38 reserves may be unnecessarily conservative. Note also that the standard deviation of the margins is considerably smaller than with AG38 Interim Solution reserves.

Percentile	Adj Aft Tax
0%	11.9
10%	14.7
20%	15.5
30%	15.9
40%	16.1
50%	16.2
60%	16.4
70%	16.6
80%	16.8
90%	17.2
100%	17.9
Average	16.1
Sigma	0.93

Our understanding is that the current PBA proposals call for pre-packaged scenarios that are approved by insurance regulators, rather than proprietary scenarios or company-selected scenarios. If this proposal holds, the results may in fact be materially different.

Figure 1 below contrasts the mean adjusted after-tax earnings by year between AG38 interim solution and our PBA proxy results.

Note that the PBA earnings are positive, initially due to the reserves and capital having a zero value at the end of the first



year. First year profits are thus essentially equal to the excess of premiums over commissions and other acquisition expenses. In fact, they remain zero through year two. Since year two has materially less cash flow strain, year two earnings are materially positive. In later years, earnings level off and are relatively smooth as the reserves increase. Later year PBA profits essentially arise as a result of release of margins.

These results are interesting but should not be considered to be fully generalizable to other product designs or assumption sets. Their main value comes in demonstrating the impact on earnings under the proposed PBA regime. Because of this, it is important to conduct PBA-based pricing now on products that may be sold once PBA comes into play.

Other Issues to Consider

There are clearly other issues to consider as well. For example, aggregation is one key issue. The analysis above measures reserve and capital as if this were the only product that the company issues. In reality, PBA reserves and capital are calculated on an aggregate basis. Thus, the marginal reserve and capital requirement for a new issue will differ from company to company

and might in fact be zero. This will certainly create some interesting philosophical discussions in pricing.

Taxes are of course another potentially significant issue. For simplicity, our analysis above assumes that the tax reserves are always equal to the product surrender value. In reality of course, no one knows yet how PBA will impact tax reserves, and the eventual resolution of this issue might materially alter the landscape as presented above.

Conclusion

The actual impact of PBA on any given company or product will clearly vary dramatically depending on the product, the company and the assumptions used. But now is not too soon to begin this analysis. For many companies, this will require new hardware or software. For almost all companies, material changes will be required in processes or mindset. ■



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Summary of May/June 2008 NAIC Meeting

by Donna R. Claire



The Summer 2008 NAIC meeting was in San Francisco—gorgeous weather, nice city. As with the past meeting, the Life and Health Actuarial Task Force (LHATF) of the NAIC continues to devote just about all its time to the Principle-Based Approach (PBA) project. There were also a few important non-PBA topics that were discussed. A summary of the meeting discussions and some subsequent conference follows:

Return of Premium—Nonforfeiture Requirements

The Interstate Compact has raised an issue as to the nonforfeiture requirements for Return of Premium Term products. Tomasz Serbinowski has written a proposed actuarial guideline to cover this. The guideline, currently referred to as the Actuarial Guideline CCC-The Application of the Standard Nonforfeiture Law for Life Insurance to Certain Policies Having Intermediate Cash Benefits, is posted on the NAIC Web site at http://www.naic.org/committees_lhatf.htm.

Group Waiver of Premium

There were some minor tweaks to the group term life waiver of premium Actuarial Guideline GWP, which contains tables to replace the Krieger tables. The Guideline has been discussed on an interim conference call. An additional change to the original draft is that the Domiciliary Commissioner needs to approve any use of individual company experience before it can be used for reserving. This Guideline may be voted on at the September LHATF meeting.

Update to the Standard Nonforfeiture Law

John MacBain gave a brief update on the American Academy of Actuaries' work on a new Standard Nonforfeiture Law that is expected to provide more flexibility, similar to the Update Valuation Law. The group expects to have a report available for the December NAIC meeting.

Loans Greater than Cash Value

LHATF formed a subgroup to look into the issue of companies granting loans greater than cash values. This provision was developed by life insurance companies in response to life settlement companies. It allows the consumer to receive a benefit without selling his/her contract to the life settlement companies to get a value higher than the cash value.

Preferred Mortality

There was a presentation on the joint Society of Actuaries'/American Academy of Actuaries' project on preferred mortality. The main purpose of the presentation, by Mary Bahna-Nolan, was to get feedback on the type and level of margins to be used. In general, the answer was similar margins to those used in the 2001 CSO table, with some

flexibility to have lower margins where the information was more credible.

Concern Regarding Any Disruptions Because of Financial Market Turmoil

Steve Ostlund gave an update on the potential disruptions to the insurance market, particularly XXX relief for term life, due to the financial market turmoil. He had completed a survey of companies and found that the current turmoil has not caused a solvency issue, but that prices have the potential of going up if a solution to excessive reserves is not found. The companies surveyed stated that principle-based reserves would solve much of the problem, and urged quick work on this issue.

Reinsurance Risk Transfer Report

Sheldon Summers and Tom Campbell presented a report on various reinsurance treaties that are not currently allowed in calculating statutory reserves, but where such treaties may make sense to allow under a PBA. This presentation will be considered when the LHATF makes a decision on how to handle reinsurance under a PBA.

Standard Valuation Law

The major topic of conversation of the meeting was the Standard Valuation Law and discussion of the proposed amendments to it. There were approximately 100 proposed amendments received, and LHATF has now gone through all of these proposed amendments. There are a few areas where the original authors were asked to rewrite some items. However, the goal is to have the law passed by LHATF at the September meeting.

Valuation Manual

The valuation manual is the document which contains the details on reserves. LHATF has created six subgroups which are meeting via conference calls. At the LHATF meeting, the subgroups had brief discussions and exposed the latest version of their

documentation. This included updates from the procedural issues, life reserving, reinsurance, experience reporting, health and AOMR updates, and report formats groups. All of these groups are still working and expect to have completed documents in December.

VACARVM

In San Francisco, LHATF briefly discussed the variable annuity actuarial guideline. On an interim conference call, LHATF introduced a compromise actuarial guideline for variable annuities. The compromise actuarial guideline included limits on reflecting net sharing; limits to the reflecting of clearly defined hedging strategies within the stochastic testing and adding required information regarding contract holder behavior assumptions in the supporting memorandum. Another change was to make the effective date Dec. 31, 2009.

PBR (EX) Committee

There is a Commissioner-level group which is monitoring and shepherding the PBA process through the NAIC. At the June NAIC meeting, this group heard reports on the progress of the various groups, including LHATF and a Corporate Governance Subgroup.

Summary

PBA is getting closer to reality. There are still some open questions, but there are a number of groups that are actively involved in working through the issues (e.g., regulation, examination, statutory accounting, corporate governance and taxes). We are getting closer to a reserving and capital system that will make sense for the 21st century. **□**



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Pricing and Underwriting of New Combination Products—Will We Get It Right?

by Carl Friedrich



The Pension Protection Act of 2006 includes some important tax rules affecting combination plans that feature life or annuity plans coupled with long-term care insurance (LTCI). Many of these rules will become effective Jan. 1, 2010. In some cases, the rules will be applicable to policies on the books prior to that time. Among the benefits resulting from these new rules, the most notable would seem to be the clarification of tax treatment of annuity/LTCI combination products. Under certain product designs, distributions of annuity cash values—which in the past would have triggered a taxable event—may be payable on a tax-free basis as LTCI benefits. As a result of these factors and the huge untapped market for products that address long-term care needs, there are a significant number of companies developing combination plans in various forms.

Underwriting of Life/LTCI Combination Plans

The development of such products is a welcome new direction for the industry, but

there are a number of challenges in designing and pricing these products successfully, in particular, for those companies who do not have prior experience in the LTCI arena. For example, life insurance providers may believe that they have a wealth of medical and non-medical information on life insurance applicants that should allow them to underwrite LTCI riders. Some even believe that the life insurance risk classification for a client should be applicable to the LTCI risk and charge structure. However, there are a number of considerations for the underwriting of LTCI that are quite different from those for life. In particular, this includes the importance of cognitive testing and activities of daily living assessments for long-term care.

The importance of these distinctions is dependent on the level of benefits provided by the LTCI rider. If the rider is purely an accelerated benefit rider that pre-pays life insurance benefits that would otherwise be paid upon death, the risk and cost of such coverage is greatly diminished and the need for additional underwriting is reduced. In contrast, the presence of independent benefits for LTCI that do not reduce the base plan coverage—particularly when inflation benefits are offered—increases the desirability of underwriting standards that are more closely aligned with the experiences and practices in the stand-alone LTCI market.

Underwriting of Annuity/LTCI Combination Plans

With respect to annuity/LTCI plans, there is an even greater challenge to define appropriate underwriting methods, as annuities typically require no medical underwriting, and producers have that engrained in many of their sales techniques. The introduction of a supplemental application with medical questions is one important step that compa-

nies can take to protect themselves against anti-selection by those in poor health. Designs with accept/reject questions need not cause any meaningful delay in the sales process. In contrast, the additional information needed to protect companies in the older age markets would commonly require personnel with some medical training to conduct assessments of applicants. This can delay the issuance of the policy and, of course, deny rider coverage to some applicants, which in turn could affect the underlying base plan sale.

The good news is that there are a number of vendors who have developed programs that allow for the screening of applicants through telephone interviews. These may include cognitive impairment tests that can be administered relatively simply and within short timeframes.

Pricing Assumptions

Of equal importance to underwriting is the question of financial modeling and pricing of these products. The first unknown for most companies entering these markets is the claim cost to be expected for LTCI. Reliable industry data is difficult to secure. The Society of Actuaries has compiled some studies from industry data, but it is difficult to evaluate the impact of product definitions and underwriting approaches against the averages provided in the SOA studies. Nonetheless, there are companies and consultants in the market who do have data that is increasingly credible with respect to stand-alone LTCI. This information can be extended to values expected under combination products. In addition, there is some early emerging experience on combination plans indicating that for certain plan configurations reflecting accelerated benefit provisions, incidence rates for at least shorter term claims are lower than those for stand-alone LTCI plans.

Financial Model Considerations

Another factor in modeling is the question of how to quantify the cost of a combination product compared to the cost of the underlying base plan. Some might attempt to simply quantify the claim costs expected to be paid for LTCI benefits and add that to the base plan cost. There are a number of reasons this approach may not be appropriate:

- Most combination products feature acceleration of benefits paid for LTCI that would otherwise be paid as surrender benefits or death benefits under the base plan. Thus, an offset to those foregone benefits should be factored in.
- The charges for LTCI are often expressed in terms of base plan characteristics, such as the net amount at risk. As LTCI benefits are paid out, they affect future life insurance amounts at risk, so the reduction in charges for those clients needs to be considered.
- The payout of account values related to LTC charges or LTCI benefit payments reduces future net investment earnings to the company because the invested assets are reduced.

The development of such products is a welcome new direction for the industry, but there are a number of challenges in designing and pricing these products successfully, in particular, for those companies who do not have prior experience in the LTCI arena.

- There are reserving and required capital considerations, and related tax considerations that make the quantification of income even more complex. There are general provisions in the NAIC Long-Term Care Insurance Model Regulation that, for accelerated benefit plans, prescribe a multiple decrement model utilizing all relevant decrements except for voluntary termination rates, noting that some alternatives may be acceptable.
- The presence of a rider with meaningful benefits is likely to have an impact on policy persistency, which represents

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another incremental change to the cash flows expected under the policy. It should be noted that favorable policyholder persistency on deferred annuity plans with these riders could have tremendous positive implications for lifetime profitability on these plans.

- On a related note, partial withdrawal activity and other policyholder options may trigger very different policyholder behavior depending on whether a LTCI rider is part of the coverage.

Modeling of Cohorts

The complexity of all the elements above is compounded further when one considers that many LTCI claims are short term in nature. Those recovering from claim have policy values that are different from those who had no prior claims. Those clients who are actively on claim have very different mortality expectations from healthy lives, which also must be recognized. There is also the question of the appropriate mortality assumption for those who have recovered from claim. Some companies assume that they are still substandard risks, while others assume that they are healthy. It would appear that the most accurate financial models that capture these distinctions are based on various cohorts of lives reflecting these different characteristics, with results blended within the models to produce aggregated results. It would require an extremely complex

model to capture all of these elements with total precision, but models have been built which do a very good job of addressing these factors.

Positions in the Market

Not surprisingly, at this point in the evolution of combination products, the range of charges being observed in the marketplace for these coverages suggests quite a wide variety of views on claims costs, appropriate underwriting levels, modeling approaches and pricing assumptions. In light of the new tax advantages being extended to these plans, and recognizing the pricing synergies of coupling LTCI riders with annuities in particular, it is expected that these plans will proliferate over the next few years. As sales increase, it will become increasingly important for companies to understand these issues and to model and price their business accurately. ■



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What's Hot in the United States and Canada?

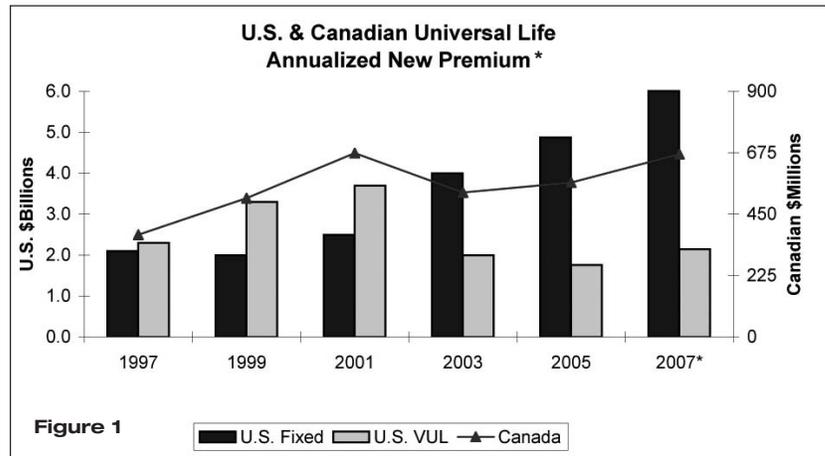
by Karen Terry

The U.S. and Canadian life insurance and annuity markets have their differences. However, when you compare sales trends for the two countries, there are some remarkable similarities in the direction of sales and product performance. This is due in part to the effect of the global economy. Financial markets do not operate in isolation and what happens in the United States and Canada affects the neighboring country's economy, as we have seen with the impact on interest rates in Canada by the recent U.S. sub prime crisis. Financial needs also cross borders. The need for financial security and investment options is the same for consumers, U.S. or Canadian. Finally, Canadian companies have entered the U.S. market and vice versa, and companies watch how products are performing on both sides of the border. Therefore, product concepts that are born in one country often find their way to the other. In this article, I take a closer look at which products are the hot products in the United States and Canada, and what we can expect for future sales for these products.

Super Hot: Universal Life

Universal life (UL) is the hot product in the United States and Canada. In the United States this refers to fixed UL. While fixed and variable universal life products combined represent 56 percent of new annualized premium, the lion's share is currently held by fixed UL, for which sales have been increasing since 1999 (See Figure 1 above). With an impressive 11 percent, 10-year compound annual growth rate, annual fixed UL sales had reached \$6 billion dollars by the end of 2007 and represented 41 percent of new annualized premium. UL continues to lead in 2008, although growth has slowed somewhat. It was the only product in the first quarter of this year to experience an increase in sales.

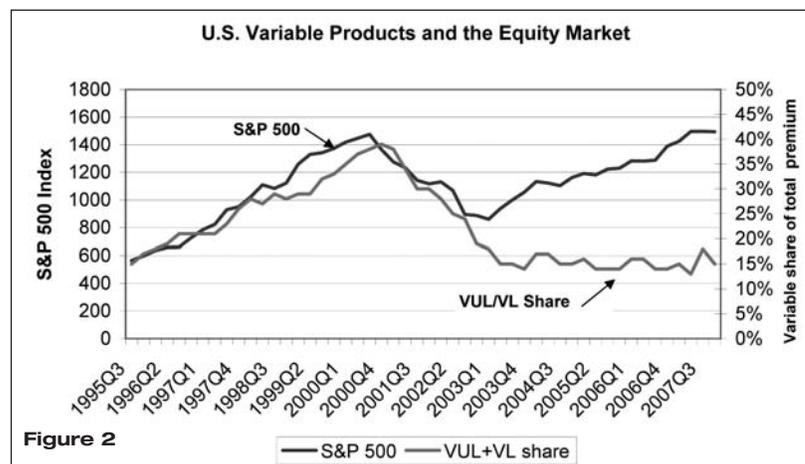
Growth for fixed UL in the United States has been driven in recent years first by the stock market downturn in 2001 when the market decline drove producers and their



* Preliminary Estimates

Source: LIMRA International Individual Life Sales Survey and LIMRA Estimates

clients away from the more volatile variable universal life (VUL) products (See Figure 2 below). Variable sales in the United States never recovered from the market decline earlier this decade due to the unwillingness of producers who went through the last market downturn to risk a backlash from their clients again. Some U.S. VUL companies have responded to the market downturn with living benefit and long-term death benefit guarantees. However, the high additional premium necessary to fund the living benefit guarantees has, up until recently, made them a hard sell.



Sources: LIMRA's U.S. Individual Life Insurance Sales, LIMRA estimates, Economy.com

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Fixed UL sales have also been driven to some degree by nontraditional market factors, such as corporate owned life insurance (COLI) and the rise of stranger originated life insurance (STOLI) sales, and by the extremely popular secondary death benefit guarantee UL (DBGUL) products.

DBGUL products have grown swiftly and peaked in 2005 with a 53 percent share of fixed UL premium. However, guaranteed UL sales have slowed recently, in part due to some companies re-pricing their products for older ages in order to reign in STOLI sales. A good portion of the initial DBGUL sales were replacements and some are theorizing that the pool of policyholders who might be replacement candidates is starting to dwindle. STOLI is also starting to appear in the sales of current assumption products as well—shifting some of that high premium growth away from guaranteed products.

Across the border, universal life in Canada is just as popular and also holds the majority share of new premium. Growth has been slightly less spectacular than that of its fixed UL counterpart in the United States, with a 10-year compound annual growth rate of 6 percent. Its growth is close to the 6.4 percent CAGR for U.S. fixed and variable UL combined however. Canadian UL products behave more like VUL in the United States. Although a handful of traditional, current assumption UL products are sold in Canada, the vast majority of UL products allow buyers to invest their premium in indices, some more volatile than others.

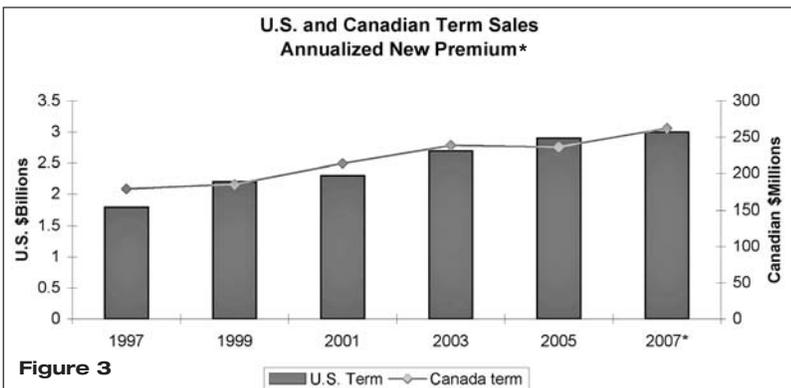
These products are not the same as U.S. equity-indexed products and do not provide the same downside protections. UL sales in Canada experienced the flight to safety seen in the United States for variable products. Unlike U.S. VUL however, UL sales in Canada have recovered, perhaps as a result of less risky indexed investment options.

The future of universal life in both the United States and Canada is dependent on a number of factors—first and foremost the performance of the stock markets and the direction of interest rates. Given the skittishness of the U.S. market, it is not surprising that VUL sales began the year with a decline. A recovery looks unlikely in the near future. Universal life sales in Canada have so far weathered the storm. Time will tell if that will continue.

Sales of UL in the United States will also be impacted by COLI and by the continued presence of STOLI sales, which produce wide swings in premium results. So far, STOLI has not been an issue in Canada and hopefully will not be going forward. Also, as we near the deadline for the new CSO tables in the United States, there may be a fire-sale in VUL as there will be new limits on the amounts people can fund their policy before it loses the favorable tax treatment given to life insurance.

Hot: Level and ROP Term

In terms of policy sales, term insurance is the leading product, representing nearly half of all policies sold in both the United States and Canada. In terms of new premium, term insurance has been a steady performer in both countries. Term sales in the United States have increased each year, with the exception of 2001. At that time, sales decreased after a dramatic increase prior to the introduction of Regulation XXX, which was expected to increase reserving requirements and therefore term prices (See Figure 3, left). Term has also increased steadily in Canada, with a 3.9 percent compound annual growth rate over 10 years. This excludes term to 100 (T-100) products, which functions more like a permanent product in spite of its name.



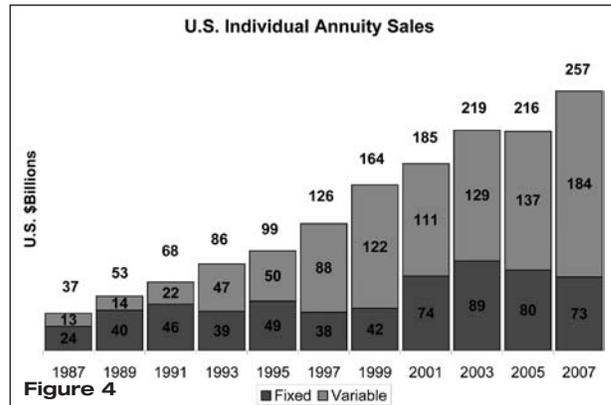
* Preliminary Estimates

Source: LIMRA's Individual Life Sales Survey and LIMRA Estimates

Specific products have been more successful than term products in general. Guarantees have also been a strong driver of term sales. Twenty-year term is the top seller in the United States at the moment, with a little over one third of new policy sales. Yearly renewable term (YRT), which accounted for one third of new policies a decade ago, now holds a minimal share of the market. Return of Premium (ROP) term has been a hot product in the United States recently as well. Sales of ROP term have helped drive increases in 15- and 30-year term products—with the most dramatic effect on 30-year term. ROP term represents about 10 percent of new premium, and about half of ROP policies are sold with a 30-year guarantee. The additional premium cost has less of an impact over a longer period, making the longer premium guarantees more appealing. This is also a product that is often sold in the mortgage market and the premium guarantee is sold to match the period of the 15-, 20- or 30-year loan.

Premium guarantees are getting longer in Canada as well. Several companies have recently introduced or increased their focus on T-30 products in response to an increase in longer mortgage loans. YRT is non-existent in Canada. The only exception to the success of longer guarantees in Canada is T-100, which again is closer to a whole life product and has been declining in recent years due to profitability issues.

Term will always be a popular product among consumers because of its affordable premiums and simplicity. Sales have slowed in the United States in recent quarters. ROP term, which had contributed to some companies' sales increases, has leveled off. The product's presence in the mortgage market has the potential to hurt growth given the current state of the U.S. housing market. Canadian term products managed a 3 percent increase in the first quarter of the year, benefiting from re-pricing and product



Source: LIMRA International, Individual Annuity Market: Sales and Assets

Individual annuity sales in the United States have grown at an annual rate of 10.2 percent since 1987. ...

A similar trend is evident in Canada.

introductions. According to a March 2008 article in the Insurance Journal, with long-term debt climbing to all time highs, term sales are expected to increase through 2008 as Canadian consumers look towards estate protection and voluminous loan balances in the event of death.

Super Hot: Variable Annuities

Annuitants are definitely a hot product in both the United States and Canada. Among the oldest members of the baby boomer generation, ensuring financial security in retirement is a top concern. Individual annuity sales in the United States have grown at an annual rate of 10.2 percent since 1987. In 2007, sales increased by 8 percent and reached a record \$257 billion (See Figure 4 above). As in recent years, sales were driven primarily by variable annuities, which grew by 15 percent over the previous year to \$184 billion (another record). Fixed annuities in the United States have languished, with some pockets of success in indexed products and qualified plans, primarily in the IRA rollover market.

A similar trend is evident in Canada. Total sales have been increasing rapidly, reaching

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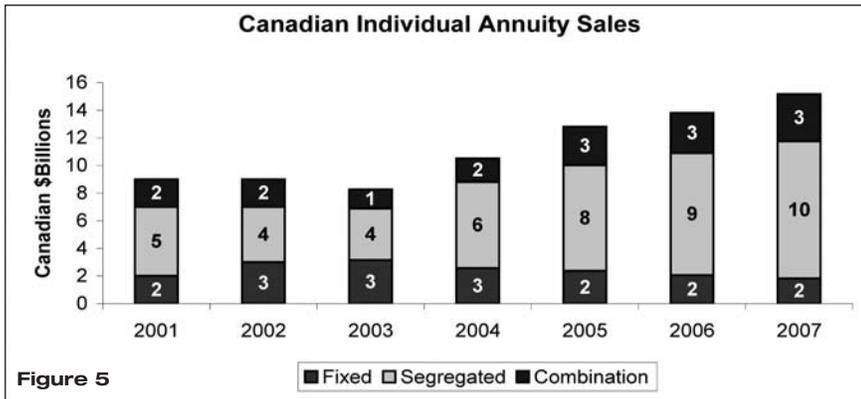


Figure 5

Source: LIMRA International, *Individual Annuities In Canada*

\$15.1 billion in 2007 (See Figure 5 above). As in the United States, annuities with the potential for a higher, variable return have been selling the best in recent years. In Canada, buyers can choose to invest their premiums in a fixed annuity, segregated fund-based annuities, or a combination product which provides both investment options. Segregated funds are tax-advantaged funds with a variable return, but also include a minimal guarantee, in which a percent of the principal is guaranteed upon death or maturity of the contract. Segregated fund-based annuities grew 19 percent in 2007 and have increased 11 percent on average since 2001. Among combination annuities, nearly 90 percent of new premium was invested in the segregated fund options.

One of the reasons for the recent expansion of U.S. variable annuity sales was the introduction and subsequent success of guaranteed living benefit (GLB) riders. Although guaranteed minimum income benefits (GMIBs) had been in existence since the 1990s, the major market downturn in 2000 through 2002 sparked new interest in guarantees and eventually led to the launch of guaranteed minimum accumulation benefits (GMABs) and guaranteed minimum withdrawal benefits (GMWBs). The latter, first marketed in 2002, did not require annuitization and were originally return-of-premium benefits. In 2004, guaranteed lifetime withdrawal benefits (GLWBs) appeared and quickly overtook the GMWB as the most popular GLB.



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In a recent LIMRA study—which represents roughly 93 percent of industry sales—the option to elect a guaranteed living benefit was available for 91 percent of newly-issued variable annuities. Of those where the benefit was available, 77 percent of purchasers elected at least one GLB.

Canadian annuity providers and producers are closely watching the recent introduction of GLBs to the Canadian market. To date, anecdotal evidence indicates these benefits are selling very well, although we do not yet have hard data to support this.

U.S. and Canadian annuity sales in the next few years should remain strong as the need for retirement planning will be high. It remains to be seen if variable products will weather the current uncertainty in the economies and stock markets in the respective companies. As of the first quarter of this year, variable sales in the United States were flat for the first time in years, while fixed annuity sales grew by 31 percent. Similarly, in Canada sales were down in the first quarter due to weak sales of segregated fund annuities. If the new GLB riders in Canada continue to take hold, they may mitigate a downturn. U.S. companies are adding to the appeal of some of their GMWB and GMIB riders including more frequent resets and inflation protection.

A Learning Opportunity

So, while U.S. and Canadian products have their differences, there are many similarities in both product types and sales performance. An analysis of each other's products provides a wonderful opportunity for companies in both the United States and Canada to watch and learn from each other's experience. The future looks bright for many of these hot products in their respective home country. It will be interesting to see going forward which product features cross the border and how those that do fare in the other market. □



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Product Development Sessions Offered at the SOA 2008 Annual Meeting

by Cathy Bierschbach



If all goes according to plan, you'll be reading this right before or on your way to the SOA 08 Annual Meeting & Exhibit. This year's meeting is taking place October 19–22 at the Orlando World Center Marriott Resort. While the sessions that have been assembled for your actuarial enlightenment may not be as thrilling as a ride on Space Mountain, they will give you a fairer representation of the recent past and near future than anything you will find at the Magic Kingdom. And, there won't be any mind-numbing sound track to go with the sessions or any hour-long queues.

The whole planning committee has done a great job in coordinating a meeting that is sure to delight, educate and inspire you. Since this is the product development newsletter, I will just focus on what your ever diligent Product Development Section Council and its friends have put together to meet your continuing education needs and desires. They have, of course, included

the perennial favorite sessions: Christine Dugan's and Elinor Friedman's "Year In Review," product specific sessions, review of recent research, and definitely worth a mention, a hot breakfast. Here are the sessions (in order of appearance):

- Session 26: Life and Annuity Product Development—Year in Review
- Session 33: 2004-05 Individual Life Experience Study Results
- Session 47: Product Development Hot Breakfast
- Session 67: Protection Products: Present and Future
- Session 78: The Fundamentals and Practical Considerations of Life Insurance Company Expenses—A Teaching Session
- Session 85: SOA Survey Results on Alternative Tools for Mortality Risk Management, Early Duration Claims and Life Settlements
- Session 106: Payout Annuities: The Past, The Present and the Future
- Session 128: Indexed Products.

They have also put together three other exciting sessions for your enjoyment:

- Session 15: Applications of Product Development Tools and Techniques from Other Industries.

Andy Ferris coordinated this session to showcase some of the tools and techniques used by other industries that might just help us design better widgets as well.

- Session 61: Hot Topics in Life Insurance Products and Marketing.

This session is the case of so many issues, so little time. We have an outstanding team working on covering some of the topics and concerns that didn't quite fit in another session and possibly wouldn't fill up a full session as a stand-alone. I'm sure everyone should be able to find at least one take-away from this session.

- Session 90: Aging Population: Opportunities and Risks.

This is a joint session with the Pension Section which focuses on a topic we all must address in at least some fashion.

Don't forget to give your feedback through those ubiquitous evaluation forms. Our volunteer speakers work for free, so be gentle and don't forget to give them some well-deserved pats on the back. Feel free to contact us with ideas for future meeting topics (especially if you would like to volunteer to coordinate said session).

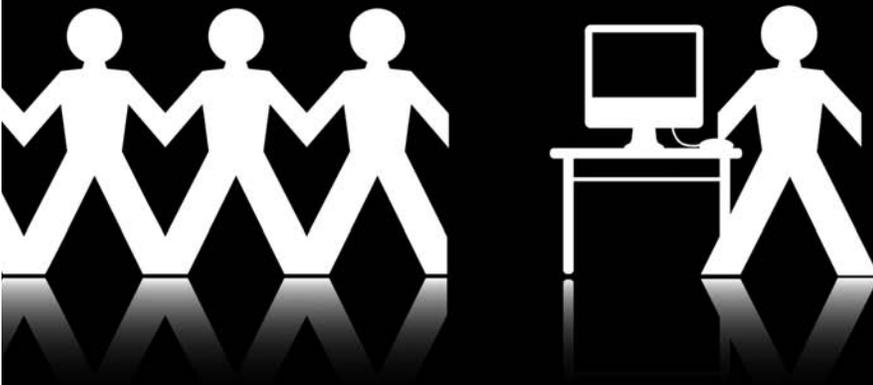
Hope to see you all at the meeting! ▣



Cathy Bierschbach, FSA, MAAA, is vice president of Transamerica Insurance & Investments in Los Angeles. She can be reached at cathy.bierschbach@transamerica.com.

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SESSION 67	Tuesday, October 21	10:30 a.m. – Noon
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Protection Products: Present and Future

SPONSORED BY THE PRODUCT DEVELOPMENT SECTION

This session will include an exploration of recent trends and current issues facing secondary guarantee UL, term and current assumption (low cost) UL products.

SESSION 90	Tuesday, October 21	2:30 – 4:00 p.m.
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Aging Population: Opportunities and Risks for Companies and for Actuaries

SPONSORED BY THE PRODUCT DEVELOPMENT SECTION

Attend this session as experts explore the impact of the aging population on the insurance industry. The goal will be to highlight specific risks and opportunities both for companies and for actuaries.

Actuaries
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