PRODUCT DEVELOPMENT SECTION

"A KNOWLEDGE COMMUNITY FOR THE SOCIETY OF ACTUARIES"

Where Creative Design Meets Market Needs — Society of Actuaries — Product Development Section

Product Matters!

Published in Schaumburg, Ill. by the Society of Actuaries October 2007 • Issue No. 69

Chairperson's Corner: A Call to Innovation

by Jeffrey A. Beckley

Longevity risk is receiving a lot of attention. Your section council has discussed the need for research in this area. Last week I attended the Actuarial Research Conference, where longevity risk received considerable discussion. I observed that much of this discussion centered on managing the longevity risk being assumed by life insurance companies. However, consumers are subject to longevity risk. As a result of the baby boom bubble and longer life expectancy, many retiring today face a risk of outliving their retirement savings. There is a great need in our society today for an innovative approach to longevity risk from the consumers' standpoint.

As product development actuaries, we are often asked to be innovative. In this issue of *Product Matters,* Tricia Matson writes an interesting article which questions whether a company really gains (either financially or through reputation) from being an innovator. I believe that while the benefits of innovation are debatable for the individual company, the insured public definitely gains from product innovation. Additionally, I would argue that as a result of innovation the industry benefits even if the innovative company does not.

With regard to longevity risk, one can argue that the life industry already offers immediate annuities, which are the perfect product. The counterpoint to this argument is the public is not buying.

There are more innovative products that are attempting to address this risk—for example, the availability of deferred payout annuities. These products offer a payout that begins at an older age (e.g., age 75). They do not provide a cash surrender value and may or may not provide a death benefit. However, the advantage is that they are relatively inexpensive and provide protection against an extended lifetime. The reversionary annuity is another product that is available in the marketplace to hedge longevity risk. For those that have forgotten their life contingencies, a reversionary annuity begins making payments to the annuitant upon the death of a second life. If the annuitant predeceases the second life, no benefits are payable.

Product actuaries need to step outside the box and develop better solutions. If we do not address this clear need, other players in the financial market will fill this void. For example, look at the success of the reverse mortgage market. The Product Development Section and the Committee on Life Insurance Research are both interested in funding research in this area. If you have a research idea that you want to explore further, please contact me.

Come on product actuaries, let's find a solution. □

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Actuaries
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Published by the Product Development Section
of the Society of Actuaries
475 N. Martingale Road, Suite 600
Schaumburg, Ill. 60173-2226

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Web: *www.soa.org*

This newsletter is free to section members. Current-year issues are available from the Communications Department. Back issues of section newsletters have been placed in the SOA library and on the SOA Web site: (www.soa.org). Photocopies of back issues may be requested for a nominal fee.

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Innovation in Annuities: Panacea or Waste of Time?

by Tricia Matson

As anyone working in product development knows, creating innovative products is an important consideration. This is particularly true in instances in which there is significant demand for new products and intense competition for market share. A somewhat extreme example of new product innovation comes from the pharmaceutical industry, in which the bulk of a company's expenses are invested in research and development, competition is fierce, and the availability of patents typically allows market leaders to secure a dominant position and blockbuster sales for several years. Specifically, one good example of a new product from this industry was Pfizer's introduction of Prilosec, a heartburn drug, in 1989. Though several similar drugs were subsequently launched (such as Prevacid by TAP Pharmaceuticals and Nexium by AstraZeneca), sales of those market followers significantly paled, and still pale, in comparison to the $2 billion of annual sales of Prilosec. Perhaps an even wider known win by innovator Pfizer is Viagra, introduced in 1998. Though two competing drugs followed around 2004, most readers of this article likely couldn't name either of them; yet is there a person on earth who hasn't heard of Viagra?

Some might say that in the 1980s universal life, or more recently variable annuity GMWBs, are the Viagra of the insurance industry. But such a comparison is a bit of a stretch—innovation in insurance is a different animal due to the very different marketplace. Patents are not available, and as we've heard many times, insurance is not bought, it's sold. This need to "sell" insurance—in other words convince buyers that it is actually something they need—and the fact that the majority of consumers struggle to fully understand the increasingly complex features of today's insurance products, creates a very different competitive landscape and incentives around innovative product development.

In light of the very different marketplace, how important is speed to market for insurance companies? Does a "market leader" product strategy really result in better performance, or are companies acting as "fast followers" more likely to reap economic rewards? While it is obviously difficult to answer these questions, there is some evidence to suggest that being the first to market in the variable annuity market may not be the key to financial success.

Deloitte Consulting performed an informal survey of seven large variable annuity writers in the United States. The information gathered in our survey included topics such as organizational structure, product development processes and systems, typical time to market, typical number of new product offerings per year and product

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development strategy. We also asked participants to give us their perception of their competitors' product strategy. Some of our key findings are summarized in the following paragraphs.

The majority of companies were organized by business unit, with the annuity division operating separately from other divisions (such as life insurance and group business). One company was organized to align with distribution, and one was organized by function. There was no apparent connection between organizational structure and innovation or success of product launches.

The typical time to market ranged from six to 10 months on average, with the majority of respondents being closer to the six-month time frame. The company with the slowest time to market was also the company perceived by the market to be a relatively slower follower. There was no apparent correlation between speed to market and those companies viewed as market leaders versus fast followers.

There was a wide variety in number of new product offerings per year (with new product defined to include new riders and significant enhancements to existing products). The range was from approximately one new product to as many as 10 new products in a year; however most respondents offer between two and four new products. Interestingly, of the two companies reporting that they only offer approximately one new product per year, one was viewed by the market as a relatively slower follower, and the other as a market leader.

All companies surveyed used formal product development teams that were staffed and managed by a resource internal to the product development division. They used shared information technology (IT) resources for new product development coding, and most cited IT as a limiting factor for putting out new products. Those companies that considered their product development culture as entrepreneurial were also generally the companies with "innovator" or "market leader" strategies.

Of the seven companies we interviewed, three defined their strategy as a market leader, three as a fast follower, and one declined to respond. Perhaps the most interesting finding of our study was the inverse relationship between internal strategy and market perception. All three companies with a fast follower strategy were generally viewed as market leaders by their competitors, and all three companies with a market leader strategy were viewed as fast followers by their competitors. In addition, while we specifically selected companies for our survey that have the most sizeable VA blocks, only two of the companies in our survey were first to market with a specific VA rider (for example WB, IB, etc.). And those two companies were both viewed as fast followers by their competitors.

In addition to the survey results, we looked more generally at companies who were the first to market with some of the key variable annuity riders (GMIB, GMWB, GMWB for life, etc.) to determine the extent to which innovation boosted their overall VA sales. While these new introductions clearly provided some benefit to the innovators, in almost every case it appeared to benefit a small number of fast followers to an even greater extent. Beyond that, we found that in many cases the industry impression is that the strongest fast follower was actually the first to market with the product.

While clearly there are many limitations to the survey, it does provide some evidence that a strategy of product innovation may not be the most advantageous path to sales growth, and that fast following, done well, can be the real panacea for annuities. □

Some Observations Regarding the Most Recent SOA Individual Life Experience Study

by Doug Doll and Jeff Dukes

The Society of Actuaries (SOA) recently released the results of its individual life experience study covering experience between 2002 and 2004 anniversaries. The results are on the SOA Web site, and consist of a report by the Individual Life Insurance Experience Committee (ILEC), and two pivot tables of results (described later in this article).

The SOA's experience studies are important to the U.S. life insurance industry. Not only do they serve as the basis for regulatory tables (e.g., the 2001 VBT table was derived from the 1990–95 experience study), but individual companies use these tables to help them develop their own assumptions, as few companies have fully credible data of their own.

We are members of the VBT Team of the AAA/SOA Joint Preferred Mortality Project Oversight Group, and had access to preliminary versions of the 2002–2004 study results that included plan specific results not in the final report. We also had access to a secondary set of data with additional preferred underwriting criteria scoring (the UCS data). As a result, we have some insights and data, beyond what is given in the ILEC report, that we believe will help readers interpret the ILEC results. We also wish to alert readers to potential reasons why the results may not be indicative of what should be expected for currently issued business.

Background and Data Limitations of the 2002–2004 Study

For the 1996–2001/2000–2001 study, 10–12 companies contributed data for 1996–2000, but 21 companies contributed data for 2000–2001. The 2002–2004 study reflects the experience of 35 companies.

Unfortunately, the rapid increase in the number of participating companies, coupled with efforts to obtain more extensive and useful information, may have contributed to difficulties in maintaining a high degree of confidence in the accuracy of the results. Work on the 2002–2004 study uncovered significant problems in the data underlying the 2000–2001 study. Those errors produced material overstatements in the overall A/E ratios, and the 1996–2001/2000–2001 results have been removed from the SOA's Web site. Moreover, the November 2005 version of the 1996–2001/2000–2001 study already reflected several corrections to a prior version which had been released on CD at the SOA's 2004 Annual Meeting.

The data call for the 2002–2004 study sought information that would greatly increase the usefulness of the experience study.

The data call for the 2002–2004 study sought information that would greatly increase the usefulness of the experience study. In particular, it requested detailed information on:

- Product type, including identification of the level premium period for term products; and
- Risk class structure, including the number of smoker and nonsmoker classes for each product and each policy's specific risk class.

Late in the process for finalizing the 2002–2004 study, it was found that a size-

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able block of non-term experience was inadvertently included with the term experience. The ILEC concluded that they were not confident that there are not additional errors in the data by plan. As a result, the 2002–2004 study does not provide any information on experience by product type. The ILEC results do show results for risk class structure but inconsistencies with the UCS results makes us suspicious of the accuracy of the ILEC results by risk class, as well. More information on both of these points is provided later in this article.

The final point to note is that the data is not homogenous by duration (which is nearly always the case for studies that cover many issue years of business). Clearly, the later duration experience reflects business issued long ago, when underwriting standards and product mix were different than today. For example, smoker/nonsmoker rates did not become prevalent until the early 1980s (the study classifies all business prior to 1980 as "unknown" smoking status, and we suspect some of the early 1980s data may be classified as smoking or nonsmoking when, in fact, it is unismoke). As another example, blood testing and preferred risk underwriting became common in the 1990s, which means that business issued prior to that time may exhibit somewhat higher mortality than expected on business issued today. And, finally, there is a large unknown homogeneity issue in that the mix of business by companies can vary greatly by duration, as some companies contributed relatively more exposures at later durations than at the early durations.

Overview of the 2002–2004 Industry Mortality Study

The ILEC report says that the experience reflected in the 2002–2004 study is supposed to:

- Include standard, individually underwritten life insurance.
- Exclude substandard or rated business.
- Exclude simplified issue and guaranteed issue business.
- Exclude "converted" issues. Based on e-mail exchanges with the SOA, we believe this is only intended to mean term conversions for which information on the original issue date is not available. The intent was to include in experience term conversions for which duration is measured from the original issue date.
- Exclude business in force under nonforfeiture provisions (RPU and ETI).

The extent to which these objectives were met depends on the accuracy of each company's data submission and the processing of that data by MIB. There is, for example, a substantial volume (by count) of recently issued experience at face amounts under $10,000, and it is our understanding that the SOA has found that at least some of that experience is from term conversions with duration measured from the date of conversion, i.e., business that should have been excluded from the study.

One of the two pivot tables provided for the 2002–2004 study, which we will refer to as the Full Table, includes all of the experience provided by the 35 companies that participated in the study. The Full Table allows the user to summarize select (i.e., policy durations 1–25) experience for both 2001 VBT and 1975–80 expected bases by any combination of:

- Observation Year.
- Gender.
- Smoking Status.
- Face Amount Band.
- Issue Age Group.
- Duration Group.
- Risk Class Rank Indicator.

The Risk Class Rank Indicator has values of one or zero. A value of one means that preferred/residual class distinctions were present and identified in the data submitted. A value of zero means either (a) the business did not have preferred/residual risk classes or (b) the contributing company was unable to accurately identify risk class even though the business did have multiple risk classes.

The Full Table also allows you to summarize ultimate (i.e., durations 26-plus) experience by:

- Observation Year.
- Gender.
- Face Amount Band.
- Issue Age Group.
- Attained Age Group.

All of the ultimate experience is deemed to have an "unknown" smoker status since the study assumes that the smoking status of any business issued prior to 1980 is unknown.

A second pivot table, which we refer to as the **Preferred Table**, was also provided with the 2002–2004 study results. This table includes only the portion of the experience in the Full Table that has a Risk Class Rank Indicator of one. For a given smoking status, only experience for business with at least two risk classes (e.g., preferred and residual standard) is included in the Preferred Table. In addition to the breakdowns permitted by the Full Table, the Preferred Table has a Risk Class Rank Band pivot variable which takes on values of one, two or three. The experience of the best preferred class is assigned to Risk Class Rank Band one. The experience of the worst (residual standard) class is assigned to Risk Class Rank Band three. The experience of all other preferred classes (e.g., classes two and three of a four-class structure) is assigned to Risk Class Rank Band two.

Some Comments on the Full Table Experience Results

As mentioned previously, the Full Table does not allow you to distinguish term experience from, say, traditional permanent or universal life experience, because a sizeable block of non-term experience was incorrectly classified as term. Even without that problem, no version of the Full Table we saw would have allowed the user to break down experience by product type in any greater detail than Term, Permanent and Other. Consequently, there is no way to filter out the effects of lapse anti-selection on term business by, for example, removing experience for durations 11-plus for 10-year level premium term plans. Similarly, it is not currently possible to use the study to measure term anti-selection. Companies are keenly interested in this information and the data requested for the 2002–2004 study should have permitted the analysis of experience by product type and level premium period, but evidently not many contributing companies were able to accurately provide the information requested.

Other minor points not mentioned in the ILEC report are:

- Experience for issue ages 88-plus was excluded from the 2002–2004 study because the so-called Milliman extension used to calculate 1975–80 expected claims for issue ages 71-plus does not have mortality rates beyond issue age 87. In addition, ultimate experience was cut off at attained age 99.

- There is both smoker and nonsmoker experience for juvenile issue ages (including issue age zero). It would make more sense to assign all juvenile experience the same smoking status.

The next two tables show a breakdown by issue age and duration group of the male,

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nonsmoker select experience for face amounts of $100,000–$2,499,999. Experience is shown on both the 2001 VBT and 1975–80 expected bases, for all plan types combined and also for term and non-term plans. Note that the experience for durations 21–25 is limited as there is no nonsmoker data prior to issue year 1980.

Table 1
2002–2004 Experience by Amount
Male – Nonsmoker - $100 – 2,499K
2001 VBT Expected Basis*

Plan Types	Issue Ages	1-5	6-10	11-15	16-20	21-25	1-25
All	18-29	73.6%	68.1%	65.6%	70.4%	55.6%	69.4%
	30-39	62.1	60.5	65.2	63.7	64.8	62.8
	40-49	63.7	60.9	62.8	64.9	59.1	62.8
	50-59	67.5	61.7	63.7	63.9	63.7	64.4
	60-69	72.5	68.6	69.3	70.1	63.5	70.0
	70-79	88.1	68.9	72.1	77.2	36.8	75.8
Non-Term	18-29	83.2%	62.4%	64.9%	76.5%	63.5%	71.5%
	30-39	81.1	66.4	63.7	64.5	56.9	66.6
	40-49	81.3	64.9	54.8	62.7	58.6	63.0
	50-59	82.4	65.0	58.6	59.0	62.6	63.3
	60-69	93.7	65.4	67.5	66.9	61.2	69.7
	70-79	98.6	71.3	70.8	74.3	37.1	77.7
Term	18-29	69.0%	73.7%	66.8%	51.5%	38.4%	67.0%
	30-39	57.5	57.6	67.0	61.4	80.7	59.9
	40-49	59.5	58.7	76.4	77.6	61.7	62.6
	50-59	63.7	59.2	80.8	120.1	72.9	65.6
	60-69	63.5	74.2	80.9	106.0	79.7	70.5
	70-79	63.2	43.5	89.6	135.7	0.0	64.3

* Highlighted A/Es have fewer than 100 actual claims.

Table 2
2002–2004 Experience by Amounts
Male – Nonsmoker - $100 – 2,499K
1975-80 Expected Basis*

Plan Types	Issue Ages	1-5	6-10	11-15	16-20	21-25	1-25
All	18-29	45.8%	49.6%	47.7%	51.0%	37.4%	47.7%
	30-39	32.7	35.9	40.3	38.7	39.4	36.3
	40-49	31.0	36.6	39.6	38.9	36.8	35.5
	50-59	37.4	39.7	44.9	40.3	44.4	40.1
	60-69	42.1	48.2	58.9	50.3	51.5	49.0
	70-79	56.9	48.9	62.7	64.2	34.0	55.7
Non-Term	18-29	52.6%	45.4%	47.4%	55.5%	43.0%	50.3%
	30-39	42.7	39.6	39.4	39.2	34.6	39.7
	40-49	39.4	39.5	34.6	37.6	36.5	37.4
	50-59	45.7	42.6	41.4	37.3	43.7	41.2
	60-69	54.3	45.9	57.4	48.0	49.7	51.2
	70-79	64.6	50.9	61.5	61.7	34.2	58.0
Term	18-29	42.6%	53.7%	48.4%	37.2%	25.3%	44.8%
	30-39	30.2	34.1	41.3	37.4	49.1	34.0
	40-49	29.0	35.0	48.0	46.3	38.5	34.1
	50-59	35.3	37.6	56.6	75.6	51.1	39.0
	60-69	36.9	52.3	68.2	76.1	64.1	45.2
	70-79	39.6	29.3	78.5	113.4	0.0	42.9

* Highlighted A/Es have fewer than 100 actual claims.

The third table adds female data, eliminates the $1,000,000–$2,499,999 band and combines issue ages to reduce fluctuations, and shows results on the 2001 VBT expected basis for more detailed durations.

Table 3
2002–2004 Experience by Amounts
Nonsmoker - $100 – 999K
2001 VBT Expected Basis*

Plan Type and Sex	Issue Ages	1	2	3	4-5	6-10	11-15	16-20
All Male	18-49	60.0%	67.3%	72.3%	65.6%	62.8%	64.9%	66.2%
	50-79	64.9	81.1	81.3	71.7	65.5	70.5	66.6
All Female	18-49	46.8	57.0	69.1	60.8	57.3	59.9	54.0
	50-79	47.5	62.3	70.2	71.8	73.9	68.1	70.7
Non-Term Male	18-49	64.3	75.8	67.6	86.4	66.7	60.2	66.0
	50-79	99.6	100.2	96.8	87.2	69.1	66.3	63.7
Non-Term Female	18-49	51.7	83.7	82.7	64.2	56.8	57.9	52.9
	50-79	46.0	94.6	73.5	70.9	77.8	66.2	70.6
Term Male	18-49	58.8	64.9	73.9	59.9	60.6	72.0	67.0
	50-79	52.8	74.4	74.5	65.9	61.3	88.2	100.5
Term Female	18-49	45.4	49.7	64.8	59.8	57.5	62.4	56.7
	50-79	48.5	41.6	67.3	72.7	61.3	80.7	71.9

* Highlighted A/Es have fewer than 100 actual claims.

Following are some observations on the preceding tables:

- The Term and Non-Term results are, of course, tainted as described previously; however, we believe that these results do somewhat follow our expectations. We think it is possible that the Term/Non-Term breakdowns might still have value, particularly if we assume that (a) the volume of mismapped Non-Term is not extremely material for these face amounts and durations or (b) A/Es for the mismapped Non-Term are similar to those for the Non-Term.

- The large drop in Table 1 Non-Term A/Es from durations 1-5 to 6-10 suggests that the slope of the 2001 VBT is too steep in the early durations. For issue ages 30-59, there is an additional drop from durations 6-10 to 11-15. These decreases would be consistent with:

  – Skewing of S/NS and early preferred underwriting experience to early policy durations of the 1990–95 experience underlying the 2001 VBT.

  – Skewing of blood testing benefits to early policy durations in the 1990–95 experience.

- Term ratios do not drop as much as Non-Term in durations 6-10, and there is a sharp increase in Term A/Es in durations 11-15, which suggests the possibility of term anti-selection.

- The drop in Table 2 Non-Term A/Es in durations 16-20 for issue ages 50-59 and 60-69 is at least partly due to discontinuities between the select and ultimate rates in the 1975–80 table at those issue ages.

- Non-term ratios are generally higher than term ratios in the first 10 durations, with the largest differentials being for male issue ages 50-79 in durations 1-5. We do not have a clear

explanation for this, but it suggests that there is a significant amount of non-term business that was subject to less rigorous underwriting standards than term.

- The ILEC report notes a "sharp increase at duration three corresponding with the end of the contestability period." This was based on the all face amounts ratio (based on 2001 VBT) going from 70 percent in duration two to 78 percent in duration three. The duration three phenomenon is less apparent in Table 3 (at least, not for ages 50-79); however, we note that it appears more strongly in the $1,000,000-2,999,999 size band. It also exists in the below $25,000-99,999 size band, so it is not solely a function of large policies being subject to after issue underwriting in the contestability period.

Some Comments on the Preferred Table Results

A separate initiative was undertaken at the time of the 2002–2004 study that involved asking companies with multiple nonsmoker or smoker risk classes to provide information on their preferred underwriting requirements at the time that business was issued. A team of actuaries and underwriters developed a scoring system that attached an Underwriting Criteria Score (UCS) to each set of underwriting requirements. A separate report describing in more detail the way underwriting criteria were scored is being drafted and is expected to be published by the end of this year. Inasmuch as the UCS report has not yet been published, the UCS results summarized below should be viewed as preliminary.

As a result, it was possible to assign a UCS to each policy in a subset of the data underlying the Preferred Table. A pivot table, the UCS Table, was developed that allowed the user to summarize mortality experience by sex, smoking status, number of risk classes, risk class rank, face amount, issue age, duration and UCS.

As shown in Table 4 below, relationships between worst class and best preferred class A/Es in the Preferred Table of the ILEC study are very different from those in the UCS Table. There are a total of 10,639 actual deaths underlying the experience in the Preferred Table for issue ages 25-plus, durations 1-10 and face amounts of $100,000 to $2,499,999. The corresponding number of actual deaths in the UCS Table is 6,280.

Table 4
Ratio of Worst Class A/E to Best Class A/E (2001 VBT Expected)
Issue Ages 25+ - Durations 1-10 – Face Amounts of $100 - $2,499K

		For UCS Data by # of Risk Classes				ILEC Experience
Sex	S/NS	2	3	4	5	2 or More Risk Classes
Male	Nonsmoker	1.97	1.97	2.11	2.33	1.44
	Smoker	1.52	NM	NA	NA	1.24
Female	Nonsmoker	1.83	1.95	1.53	NM	1.63
	Smoker	1.55	NM	NA	NA	1.51

Notes: 1. NM means an immaterial # of deaths (fewer than 20) for at least one of the A/Es in the ratio.
2. Highlighted ratios mean at least one of the A/Es in the ratio had fewer than 100 (but at least 20) deaths.

It is our understanding that the UCS experience was subject to additional data scrubbing, and we believe it to be more reliable than the data in the Preferred Table of the ILEC study. We believe that some changes made for the UCS study were not made to the data for the ILEC report. As an example of the differences, if experience is summarized by number of risk classes and risk class rank, which was possible with a version of the ILEC Preferred Table provided to the Preferred VBT team, then one finds 298 actual deaths for the best male, nonsmoker preferred class in a three-class structure, but the corresponding number for the UCS Table is 386. Since the experience underlying the UCS Table is a subset of the experience in the Preferred Table, this difference indicates that some sort of remapping must have occurred.

A large portion of the extra experience in the ILEC data is two-class business, which

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would be expected to have a lower difference between worst and best preferred class. However, even on an "apples to apples" basis, there seems to be a significant difference between these two data bases. For example, using the prior version of the Preferred Table, we find the ILEC ratio of worst to best preferred class for three-class male nonsmoker is only 1.38, versus the UCS ratio of 1.97.

We also note that the relative mortality between the worst and best classes for the UCS Table is more consistent with the expectations of reinsurers and direct writers that were captured in the SOA's preferred underwriting surveys of a couple of years ago.

Summary and Conclusion

As previously noted, these experience studies are important to the U.S. life insurance industry. We applaud the efforts of regulators and the SOA to expand both the number of contributors and the types of data gathered. However, we believe that more needs to be done to improve the accuracy of the data submitted and to improve the reliability of results so that the key additional information (such as plan type) can be reported with confidence. We understand that there are confidentially issues, but a better way to scrutinize individual company results would be good. A side benefit of this would perhaps be insights as to how the aggregate results are skewed by changes in the mix of contributing companies by duration, product type, etc. Individual companies are provided their own results prior to finalizing the study, but it is not clear whether they are always reviewing these results carefully. Although the SOA is in the process of gathering data for years after 2004, having a separate effort to clean up the outstanding issues relative to the 2002–2004 study might identify ways to better perform future studies. □

NAIC June '07: All PBA, All the Time

by Donna R. Claire

The June 2007 NAIC meeting was held in San Francisco. As with the last few meetings, the major topic of the Life and Health Actuarial Task Force (LHATF) of the NAIC continues to be principles-based approaches (PBA) to reserves and capital. This is also a major topic on conference calls of the Life Capital Adequacy Group on the NAIC, as well as a Commissioner-Level Principles-Based Reserving—PBA (EX) Group.

PBA (EX) Group: First I want to mention the work of this group. This group, chaired by Commissioner Hampton of Washington, D.C., is responsible for shepherding the PBA project through the numerous affected NAIC groups (e.g., capital, accounting and examination groups would be affected by PBA). They have developed a proposed set of regulatory principles for PBA, which can be found on the NAIC Web site: *www.naic.org*.

New Chair of LHATF: Congratulations are in order to Larry Bruning, new chair of LHATF, and Leslie Jones, new vice chair of LHATF. They certainly picked an exciting time to step up to the plate!

SVL2/PBA: I gave an update on a number of the American Academy of Actuaries' PBA/SVL2 groups. We are on track to complete the technical actuarial work in 2007; the regulators and the industry need to feel comfortable/make any needed changes with all the proposals before it is implemented. One possible timetable is to have the technical work completed in 2007, the law and valuation manual passed in 2007/2008, with state adoption in 2009 and going live in 2010. Note that the capital changes may be on a different timetable—it is possible that this could apply to all life insurance in force by year-end 2008. There will be an Academy webcast on June 20 to update everyone on this project. More details are available at *www.actuary.org*.

Reinsurance: Sheldon Summers gave the update on the Academy's Life Reinsurance Group. They are working very hard to determine how reinsurance could be affected by PBA and to propose any changes needed to various proposals and regulations to accommodate reinsurance.

Preferred Mortality: I gave a brief update on the overall Preferred Mortality project, and Mary Bahna-Nolan, chair of the Preferred Mortality Basic Table Group, provided details on their work. Mary's group is working very hard to meet the goal of delivering a set of tables by September.

Valuation Manual Team: Mike Boerner, chair of the Academy's Valuation Team, gave an update of the work of his group. They have done a tremendous amount of work. There are over 50 volunteers, split into four subteams (new PBA rules, current rules, experience studies and low-risk products). Mike provided a draft of the manual to LHATF. This draft gave an overall outline as

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well as some sections of the manual. LHATF exposed this draft for comment. This document will be available on the Academy's Web site: *www.actuary.org.*

LRWG: Dave Neve, chair of the Academy's LRWG, gave an update on the Life Reserve Work Group work. They have made minor modifications to the proposed regulation, which is expected to become part of the Valuation Manual. The LHATF voted to expose these drafts separately from the Valuation Manual. These documents will be available on the Academy Web site.

SVL2: Katie Campbell, new chair of LHATF's SVL2 Group, led a discussion of LHATF on various aspects of the proposed revisions to the Standard Valuation Law. These are exposed for comment on the NAIC Web site: *www.naic.org.*

VACARVM: Tom Campbell, chair of the Academy's VACARVM Group, reviewed the Academy comments on the proposed regulation for variable annuities. Because there is a survey on VAs out, LHATF did not expose these comments at this time. They will be available on the Academy's Web site.

Nonforfeiture Improvement Work Group: John MacBain, chair of the Academy's SNFL Group, gave an update on the work of the Academy's Standard Nonforfeiture Law Group. This meeting discussed issues related to the long-term solution incorporating new ideas into nonforfeiture. It is recognized that this work will take time, but it is important work for the consumer and for the future of the industry.

Pre-Need Mortality: Mike Villa gave an update on the pre-need mortality study being conducted by the Society of Actuaries. The work done clearly shows that the 2001 CSO Table would not produce adequate reserves for this product. The SOA has prepared an alternative table. There will be an Academy group to review the information and work with LHATF to possibly propose a regulation to deal with this product.

Pandemic Risks: Tom Edwards gave a summary of the SOA study on pandemic risks. The CDC defines a "severe" pandemic as one comparable to the 1918 flu epidemic, which had an increase of 6.5 deaths per 1000. The SOA work showed that, overall, the life insurance industry would be able to withstand a severe epidemic (although there may be disruptions at certain companies or reinsurers).

Group Term Life Waiver of Premium Model Rule: Shawn Loftus, chair of the Academy's Group on Group Term Life Waiver, gave an update on the progress of his group to date. The SOA has done a study on this, and the Academy is using this information to develop a proposed regulation which would adopt new rules for reserves for this product.

This group will have a proposed regulation available by the September NAIC meeting.

GRET Factors: The SOA has prepared the 2008 Generally Recognized Expense Table factors. These were exposed for comment by LHATF. There are differences from the 2007 table factors, most notably more categories of types of companies, so, if the illustration actuary is using the GRET factors, this document should be reviewed.

Actuarial Guideline TAB: The actuarial guideline on the interim solution allowing 2001 CSO split for preferred mortality was passed by LHATF.

Statistical Agent: LHATF voted to set up a subgroup to work on what the rules would be for a statistical agent and how it would be funded. The statistical agent is the one that would collect the experience studies data required under Actuarial Guideline TAB (and expected to be required under PBA as well).

Major progress has been made on PBA, and the September 2007 NAIC Meeting in Washington will advance the PBA project even more. For more details on the PBA project, go to *www.actuary.org/risk.asp.* □

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Secondary Guarantee Universal Life: Protection versus Accumulation

by Donna Megregian and Rob Stone

In the last issue of Product Matters, we discussed how protection-oriented secondary guarantee universal life (SGUL) products are affected by various reserve regulations and potential structured-finance solutions. Understanding SGUL reserves and how profitability of SGUL products is affected by any change in reserves are both important concepts to the product development actuary.

We'd like to provide a different perspective on SGUL designs by comparing a protection-oriented design to an accumulation-oriented design. This will allow us to view the risks of a secondary guarantee within both protection and accumulation products.

Protection-Oriented Product

The protection product modeled is a shadow fund design. Lifetime guarantee premiums were created to be competitive in the market for fourth quarter 2006. The designed shadow fund uses a relatively high load on paid premium in excess of target premium to ensure that single-pay and quick-pay premiums derived via the shadow fund are not so aggressive as to be unprofitable. The modeled product illustrates only level-pay policies. Profit measures for the protection product are shown in Table 1.

As designed, and without any surplus relief in place, this sample product presents the writing company with substantial reserve strain and limited profitability. Because of the limited account values that are produced in protection-oriented products, the company has fewer levers in the form of interest spreads and cost-of-insurance adjustments to help manage future profitability.

Moving beyond deterministic pricing, 100 interest rate scenarios run through the model indicate additional downside risk when current interest rates are insufficient to support account values (and provide spread income) for a sufficient number of years. Stochastic results are shown in Table 2.

Most competitive products require aggressive assumption-setting from a lapse and mortality standpoint. Because these products tend to be lapse-supported, companies need to be comfortable with the lapse rates being projected.

Additional design issues that should be tested carefully include ensuring that the flexibility of the shadow fund does not permit unprofitable quick pay premium. Also troublesome is the developing secondary market, which causes more concern around the companies' comfort level with its lapse assumption.

Accumulation-Oriented Fixed SGUL

An accumulation-oriented design was created from the protection-oriented shadow fund design, with some adjustments made to lower loads and interest-rate spreads so as to improve the account value accumulation. Additional changes in the modeled assumptions include an increase in the lapses and expectation of higher premiums. This article assumes that accumulation products receive a level premium in line with competitive endowment premiums in the accumulation universal life (UL) market, but not less than the minimum to carry the shadow fund over the life of the policy. The revised account-value mechanics combined with the endowment premiums endow the policy on a current assumption basis.

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Designed to earn a deterministic return similar to that of the protection product, profit measures can be seen in Table 1. One hundred interest rate scenarios run through the model produce results displayed in Table 2. Results appear to indicate that there is less tail risk than the protection product, but care should be taken not to over-generalize this conclusion as higher lapse rates and level of paid premium are projected for the accumulation product.

The accumulation product, as designed, does increase the number of years before the secondary guarantee is in the money (meaning the account value is less than zero but shadow fund is positive). Predicting and modeling policyholder behavior is key to the pricing process. There is no guarantee that a product with the ability to more efficiently accumulate cash values will actually be used as an accumulation vehicle, or that the policyholder will behave as if the contract is an investment vehicle (i.e., be more likely to pay additional premium or to surrender it for value). The difficulty in predicting behavior is the reason that most large carriers have two separate products—a death benefit protection and accumulation. Also, some carriers keep a close eye on the mix of business and try to limit the death benefit protection product to a certain percentage of overall UL sales.

Indexed UL and Variable UL with Secondary Guarantee

Assume indexed and variable products are designed similarly to the accumulation-oriented product, with the main difference being the crediting mechanism. The indexed product design is a simple annual reset product with a cap, where 80 percent of the premium is assumed to earn indexed credits and 20 percent is assumed to earn traditional fixed credits from which all non-premium-related product charges are taken.

The variable universal life (VUL) product has 80 percent investment in an equity-like separate account and 20 percent in a general/bond/money market account. The VUL product has a mortality and expense charge in lieu of a pricing spread. The reserving in these products is assumed to be AG 38 only, without regard to AG 36 for indexed products and AG 37 for VUL products. The intent of this article is only to change the crediting mechanics and look at the resulting behavior of the secondary guarantee.

Stochastic pricing results are shown in Table 2.

Indexed and variable products offer increased account value accumulation on an expected basis. The variance in expected account value accumulation, however, is what drives the return profile for the writing company. One should bear in mind that more accumulation potential provides the opportunity for increased collected premium payments, which could reduce the risk to a company offering the guarantee. There is no guarantee, however, that such premium will be realized.

Summary

The above discussion demonstrates two primary risks assumed by direct writers of SGUL-type products. The first is based on policyholder behavior. Competitive secondary guarantees are often priced with aggressive mortality and lapse assumptions. If those assumptions are far enough off the mark, the insurer's realized profitability is much lower than assumed in original pricing.

The second risk is driven by the economic environment and the "in-the-moneyness" of the secondary guarantee. Should the actual account value accumulation fall short of pricing projections, secondary guarantees can be in the money earlier than the pricing assumed. This risk appears in the stochastic scenario results, where the least profitable scenarios result from less-than-expected account value accumulation.

Actuaries need to be careful setting assumptions in their models. Predicting policyholder behavior and projecting a range of interest rate scenarios are necessary yet difficult jobs of the product development

actuary. Often the only available option is to understand the sensitivity of profit results to assumption changes around best estimates. Insurance companies are risk-accepting entities, but on the condition that they truly want the risk and understand the range of outcomes that are possible with the products they offer. □

Product Type	First Year Strain as % of First Year Premium	Break-Even Year	Profit Margin @ NIER	IRR
Protection	-77.16%	22	4.70%	8.00%
Accumulation	-64.68%	21	5.20%	8.20%

Scenario	Fixed UL Protection	Fixed UL Accumulation	Indexed UL Accumulation	Variable UL Accumulation
Minimum	2.8%	4.6%	3.6%	4.5%
5th Percentile	3.5%	4.9%	4.6%	6.1%
10th Percentile	4.4%	5.7%	5.3%	6.9%
25th Percentile	5.5%	6.4%	6.5%	8.1%
50th Percentile	6.9%	7.4%	7.8%	10.0%
75th Percentile	9.3%	9.1%	10.5%	11.2%
90th Percentile	11.2%	9.8%	12.1%	14.1%
95th Percentile	12.2%	11.0%	14.4%	14.9%
Maximum	15.7%	14.1%	16.5%	16.5%

Product Development Symposium 2007 Recap: 7th Annual Event Sizzles

by Mike Boot

Over 250 industry leaders met in Denver for the 7th Annual Product Development Actuary Symposium. During the conference, industry experts explored the latest issues and trends in product development (PD) and pricing of life insurance and annuity products.

The conference included two general sessions and 14 breakout sessions. As compared to other SOA programs such as the SOA life spring meeting or the SOA annual meeting, the conference offers networking with others in similar PD roles and the most advanced subject content for those in the PD world.

The concurrent sessions were offered multiple times throughout the conference, so attendees could make sure that they didn't miss sessions that were of interest. Session topics included:

- The Impact of Capital Market Solutions on the Product Development Process.
- Life and Annuity Trends.
- The Need for Speed: The product development process.
- Principles-Based Approach to Capital and Reserves: What are the implications for the product development actuary?
- How the World Has Changed: How medical underwriting will benefit your applicants' and your companies' bottom line.

The conference opened up with a stimulating challenge from demographer Dr. S. Jay Olshansky. He presented his case that he believes that life expectancies have reached a peak and will decline over the next generation. He explored reasons why you cannot simply extrapolate the past experience for improvements in life expectancy. He focused much of the presentation on obesity, pathogens, pandemics and environmental hazards, challenging the accepted view that mortality improvements will continue into the future. One attendee stated in the evaluation: "The opening session was among the best I have attended in all my SOA meetings."

The 2007 Symposium Planning Committee consisted of: Elinor Friedman as chairperson, Kevin Howard, Nancy Kenneally, Rob Stone, Mike Kaster, Juliet Sandrowicz, Jeff Burt and Barbara Gold.

The symposium was held June 25–26 during record-breaking temperatures in Denver and was cosponsored by the Product Development, Marketing and Distribution, Reinsurance and Tax Sections. For the first time, there were three corporate sponsors: Watson Wyatt, Towers Perrin and GGY-Axis. Following the PD Symposium, the Product Development section sponsored a PD Boot Camp which focused on case studies to illustrate the design and pricing of products.

In the overall evaluations after the meeting, the attendees strongly complimented the faculty and topics at the meeting. The planning committee for the conference has already started work for next year's conference in early May 2008. The chairperson for the 2008 Symposium is Rob Stone. Stone stated, "The planning committee is looking forward to building on the success of the 2007 Symposium. We anticipate creating another dynamic program for 2008, a process improved by having suggestions from PD Section members." □

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Product Development Challenges in a Principles-Based World

by Mike Lombardi

The recent U.S. industry movement to transition from formula-based statutory reserves and capital to principles-based regulation for statutory reserves and capital is taking on increasing momentum, although details are still evolving regarding the final guiding principles and timeline. The new principles-based regulations will have a significant impact on life insurance companies with dramatic changes to the competitive landscape.

At the corporate level, internal and external demands will increase, including the cost and complexity of dealing with regulators, and impact companies' existing risk management frameworks.

While the intention is to produce statutory financial information that more accurately reflects evolving insurance products and risks on a timelier basis, the product development implications of such a change are not clear.

Based on the experiences of Canadian life insurers that have been subject to comparable principles-based approaches with respect to reserves and capital, product development actuaries can expect changes in their activities as they deal with the new challenges.

In this article, we will review the issues and implications for the product development actuary with respect to the following principles-based topics:

- subjective statutory reserve and capital requirements.
- expense allocation.
- deterministic vs. stochastic considerations.

Subjective Statutory Reserve and Capital Requirements

One of the cornerstones of the principles-based approach (PBA) is that statutory reserves and capital will no longer be formulaic but will instead attempt to more accurately reflect the real risks to which the company is subject. For statutory reserves, this means that assumptions will be based on the PBA actuary's judgment as to best-estimate experience plus a margin for adverse deviation.

One of the cornerstones of the principles-based approach (PBA) is that statutory reserves and capital will no longer be formulaic. ...

Practically speaking, this means that, in the future, the pricing actuary can no longer independently proceed with the mortality and interest statutory valuation assumptions previously prescribed in regulations but must conduct a dialogue with the PBA actuary to determine what reserve assumptions the PBA actuary intends to establish for the new product. A similar discussion may need to take place with respect to capital requirements. Product development actuaries may find this new process somewhat frustrating, particularly in those situations where the PBA actuary may not have an immediate answer.

Why not? The reason is because there will be no prescribed statutory valuation assumptions. The PBA actuary will need to consider the product and risk characteristics and then proceed to determine a set of applicable assumptions based on available company experience, the relevance of this experience, the credibility of this experience, the avail-

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ability of applicable industry experience and his or her judgment with respect to appropriate risk margins. Given that the PBA actuary's assumptions are also subject to external review, in some cases it will be prudent to seek the external review actuary's opinion as well.

Why are these steps necessary? The reason should be obvious. If the product development actuary designs a product with stated ROI and projected statutory earnings, the product development actuary needs to make sure he or she is including the same statutory reserve basis that is to be used in the company's statutory financial statements. Otherwise, the product will not produce the intended financial results and the product development actuary, the PBA actuary or both will be taken to task to explain the differences to senior management—to suggest that the shortfall is due to inconsistency between the statutory reserves used for pricing versus those same statutory reserves used for corporate reporting is unlikely to provide a satisfactory explanation.

Expense Allocation

Principles-based reserves (PBRs) will be introduced prospectively, meaning that the new regime will initially apply only to new business; i.e., statutory reserve requirements for existing business will continue to be on the old prescribed NAIC basis. This dual approach creates some interesting allocation issues with respect to a variety of assumptions, which may be best illustrated by examining expense allocation issues.

Currently, some companies are not able to fully reflect their actual costs in the price of their products. This may be for a variety of reasons such as inefficient administration, lack of appropriate resources or infrastructure, or simply because of entry into a new product area where critical mass has not yet been achieved.

If the entire company's business were to be reserved on a PBA, use of the company's own expense experience would mean that the company would need to hold higher reserves than its competitors, further aggravating what may already be a difficult competitive situation. However, because principles-based statutory reserves are being introduced gradually on a prospective basis, there will be two sets of statutory reserves, covering pre- and post-PBA business respectively.

What are the implications? Expense assumptions are required only for the post-PBA block of business. There are, of course, a number of acceptable ways to perform expense studies that can be used to determine internally consistent unit costs. The problem (or opportunity) is that while there is more than one way to achieve a reasonable result, it is only the post-PBA pieces of that allocation that will be used.

Thus, if the expense analysis philosophy allocates more (or less) fixed costs to older business, there are less (more) fixed costs attributed to newer business. Thus, all other

things equal, different companies operating at the same overall expense levels may nevertheless differ as to the amount of unit expenses being allocated to or absorbed by new business.

The present value effect may be even more significant. Since a component of PBA reserves is the present value of unit costs, minor differences in expense allocation methodology can magnify and lead to significant differences in PBA reserves, with no equivalent offset to balance this in the pre-PBA block. Table 1 below illustrates the effect of this for an imaginary company (PBR Life). Depending on whether expenses are allocated in proportion to premiums or number of policies, and despite the fact that all the expenses have been allocated to the relevant blocks of business, a relatively small difference of $1 million in allocation method produces a $20 million increase in PBA reserves with no equivalent reduction in pre-PBA reserves.

Table 1: Impact of different expense allocation methodologies under PBR

	Premiums ($millions)	Policies ('000)	Expenses Method 1	Expenses Method 2	Expenses Method 1-2	Reserve Impact ($millions)
Pre-PBR business	160	360	8	9	-1	N/A
Post PBR business	40	40	2	1	1	20
Total	200	400	10	10	0	20

Method 1 $10 million expenses allocated in proportion to premiums
Method 2 $10 million expenses allocated in proportion to policies

The caution for product development actuaries is to be aware that PBR statutory results will be very sensitive to the choice of expense allocation methodology and an overallocation to a PBR block will not be offset by an underallocation to a pre-PBR block. Expense allocations will need to be critically reviewed for their reasonableness.

Deterministic Versus Stochastic Considerations

One of the provisions of the new PBA is that stochastic analysis will be required for products with significant tail risk and that in such cases the actuary will need to hold the greater of a deterministic reserve or the level of reserve that represents the average cost of the worst 35 percent stochastic outcomes (i.e., CTE65). If the PBA actuary can demonstrate that such tail risk does not exist, stochastic reserving is not required. In such cases, the PBA actuary may use a simpler deterministic reserve method based on the greatest present value of accumulated deficiencies (GPVAD).

The product development actuary will need to consider several new questions, among these:

1. How can it be demonstrated that the product has no significant tail risk—and does this demonstration require stochastic analysis?
2. What happens if the product does have tail risk?

First of all, under the proposed PBA rules, stochastic analysis, if it is required at all, applies solely to interest and equity assumptions, not to the non-economic assumptions. Secondly, the good news is that an actuary need not perform stochastic analysis to demonstrate the absence of material tail risk with respect to interest or equity returns.

How can stochastic analysis be avoided? For example, the PBA actuary may apply a few deterministic scenarios such as the New York 7, or other scenarios believed to be well into the tail of the distribution, and may be able to demonstrate that the resulting statutory reserves are not materially different. That outcome would be compelling evidence that the product does not have significant tail risk and that a deterministic approach will suffice to determine statutory reserves.

However, the actuary may not be so fortunate in the case of all the company's products, and a stochastic approach may be required for some of these.

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Again, it will be important for the PBA actuary and the product development actuary to have a meaningful dialogue on these aspects because even though a product may have significant tail risk when examined at the single product level, that risk may not be significant at the level of aggregation performed by the PBA actuary.

In any event, assuming the product development actuary is required to use stochastic reserving methods, that actuary will face a new level of complexity not faced by the PBA actuary.

The PBA actuary is interested in the reserves at a point in time, the end of the reporting period. So, he may perform analysis on 10,000 scenarios and be done with the task. The product development actuary, on the other hand, is determining ROI over the life of the product. Application of 10,000 stochastic paths may only determine results to the end of duration one, and there are many durations to go. In theory, the results at each future year's duration will require repeated application of 10,000 scenarios, the so-called stochastic-on-stochastic challenge which can be complex, technologically challenging, and in some cases not cost-justified. If the product development actuary wishes to avoid the challenge of applying scenario requirements that grow exponentially, a simpler approach (such as scenario reduction techniques) should be considered.

Under such circumstances some simplifying approaches may be advisable; however, the pricing actuary is well-advised to consult with the PBA actuary to make sure there is a common understanding of what approximations will be acceptable.

Conclusion

As we can see from the various examples in this article, the introduction of the principles-based environment will lead to new product development challenges requiring new solutions and increased dialogue between the product development actuary and the PBA actuary. □

Product Development Sessions Offered at the 2007 Annual Meeting

by Cathy Bierschbach

Fall is in the air, so it's time for the event you've been looking forward to all year—the Society of Actuaries' annual meeting. This year's meeting will be held October 14–17 in Washington, D.C. I think the planning team has managed to line up a bunch of exciting topics. The Product Development Section will be holding a hot breakfast first thing Monday morning to ensure that everyone has the energy to get the most out of the whirlwind of events that follows.

Believing in the power of synergy, we are cosponsoring some important sessions with our esteemed colleagues. Namely:

- The "Retirement: Risk is Opportunity" series of sessions jointly sponsored with Pension, Long-Term Care and Health. There will be a joint opening session, followed by numerous breakout sessions, culminating in a joint session where you can vote on the soundness of the ideas presented. Breakout sessions that may be of particular interest to readers of the newsletter include "Key Findings from 2007 Post-Retirement Needs and Risks Survey" and "Understanding the Market for Retirement Income."
- Two interesting sessions on life settlements jointly sponsored with Investment. The first session is a 101 without the dreaded final exam. The second will feature a lively discussion between four industry experts—two esteemed actuaries and two industry insiders.
- A session on the all-important Intercompany Expense Study jointly sponsored with Smaller Insurance Company.
- An update on "the Latest and Greatest in Preferred Mortality" jointly sponsored with Futurism.
- A session on the evolving world of stochastic modeling jointly sponsored with Financial Reporting.
- And a last-minute collaboration with Management and Personal Development for a session entitled "Pain to Gain: Enhancing Productivity through Conflict Management."

Have no fear; we also have some reliable and much needed sessions aimed specifically at our members. Christine Dugan and Elinor Friedman will be once again hosting "Life and Annuity Product Development—Year in Review." This year they have found a new star speaker to complement their act: Rhonda Elming. To address an area of growing importance, we are sponsoring a session entitled "Product Patents and Their Impact

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on the Life Insurance Industry." We also have sessions on three core products—Index Life, Term and Universal Life. I'm sure all three of them will either have at least one important takeaway or will confirm that you are already an industry expert who should volunteer to speak next year.

Not to be overlooked are our sessions on areas of recent research:

- What do Business Decisions, Mortality Tables and Older Age Underwriting Have in Common?—Results of three eye-opening surveys.
- Post Level Premium Term Lapse and Mortality Survey—A presentation enlightening findings by the researchers themselves.
- Older Age Mortality: 2002-04 Results—Mortality is a key assumption, so it may be wise to keep up on the research presented here.

We look forward to seeing many of you at the meeting. Please remember to give us your feedback through the session evaluation, but do remember that our speakers are volunteers. If you see areas that we overlooked, let us know—or better yet volunteer to help organize next year's meetings. □

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