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Comments from the Chair

The Shape of Products in 2010

by Noel J. Abkemeier

What might the product world look like in 2010? A number of forces are developing that will heavily influence the products that characterize the life insurance and annuity market in the mid-term future. Some are already taking effect, while others will evolve over several years.

Risk Management

Asset-liability management was in the spotlight in the early 1980s when interest rates spiked. It returned to the spotlight in recent years because of the risk concentration created by many insurers' heavy reliance on variable annuities and the sale of derivative-based benefits added a new dimension of concentrated risk. The impending arrival of C3-Phase II risk-based capital requirements for variable products, the scrutiny of rating agencies and the scarcity of reinsurance already are causing a retreat in equity put-based benefits and will probably lead to more severe reductions.

The availability of guaranteed living benefits and guaranteed minimum death benefits will be limited by an insurer's ability to hedge them through internal product balancing and diversification. Dynamic hedging and reinsurance will remain in the background. The result will be significantly less prominence for these currently popular guaranteed benefits.

Equity-indexed benefits, which gained popularity as a product designed for the conservative equity investor, will gain new popularity as a product for the prudent insurer to deliver guarantees. Their ability to be hedged with call options will be valued.

continued on page 3

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CONTENTS

COVER

FEATURES

Product Design Flexibility

Periodically over the last 17 years there has been a push to make broad revisions to nonforfeiture requirements, and one of the quinquennial efforts is now occurring. Whether change occurs now or five years from now, change is inevitable. The Standard Nonforfeiture Laws for Life Insurance (1942) and Deferred Annuities (1976) both have their roots in eras that predated today's computer capabilities, liberalized financial regulation structures, available financial products, and constantly evolving consumer needs and preferences. The formulaic requirements of the current laws will be replaced with more flexible approaches that will allow new product designs.

A single product may be capable of accommodating multiple risks equally, e.g., life, health, annuity, long-term disability, homeowners, auto, etc., rather than accommodate them only as small ancillary benefits on a primary product. Life cycle products that start as life insurance and evolve into an annuity and then long-term care may be available. Products may have personally designed balances among death benefit, premium and cash value, including no cash value despite sizable premiums.

Increased Disclosure

Historically, sales disclosure has been pushed by regulators for the purpose of consumer protection. The ever-growing culture of litigiousness and the widening circle of class action law suits has intersected with increasing product complexity and will cause insurers to take a leading, if not controlling, interest in providing full disclosure. The product complexity will be characterized by personalized product design and/or personally adaptable sales illustrations that demand disclosure.

Genetic Testing

Genetic testing will have moved from the laboratory to being used by individuals. A common-sense business approach toward underwriting will evolve despite some legislative pressures to the contrary, and it will allow genetic test results to be treated like other components of medical history, namely something that must be disclosed on an application and is available for forming an underwriting decision.

Immediate Annuity Creativity

Limited attention has been paid by insurers to immediate annuities because the insurance industry never achieved enough sales to form a critical mass. The aging of the baby boomers, the increasing awareness that managing one's own investments is not as easy as it once looked, and emerging education about the risk of unpredictably living too long will lead to the long-awaited emergence of the immediate annuity market. This will lead to much broader and more competitive offerings of underwritten annuities, including those that are attractive to purchasers with impaired health. The degree of creativity that has marked the deferred variable annuity market for the last 10 years will expand into immediate annuity products; however, insurers will be more cautious about the new types of product design risks they take on.

Will these changes all occur? Let's check back in seven years (when I have purchased an attractive and fully disclosed immediate annuity that contains multiple benefits, none of which imposes great risk on the insurer).

* * * * *

Before we get to 2010, there are enough current risks that insurers face. The Product Development Section has initiated a research project called the Analysis of Product Guarantees that will analyze the various guarantees provided in fixed and variable life insurance and annuity products. The study is intended to identify the guarantees and their associated risks, describe pricing methods and measures and quantify the impacts on policyholder behavior. The results should be a valuable resource for product development actuaries. We will keep you apprised of the progress of the study. □

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Mortality Anti-selection —

Different Versions of Dukes/MacDonald

by Douglas C. Doll

A common method for projecting the mortality associated with high lapse rates is to use the so-called Dukes/MacDonald approach. I have found more than one version of Dukes/MacDonald being used in practice. It is important that we are aware of which version is being used, so we understand how much extra mortality we are projecting. The purpose of this article is to provide some background on anti-selection formulae (for those who, unlike me, are not old enough to have been around when they were developed), and to describe the different forms of "Dukes/MacDonald" that I have seen.

Anti-selection Formulas

This topic came to the forefront during the "term wars" of the early 1980s, when ever-decreasing term rates caused very high lapse rates on existing term products. The development of select and ultimate rate scales for term insurance was expected to lock in high lapse rates, as healthy lives had significant incentive to lapse and start over on a new select scale. Finally, term products with explicit re-entry provisions required the actuary to estimate the mortality of the non re-entered group as well as the re-entries.

Three major methods to calculate the mortality of the persisters were published in the 1980s. They are similar in their underlying theory, but somewhat different in mechanics and results.

Shapiro/Snyder Method[1]

The mortality of the persisters is expressed as ratios to standard mortality. Each duration a new ratio is calculated equal to the prior year's ratio, plus an increment to the ratio calculated assuming that the extra lapsers are fully select. Refinements to the model include an assumption that lapsers are not fully select (by introducing an "effectiveness" percentage), and by grading off over time the increments to the mortality ratio.

Dukes/MacDonald Method[2]

This method uses the concept of conservation of total deaths. The excess lapsers are assumed to be fully select at the time of lapse, but their mortality grades to ultimate in normal fashion.

1) "Mortality Expectations Under Renewable Term Insurance Products", Proceedings of the Conference of Actuaries in Public Practice, Vol. XXX.

2) "Pricing a Select and Ultimate Annual Renewable Term Product", Transactions of the Society of Actuaries, Vol. XXXII.

The mortality of the persisters is assumed to be the difference between total aggregate mortality and the mortality of the excess lapsers. Note that the effect of one year's excess lapse goes away after 15 years, if a 15-year select mortality table is being used. The focus of Dukes/MacDonald's method was on excess lapse due to re-entries to term products, and the method assumed an anti-selection effectiveness of 100 percent.

Becker/Kitsos Method[3]

This method starts with the Dukes/MacDonald method and refines it by adding an effectiveness factor, similar in concept to Shapiro/Snyder effectiveness. In the Becker/Kitsos method, excess lapsers are assumed to have mortality equal to fully select, plus an extra mortality equal to a portion of the initial difference between the select and the persisting group. This extra mortality is graded off over a 15-year period.

The Different Forms of Dukes/MacDonald

The typical formula used today is a modification of Dukes/MacDonald, whereby an effectiveness percentage less than 100 percent is assumed.

The different versions that I have seen used differ based on which group of "persisters" the excess mortality is spread over. The three methods are as follows:

- Method 1: Persisters are those who continue their policy in-force.
- Method 2: Persisters are those who continue in-force, plus the nonselect excess lapsers.
- Method 3: Persisters are those who continue in-force, plus the nonselect excess lapsers, plus the base rate lapsers.

To illustrate the impact of the three methods, consider the following example:

- Base lapse rate is 10 percent
- Total lapse rate is 85 percent
- Effectiveness is 80 percent
- Select and point-in-scale mortality rates are .01 and .03, respectively

Assuming 100 lives, I now calculate the mortality ratios for the in-force business for the three methods:

- Base lapses = 10
- Excess lapses = 85 – 10 = 75
- Select excess lapses = .80 * 75 = 60
- Nonselect excess lapses = 75 – 60 = 15
- Extra mortality on persisters = 60* (.03 - .01) = 1.20
- Method 1 mortality ratio = (.03 + 1.20 /15) /.03 = 367%
- Method 2 mortality ratio = (.03 +1.20 /30) /.03 = 233%
- Method 3 mortality ratio = (.03 + 1.20 /40) .03 = 200%.

The differences among the three methods are significant and demonstrate that it is important that you know exactly how mortality deterioration is calculated in your pricing models. □

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3) "Pricing for Profitability in ART", Best's Review, September 1984, and "Mortality and Lapse Assumptions in Renewable Term Insurance", Reinsurance Reporter, August 1984.

Estimating Worksite Mortality—

A Structured Approach

by Adrian R. Pask

For the pricing actuary, estimating worksite mortality is a challenging task. This kind of coverage has characteristics of both individual and group insurance because it is an individual policy that is sold at an employee's place of employment. Additionally, life insurance sold in the workplace is a voluntary benefit, meaning participants elect to purchase the coverage and choose the coverage amount. The voluntary nature of this insurance creates the opportunity for antiselection

because individuals in poor health will elect coverage more often than healthy individuals. On the other hand, insurance company underwriters accept or reject the best risks based upon the information contained in the application. The result is two competing forces driving worksite mortality: antiselection by the applicant population and protective selection by the underwriters.

The problem for the pricing actuary is that the two competing forces are compounded by two elements of the product design process: the number of questions on the application used by the underwriters to select the best risks and the minimum required participation level. Agents want to streamline the sales process by removing as many questions from the application as possible. Removing questions from the application reduces the probability that underwriters can identify a substandard individual. Additionally, the worksite group may have differing levels of participation. Participation is the percentage of the employees at the worksite who apply for insurance. The lower the participation rate, the greater the intensity of anti-selection, because a limited number of substandard individuals will be a larger percentage of the insured population. The pricing actuary is often required to answer questions such as:

- "What is the impact on mortality if we streamline the application by removing a question about prescription medication?"
- "If we lower our required participation from 40 percent to 30 percent, how much will our mortality and resulting premiums increase?"

One solution is to divide the actively at work population into risk classes and view each selection decision as a screen that eliminates individuals in each risk class. For this case study the population is divided into three risk classes: standard risk with 100 percent of standard mortality, substandard risk with 300 percent of standard mortality, and HIV positive risk with 2000 percent of standard mortality. An HIV-positive risk is used in this example because this risk represents a "mortality time bomb" that is identifiable through a question or blood test. The first screen in the process is the employee electing to purchase coverage. It is reasonable to assume that substandard individuals will elect coverage more frequently than standard individuals. This screen will skew the applicant population toward the substandard risks. The second screen is the underwriting process that further reduces the applicant pool. In opposition to the application screen, the underwriting screen selects individuals who are standard and weeds out substandard individuals, skewing the insured population back toward the standard risks.

The process involves six steps:

1. Estimate actively at work mortality
2. Estimate the actively-at-work risk class distribution
3. Calculate a standard risk mortality table
4. Estimate the participation rate
5. Estimate the underwriting acceptance rates
6. Calculate the insured mortality table

This process has been used successfully to price worksite products. The following example should be considered illustrative and uses assumptions that do not reflect any particular product or pricing situation. It is critical to develop the assumptions in each stage of the process using professional judgment while considering the impact of the target market and product characteristics.

Step 1: Estimate Actively-at-Work Mortality

One of the key mortality advantages of life insurance sold in the worksite is that all the applicants are actively at work. Employees pass through a powerful screen by showing up for work regularly. Major mortality risk factors such as terminal cancer or serious drug abuse are reduced because it is difficult for these individuals to remain full-time employees.

The problem facing the actuary is selecting an appropriate actively-at-work mortality table. The requirements for this mortality table are that it:

- Reflects current experience
- Is sex and smoker distinct and
- Reflects the actively-at-work selection criteria.

Both the actuary and underwriter must evaluate the target market, evaluate the risks of the target industry and adjust the actively-at-work mortality tables accordingly. This method can be applied equally to insurance for miners or insurance for office workers if the actively-at-work mortality table is adjusted correctly.

Step 2: Estimate Distribution for Actively-at-Work Ratings

The actively-at-work population contains both standard and substandard risks. Substandard risks are more likely to purchase insurance than standard risks in the worksite as they face stricter underwriting standards and higher rates if they decide to purchase insurance as an individual. For this reason is it critical to estimate the number of lives in each risk class.

Input from the underwriting department is critical for this step. Underwriters can use information from fully underwritten applications and industry statistics to estimate the distribution of the actively at work risk class distribution. Table 1 shows the assumed distribution for this case study and how the lives are distributed into the risk classes.

Table 1: Actively-At-Work Risk Class Distribution

Risk Class	Numerical Rating	Actively-at -Work Lives
Standard	100%	950
Substandard	300%	45
HIV Positive	2000%	5

Step 3: Calculate the Standard Mortality

The third step is to calculate the mortality for a standard, 100 percent rated, individual. The conservation of deaths principle says that the actively-at-work population can be broken into risk classes and the result must sum to the population mortality, creating a unique mortality rate each year. The net effect is to have one unknown, the standard mortality rate, per year. Subsequent mortality rates can be estimated by a bootstrapping method. Table 2 illustrates the method.

An important point is that the standard mortality rates calculated in this step are not the mortality rates used for pricing the worksite product. The "standard mortality rate" represents the mortality table for a fully medically underwritten product. The following steps adjust the standard mortality rate for both underwriting selection and participant anti-selection to arrive at an insured mortality table that can be used in product pricing.

Step 4: Estimate the Participation Rate

The fourth step is to estimate how many individuals in each risk category will apply for insurance. For this case study Table 3 shows three scenarios: 20 percent, 40 percent, and 60 percent participation rates. Twenty percent participation means that 20 percent of the standard risk class elects to

continued on page 8

Table 2: Actively At Work Standard Mortality Calculation

		Number of Lives				
Year	qx At Work	At Work	Standard (100%)	Substandard (300%)	HIV+ (2000%)	Qx (100%)
0		1,000.00	950	45	5	
1	0.001185	998.82	950 * (1-q1) =949.05	45 * (1-3 * q1) =44.87	5 * (1-20 * q1) =4.90	0.001
2	0.002366	996.45	947.15	44.60	4.70	0.002
3	0.003538	992.93	944.31	44.19	4.42	0.003
4	0.004695	988.27	940.53	43.66	4.07	0.004
5	0.005833	982.83	935.83	43.01	3.66	0.005

Table 3: Participation Rate

	Standard	Substandard	HIV+	Aggregate
20% Participation	20%	70%	70%	22.5%
40% Participation	40%	80%	80%	42.0%
60% Participation	60%	90%	90%	61.5%

apply for insurance. The substandard risks have a higher participation rate as they know that they are receiving value. However, it is unlikely that every member of a risk class, even severely impaired classes, will apply for insurance. There are some individuals that will not elect to purchase insurance regardless of the economic value. The application rate for impaired risks should be bounded between the standard participation rate and 100 percent.

It is important to note that the 20 percent participation scenario will generate an aggregate participation rate greater than 20 percent because the substandard risks elect to purchase insurance more frequently than the basic 20 percent. If an aggregate participation rate of 20 percent is required, you can solve for the standard rates that will yield a 20 percent aggregate participation rate.

Step 5: Estimate the Underwriting Acceptance Rates

The underwriting acceptance rate is the percentage of applicants who are accepted for life insurance. All the standard individuals should be accepted by the underwriting screen. For substandard individuals there are three ways that they can pass through the underwriting screen:

- The underwriting questions do not identify them as substandard
- The individual knowingly commits fraud
- The individual is ignorant of his/her health conditions

The first situation gives the actuary an interesting basis for dialog with the underwriter. The conversation could go something like this:

Actuary: You say we have a 50 percent chance of identifying and rejecting a substandard individual. What can we change to move that percentage to 70 percent?

Underwriter: Adding an additional question about prescription medications will move that percentage to 70 percent.

Actuary: Our producers are asking for a shorter application. What is the impact of eliminating the question about medical treatment in the last five years?

Underwriter: Given the protective value of the other questions, that change will result in identifying and rejecting 30 percent fewer substandard risks.

Table 4 shows a sample underwriting acceptance rate.

Table 4: Underwriting Acceptance Rate

	Standard	Substandard	HIV+
Guarantee Issue	100%	100%	100%
Simplified Issue without HIV Testing	100%	50%	100%
Simplified Issue with HIV	100%	50%	0%

Table 5: Insured Mortality

Year	Standard lx	Substandard lx	HIV+lx	qx Insured	qx I/qxg
0	950*40%*100% =380	45*80%*50% =18	5*80%100% =4	-	-
1	380*(1-0.001) =379.62	18*(1-0.003) =17.95	4 * (1-0.02) 3.92	0.001279	107.90%
2	378.86	17.84	3.76	0.002550	107.76%
3	377.72	17.68	3.54	0.003803	107.50%
4	376.21	17.47	3.25	0.005028	107.11%
5	374.33	17.20	2.93	0.006219	106.62%

Table 6: First Year Mortality Ratios

	20% Participation	40% Participation	60% Participation
Guarantee Issue	132.96%	114.12%	107.23%
Simplified Issue without HIV Testing	123.91%	107.90%	102.27%
Simplified Issue with HIV Testing	97.31%	92.02%	90.18%

Step 6: Calculate the Insured Mortality Table

Calculating insured mortality involves projecting the number of lives in each risk class and using the total number of lives to construct an insured mortality table, as shown in Table 5.

Expressing the resulting mortality as a percent of the actively-at-work mortality illustrates the combined effect of anti-selection and underwriting selection. A percentage less than 100 percent means that the underwriting selection predominates. A percentage greater than 100 percent means that applicant anti-selection predominates.

Perform What-If Analysis

When pricing worksite products the actuary often has to quantify the answers to "What-if" questions. What if we change the minimum participation requirement? What if we change the level of underwriting? Table 6 illustrates how this process allows the actuary to quantify the impact on mortality of different proposed product designs.

Conclusion

There are many factors that are critical to the success of this process.

- Input from the underwriting department is critical for both estimating the risk distribution of the actively-at-work mortality and the underwriting screen.
- It is critical to recognize that the standard mortality table created in step three is not the table used for pricing the coverage. The table must be adjusted for participation and anti-selection to produce insured mortality.
- Cooperation and understanding between the underwriters and actuaries is critical.
- At the end of the process, the insured mortality must be reasonable. □

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Is Your Reinsurance Creating Enough Value?

by James W. Dallas

"First-dollar" reinsurance agreements have become commonplace. In fact, figures indicate that approximately 60 percent of new life insurance sales are reinsured, driven by first dollar reinsurance programs. In addition, many of these programs are being implemented on a coinsurance basis for level term business—as opposed to yearly renewable term (YRT) programs.

A direct writer of level term business cedes such business on a coinsurance basis to a reinsurer for two primary reasons.

- Reinsurers are typically on the forefront with mortality trends, and will be more aggressive on their assessment of mortality levels. This aggressiveness then gets passed on in their pricing.

- Direct writers like shifting the burden of the onerous Regulation XXX reserves on to the reinsurers.

Placing less reliance on coinsurance will take some pressures off reinsurers to find the capacity for reserves...

Combining the above two reasons often leads to a leverage of returns for the direct writer. A product with sub-par profitability without reinsurance suddenly becomes a profitable product through the use of coinsurance.

There are recent signs that the use of coinsurance and the inherent shift of the burden of the reserves to the reinsurers are putting stress on the reinsurers' capacity limitations. Reinsurers are able to shoulder only so much of the burden of the reserve strain caused by Regulation XXX. What reinsurers do best, and know best, though, is mortality risk.

If your company is seeing signs from your reinsurers that this is the case, this article will present some thoughts to consider as to why sales of level term products may still be acceptable, even without the support of coinsurance programs. Placing less reliance on coinsurance will take some pressure off reinsurers to find the capacity for reserves, while maintaining the ability of direct writers to leverage off of life reinsurers' ability and willingness to be on the forefront regarding mortality assumption levels.

Value Creation Analysis

Much of the discussion below will make use of embedded value (EV) analysis. EV is an excellent means to better understand how much value is being created for a company. EV is the present value of distributable earnings, where distributable earnings are defined as after-tax book profits, less the cost of holding required surplus. EV has become popular in Europe, as well as in Canada. It is also gaining steam as an accepted and more insightful form of reporting in the U.S., as well (when compared to U.S. GAAP).

The discount rate used to calculate the present value of the stream of distributable earnings varies from company to company in performing an EV calculation. In today's environment, the discount rate typically used to discount the distributable earnings is in the 7 percent to 9 percent range. The rate used to calculate EV is called the Risk Discount Rate (RDR).

For a product priced with a double digit internal rate of return (IRR) on distributable earnings, discounting the same stream of distributable earnings at a 7 percent to 9 percent rate will generate a value greater than zero.

Table 1 on the next page provides a simple example of the development of IRR and EV for a given flow of anticipated distributable earnings for a hypothetical book of life insurance business.

Assuming that EV is the appropriate measure of value, the pricing department should develop products that maximize EV. Maximum EV is not necessarily tied to products with the highest IRR. Maximizing IRR certainly helps, but maximizing IRR does not always maximize EV. For example, one way to maximize IRR is to minimize the investment, but a large IRR on a tiny investment could equate to a small value for EV.

TABLE 1: IRR AND EV FOR A STREAM OF DISTRIBUTABLE EARNINGS

Year	After Tax Book Profits (+)	Effect of Required Surplus (-)	Distributable Earnings (=)
1	- $105	$5	- $110
2	$35	$1	$34
3	$35	-$2	$37
4	$35	-$1	$36
5	$35	-$3	$38
		IRR:	11.8%
		EV at 7%:	$11.65
		EV at 9%:	$6.47

TABLE 2: OPTIMIZATION OF EV

Pricing Scenario	IRR per Unit	Anticipated Units of Sales	EV per Unit	EV Created
1	9%	110	10	1,100
2	12%	100	12	1,200
3	15%	60	14	840

TABLE 3: KEY FIGURES PER UNIT ISSUED

Pricing Scenario	First Year Loss	Initial Statutory Reserve	Maximum Statutory Reserve Over Pricing Horizon	Embedded Value at 7% RDR
No reinsurance:	33.16	32.28	33.52	1.90

TABLE 4:
KEY FIGURES PER UNIT ISSUED 80% COINSURANCE

Pricing Scenario	Embedded Value at 7% RDR	Embedded Value at 8% RDR
No Reinsurance	1.90	-0.13
9% IRR After Reinsurance	0.81	0.38
10% IRR After Reinsurance	1.22	0.77
11% IRR After Reinsurance	1.63	1.15
12% IRR After Reinsurance	2.05	1.55

EV is also a function of gross sales. The higher the IRR, presumably the lower the sales. When you multiply the sales times the EV per unit of sales for a given level of IRR, your optimal EV does not necessarily occur at the largest IRR. For a simple example, see Table 2 above. Optimization of EV does not occur at the point that IRR per unit is at its maximum.

continued on page 12

EV and Coinsurance of Level Term Products

To see how EV analysis could apply to the pricing of level term business and the associated use of reinsurance, I developed an illustrative term product to guide us through value creation under various reinsurance programs. To begin, I develop EV without use of reinsurance and with the use of coinsurance. Below is a brief summary of the assumptions:

No Reinsurance

- 20 years of level premiums, fully guaranteed
- No reinsurance
- Profit margin after tax and after use of required capital of 5 percent, which resulted in an IRR of just under 8 percent

Table 3 on page 11 summarizes some of the key figures for products without reinsurance.I then solved for various coinsurance allowance structures that accomplished varying levels of leverage for my baseline product. I did this by first assuming 80 percent first-dollar quota share coinsurance in all instances and a 100 percent of premium first year allowance. I then solved for the renewal allowance structure that would leverage the IRRs to 9 percent, 10 percent, 11 percent and 12 percent.

Table 4 on the bottom of page 11 summarizes the results. As you can see, the embedded value at a 7 percent discount does not increase over and above the base case until sufficient allowances are received from the reinsurers to increase the IRR above 11 percent. So, certain coinsurance programs may actually decrease the value being created, even though they may leverage IRR.

Note that the analysis above is dependent on the level of the RDR. Using an 8 percent RDR demonstrates that any coinsurance program that increases the IRR above the baseline IRR of 8 percent will increase value for the company over and the no reinsurance scenario.

EV and the Use of YRT

What happens, though, if I use YRT reinsurance, rather than coinsurance, for my illustrative product? In this analysis, I used the same base product, but reinsured 80 percent of the mortality risk on a YRT basis, rather than on a coinsurance basis.

To analyze the effect of various YRT scenarios, I varied the level of YRT rates that I might receive from my pool of reinsurers. I looked at the results under a variety of reinsurance rates ranging from 5 percent below my mortality assumption built into my base product, to 5 percent higher than my baseline mortality assumption.

Table 5 below summarizes summarizes some of the key figures per unit.

By comparing Table 5 EV results to the Table 4 EV results under coinsurance, you can see that using an RDR rate of 7 percent, the

TABLE 5:
KEY FIGURES PER UNIT ISSUE YRT REINSURANCE

Pricing Scenario	Embedded Value at 7 % RDR	Embedded Value at 8% RDR
No Reinsurance	1.90	-0.13
YRT Rates 5% Below Pricing	2.25	0.25
YRT Rates 2% Below Pricing	2.04	0.05
YRT Rates 2% Above Pricing	1.75	-0.20
YRT Rates 5% Above Pricing	1.54	-0.39

EV for mortality rates as high as 2 percent more than the pricing mortality assumption is higher than coinsurance allowances that leverage the return up to more than 11 percent. If I'm able to secure reinsurance rates at or below my pricing mortality assumption, the EV is better than coinsurance allowances that leverage as high as 12 percent.

This example illustrates that by using EV analysis, consideration of both coinsurance and YRT reinsurance programs could prove insightful. However, you will notice, by comparing the 8 percent RDR columns, a different RDR rate will lead to different conclusions. Your company's final results will depend on your company's RDR rate.

It is also useful to analyze the effects of variations in results from that expected. For example, the effect of mortality fluctuations will be different for the coinsurance and YRT scenarios. You'll see that the YRT scenario creates more leverage on the EV results than does the coinsurance program, with EV being increased more when mortality is less than expected, and the opposite effect when mortality is greater than expected.

Conclusions

Despite the fact that coinsurance programs remove much of the strain and reserves, an analysis using embedded value could shed some light on the sensitivity of results under various combinations of YRT and coinsurance programs. Using YRT rather than coinsurance, may give you the ability to maximize your embedded value, while at the same time giving you the opportunity to leverage off your life reinsurers' expertise regarding mortality expectations. □

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AAA—Illustrations Work Group

by Michael S. Taht

Recently, the Life Products Committee of the American Academy of Actuaries "the Academy" formed a new work group. The Illustration Work Group "IWG" has been created to research and review issues with respect to life insurance illustrations. Based on the particular issue, the IWG will provide feedback to constituents such as the Academy's Life Products Committee, NAIC, LHATF and the Academy's general membership. The first issue that the IWG will explore is whether mortality improvement is implicitly being utilized in certain late duration mortality assumptions supporting some illustrations.

The explicit use of mortality improvement in the preparation of Illustration Actuarial Certifications is prohibited by the Model Illustration Regulation. However, there appears to be great divergence in the level of late duration cost of insurance rates on universal life and variable universal life products. While this may be the result of significantly different opinions on late duration mortality, the IWG is researching whether this is also the result of mortality improvement being implicitly assumed by some actuaries in setting mortality assumptions. The existence of significant differences in late duration mortality assumptions could also be due to the lack of late duration mortality experience on business issued in today's underwriting and mortality environment. No matter what the cause for the difference in late duration mortality is, if late duration mortality turns out to be significantly higher than assumed, there is a concern expressed by some actuaries that life insurance illustrations will not be supportable in the future.

The Life Insurance Illustrations Model Regulation's goal was, in part, to ensure that life insurance illustrations do not mislead purchasers of life insurance. Consistent with this goal, the IWG is researching and identifying situations where divergent opinions exist regarding late duration mortality and then providing further guidance (above and beyond the current ASOP and practice notes) to actuaries, in setting mortality assumptions at late durations.

For more information regarding the IWG, please contact its chairperson, Tracey Polsgrove at *tracey.polsgrove@hartfordlife.com.* □

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Shadow Account Products: Beyond Pricing

by Jeremy A. Bill

One of the most successful products in the current market is the death-benefit-focused UL. This type of product offers guaranteed lifetime protection (using a secondary guarantee and a maturity extension) at a very affordable price. Many companies have utilized a shadow account approach to make the guaranteed coverage even more affordable.

The shadow account is a value that is calculated similar to a UL cash value. However, the shadow account has its own set of charges. As long as the net shadow account value is positive, the policy will stay in force regardless of whether the cash value is sufficient to cover the insurance charges.

The biggest challenge to using a shadow account is calculating two separate account values....

Pricing a product with a shadow account can be very difficult because of the need to reflect the reserves required under Guideline AXXX. However, once the product is successfully priced, there is still the difficult task of getting the product to market. This task can be especially difficult for companies with legacy administrative systems.

Two Account Values

The biggest challenge to using a shadow account is calculating two separate account values: one for the shadow account and one for the actual cash value. When premiums are paid, they must be applied to both the shadow account and the cash value.

One approach is to use a single plan (policy record) that contains the charges for both the shadow account and the actual cash value. When premiums are paid, the plan calculates both the shadow account value and the actual cash value (See Figure 1).

This approach can be difficult because of the need to store two sets of charges. This can be especially difficult if the charges are vastly different. For example, actual COI charges may be on an attained age basis, but shadow charges could be select and ultimate.

Another option for keeping track of two account values is to use two plans. One plan contains the charges for the shadow account and one contains the actual charges used in calculating the cash value. In this case, the paid premiums are sent to both plans. The first plan calculates the shadow value and the second one the cash value (See Figure 2).

The biggest challenge under this approach is making sure both plans contain the same information. The same premium must be sent to both plans. Moreover, when a change is made to the policy, it must be made to both plans. Also, there must be a link between the two plans to indicate when the shadow account is no longer positive and the guarantee is no longer in effect.

Overall, there are difficulties with both approaches to calculating two separate account values.

Communication

Communicating the concept of a shadow account is another challenging endeavor. Several terms are used in the actuarial community that may not be appropriate when marketing to potential policyholders. For instance, the term "shadow" may suggest something secretive or deceptive, which is probably not the image that is desired. Moreover, referring to an "account value" may give the impression that the shadow account has a surrender value, which is not the case. Terms such as "balance" or "threshold" may be more appropriate.

Once the terminology is in place, the shadow account can be described to policyholders and agents. The shadow account calculations can be explained in great detail or the discussion can be limited to the guarantee provided by the shadow account. In either case, it is important for agents to be familiar with the unique features of a shadow account guarantee.

Policy Form

Since the shadow account provides a guaranteed death benefit, the policy form for the

Figure 1 – Using One Plan to Calculate Shadow Account Value and Cash Value

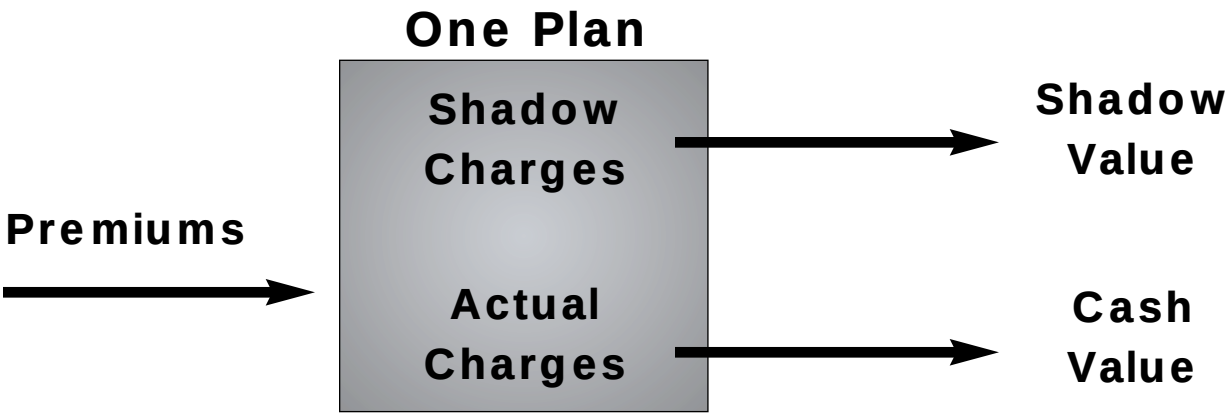
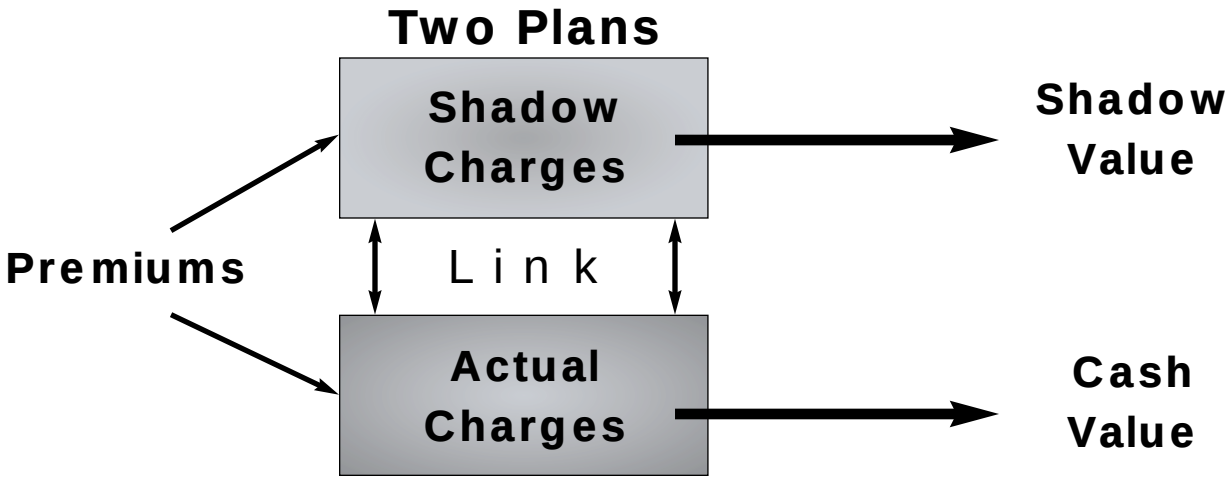


Figure 2 – Using Two Plans to Calculate Shadow Account Value and Cash Value



shadow account must contain enough information so that the policyholder can reproduce the shadow account calculations. At least two approaches can be used to accomplish this goal:

1) Use the description of the cash value found in the base contract and describe any differences. This approach produces a shorter form, but can be confusing if there are a lot of differences between the shadow account calculations and the cash value calculations.

2) Describe all of the calculations from scratch, but apply them to the shadow account values. This approach takes up more space but is effective in separating the shadow aaccount from the cash value.

When describing the charges that will be used in calculating the shadow account, it's again important to consider the terminology that will be used. Also, since these charges are guaranteed, they will need to be printed somewhere in the policy form. A separate schedule of charges can be included that applies only to the shadow account. This can help to distinguish between the guaranteed charges that apply to the actual Cash Values and the charges that are guaranteed for the shadow account calculations.

Conclusion

All in all, the process of administering and filing a shadow account product can be even more difficult than pricing the product. However, with hard work and creativity, it is possible to effectively market and administer a very competitive, complex product. □

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VUL Secondary Guarantees:

Catalyst for Sales Rebound

by Thomas E. Norton and Robert Grotyohann

The extended bear equity market has driven down sales of VUL and caused potential buyers to desire downside protection. The UL market with its lifetime guarantees based on very aggressive premium levels has set the standard for this downside protection. Distributors, and to a lesser extent buyers, focus on UL required premium levels more than the required premium level of other VUL products with lifetime guarantees.

In addition to the aggressive UL required premium levels, developers of VUL secondary guarantees must overcome conservative reserving requirements, the absence of viable reinsurance options and the negative perception of senior management due to the losses experienced by many carriers on variable annuity guarantees. The incidence of risk under VUL death benefit guarantees is much different and smaller than guarantees contained in variable annuities. These challenges may cause the optimum path to be one of including a "UL Lifetime Guarantee" within a VUL Product.

Reserves:

Reserves for this guarantee provide for death benefits that exceed those which exist in the absence of the secondary guarantee. The reserve methodology is contained in the Variable Life Model Regulation and is clarified in Actuarial Guideline XXXVII (AG 37). AG 37 enables consistent reserve treatment of VUL guarantees even though the earlier version of the model regulation (which is the only version approved in many states) did not anticipate current types of long-term VUL guarantees.

The reserve is the greater of (1) the one-year term reserve (OYT) and (2) the attained age level reserve (AAL). The OYT reserve is designed to cover extreme circumstances that could occur prior to the next annual statement. The AAL reserve provides for the full risk period but is designed to build and decrease slowly through periods of poor and favorable investment experience, respectively.

The OYT reserve essentially is equal to the total term cost for up to one year that is not covered by a "reduced" account value. The "reduced" account value is equal to the valuation date account value after the separate account portion is reduced by one third.

The AAL reserve equals the "residue" of the prior year's AAL reserve increased by a defined payment (which can be positive or negative). The "residue" is the prior year's AAL reserve adjusted with persistency and interest and reduced by tabular claims due to the guarantee. The defined payment equals (A) the present value of projected future guaranteed minimum death benefits less (B) present value of projected future death benefits in the absence of the guarantee less (C) the "residue" divided by a level annuity factor for the guaranteed period.

AG 37 clarified the following calculation details:

- Secondary guarantee must be assumed to remain in force if contractually possible.
- Projections and discounting are based on valuation mortality and interest and ignore product loads.
- XXX select factors do not apply.
- In the calculation of AAL, at all points during the guarantee period the quantity (A)-(B) is floored at zero.

Competitive Overview:

The death benefit guarantees currently offered under VUL products can most logically be separated by the length of the guarantee period. Most VUL contracts offer a short-term benefit and may also offer an intermediate term or a lifetime guarantee or both. Short-term benefits provide a three- to 10-year guarantee. They essentially enable a lower minimum premium by deferring the need for a positive surrender value. Intermediate term benefits usually provide a guarantee to "retirement" (i.e. until the later of age 65 or 70 and 20 years). The "best" intermediate term designs usually require payment of the commissionable premium. Lifetime guarantees are currently gaining most attention, but have very high required premiums.

The death benefit guarantees can also be separated by the methodology for measuring "required premiums." The Cumulative Premiums Method requires that the sum of premiums paid less partial withdrawals less outstanding debt exceeds the sum of required monthly premiums since issue. With the Interest-Adjusted Premiums Method, premiums and withdrawals are adjusted with an interest factor from point of payment before comparison to the required monthly premium adjusted with interest from the assumed due dates. The third and far less common method requires a positive shadow account value based on actual premiums, withdrawals, debt and assumed return and charges. All three of these methods may be utilized with or without a catch-up provision. Without catch-up, the premium requirement (or a positive shadow account value) must be met on each processing date (or sometimes annually).

If it is deficient, a lapse notice is sent indicating that the guaranteed benefit will be lost if the required premiums are not paid. With catch-up, the owner is only required to have paid sufficient premiums at the point the surrender value is negative and the contract would lapse without the secondary guarantee. A grace period is allowed for paying sufficient premium to cause a positive surrender value or to meet required premiums.

Recently two companies have added secondary guarantees maintained solely or primarily based on "premiums" allocated to the fixed account. This essentially creates a UL with a secondary guarantee and a tax-advantaged side fund. The required premiums for the first of these two products are competitive with UL products (we have not yet seen required premiums for the second product). At a competitive UL premium level (30 percent to 40 percent of a guideline annual premium for super preferred), significant additional premiums can be paid and allocated to generate retirement income or to increase corridor death benefits.

Figure 1 provides a sampling of required premiums for lifetime VUL death benefit guarantees. The majority of these benefits have required premiums greater than 85 percent of a guideline annual premium. One of the products has required premiums in the range of 65 percent to 70 percent of the guideline annual premium. Even at this lower level, it is significantly higher than some UL guarantees.

Benefit Cost Analysis:

With some stochastic cost analysis, the required premium levels shown in Figure 1 can be logically explained. For our modeling, we captured the following key benefit cash flows on a stand-alone basis.

- PV of the change in year by year secondary guarantee reserves
- PV of foregone monthly deductions due to investment return scenarios which totally dissipated account values
- PV of benefit specific charges ($0.01 per month per $1,000 of a specified amount in our case)

We discounted all cash flows at 12 percent interest and expressed all PVs as an amount per $1,000 of an initial specified amount. Our analysis only reflects standard contract lapse and does not attempt to add benefit lapse or adjust contract lapse dynamically based on investment returns in each stochastic scenario.

For our modeling we created a generic death-benefit-oriented VUL for a male

continued on page 18

With catch-up, the owner is only required to have paid sufficient premiums at the point the surrender value is negative...

preferred non smoker with issue age 55. For a $500,000 specified amount, Death Benefit Option 1 and a gross return of 9.00 percent, our current assumption level premium to carry to age 100 is $5,855.

In our model, investment returns were randomly generated based on the independent lognormal distribution. The baseline analysis assumes a mean return of 10 percent and a 15 percent standard deviation. Initially 1000 scenarios were run. The results were then ordered (lowest cost to highest). Then every fourth scenario was extracted for use on all other runs (250 scenarios).

Figure 2 displays our cost and revenue components at the following three different premium levels.

- $16,813 (95 percent of the guideline annual premium)
- $15,044 (85 percent of the guideline annual premium)
- $13,274 (75 percent of the guideline annual premium)

These mean results clearly show that the reserve cash flows dominate the cost and greatly increase as the required premium drops below 85 percent of the guideline annual premium. At this mean and variance we did not generate any scenarios where the account value was fully liquidated. Figures 3 and 4 display the distribution of net costs for both 85 percent of GAP and 75 percent of GAP respectively.

Next we looked at sensitivity testing of the mean and standard deviation of the investment return by utilizing the following two combinations and 85 percent of GAP.

- Mean 10 percent/Standard deviation 20 percent
- Mean 6.5 percent/Standard deviation 15 percent

The results from these distributions are shown in Figure 5. The reserve costs increase somewhat, but the incidence of totally dissipating the account value stays at or close to zero. These limited results support a required premium of roughly 85 percent of GAP if the full statutory reserve effect is reflected. If nonstatutory measures are used to set the profit goals or if some mechanism is employed to utilize reserves closer to the economic cost, then lower required premiums can be justified.

Effect of 2001 CSO:

Since the XXX select factors do not apply to this benefit, the lower mortality rates contained in the 2001 CSO Table help considerably. This can be viewed in Figure 6, which compares the reserve costs at several required premium levels.

Other Considerations:

Financial reinsurance with a methodology similar to that utilized for UL secondary guarantees would lower costs considerably. Reinsurance on this basis is essentially not available. Reinsurers are unwilling to spend limited capital on an agreement that yields minimal incremental revenue. In addition, losses on annuity guarantees are causing many reinsurers to avoid the equity guarantee market. Companies may have more luck piggybacking their UL deals with a "UL lifetime guarantee" within a VUL.

Another possible cloud on the horizon is the proposed C-3 changes which would require risk capital based on stochastic modeling at the modified CTE 90 level. The modified CTE 90 level is the arithmetic average of the worst 10 percent of all scenarios, with no scenario being calculated as a positive value of accumulated surplus. Current reserves for a lifetime benefit with a required premium at 85 percent of GAP probably exceed this level.

Conclusions:

The "UL lifetime guarantee" within a VUL may be an easier path for financial reinsurance and more in sync with buyers' risk tolerances at the tail of a bear market. Alternatively, early use of the 2001 CSO Table for death-benefit-oriented VUL should generate positive results. □

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Sample Required Premiums (Lifetime Benefit)
Face Amount = $500,000 – Best Class – Male NS – DB Option 1

Company/Product	Issue Age 45	Issue Age 55	Issue Age 65
Comp. A/Accum.	$10,129	$16,192	$25,765
Comp. A/DB	$9,215	$15,069	$24,659
Comp. B	$9,985	$16,635	$29,495
Comp. C/Accum.	$10,432	$16,896	$28,421
Comp. C/DB	$10,020	$16,325	$27,750
Comp. D/DB	$6,324	$10,160	$17,486
Comp. E	$8,790	$14,600	$24,365

Figure 1

BENEFIT COST ANALYSIS (1980 CSO)
Required Premium Level – Mean Costs – Issue Age 55

Premium Level	PV of Reserve	PV of Foregone Changes	PV of Revenue	Net PV
95% of GAP	$0.05	$0.00	$0.61	-$0.56
85% of GAP	$3.56	$0.00	$0.61	$2.95
85% of GAP	$13.92	$0.00	$0.61	$13.31

Figure 2

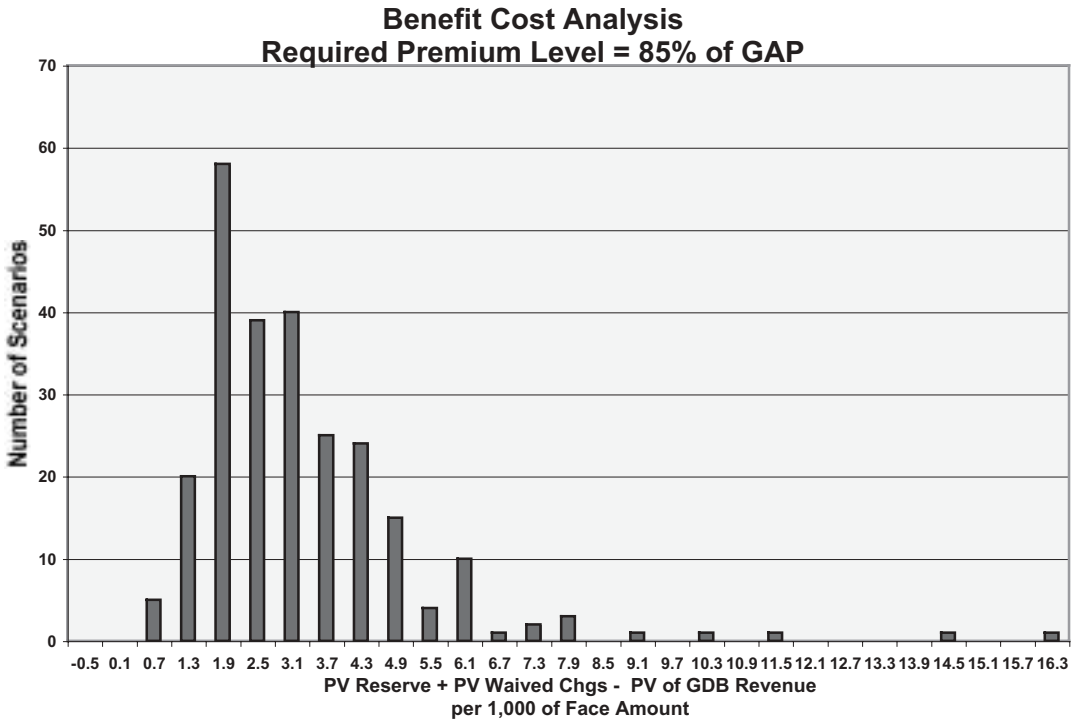

Figure 3

Figure 4

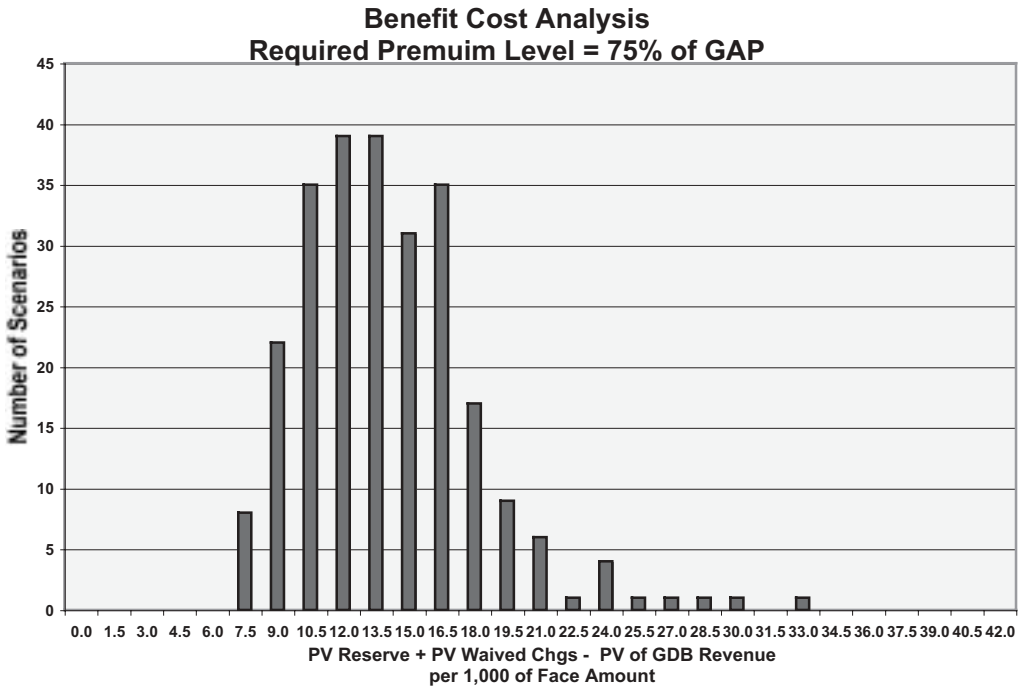

Figure 5

BENEFIT COST ANALYSIS (1980 CSO)
Investment Return Effect – Mean Costs – Issue Age 55

Mean/Standard Deviation	PV of Reserve	PV of Foregone Charges	PV of Revenue	Net PV
10%/15%	$3.56	$0.00	$0.61	$2.95
10%/20%	$4.56	$0.00	$0.61	$3.94
6.5%/15%	$5.25	$0.01	$0.61	$4.61

Figure 6

BENEFIT COST ANALYSIS (2001 CSO)
Cost Comparisons with 1980 CSO – Mean Costs – Issue Age 55

Premium Level	1980 CSO PV of Reserve	2001 CSO PV of Reserve
85% of GAP (1980 CSO)	$3.56	Exceeds 2001 CSO GAP
75% of GAP (1980 CSO)	$13.92	Exceeds 2001 CSO GAP
65% of GAP (1980 CSO)	$28.04	$0.79
60% of GAP (1980 CSO)	$36.23	$4.71

U.S. Population Mortality Improvement

by Douglas C. Doll

You may have seen in the newspapers last March a press release announcing that the U.S. had reached another record for life expectancy. The National Center for Health Statistics (NCHS) had just released their report on 2001 U.S. population mortality. (This report is preliminary—the final report, which includes additional detail, likely will come out this fall.)

The report is available on the internet at *www.cdc.gov/nchs/releases/03news/lifeex.htm*. I used the report to update a table on U.S. population mortality improvement rates. Some comments on the table results, focusing on the four years ending 2001, are as follows:

- There has been robust improvement (2 percent+) for males ages 55-74. This is a key age group for life insurers when you weight by expected mortality.
- Males ages 45-54 did not fare as well in 1997-2001, although they had done quite well the prior four years.
- You cannot tell much from the male ages 25-44 statistics. Looking at the entire history from 1987, you see deterioration through 1993 on account of AIDS, and then substantial improvement as the AIDS deaths reduced.
- Female mortality at older ages continues to have smaller improvements than male mortality. In addition, female mortality at ages 35-44 has deteriorated in recent years.
- You might be wondering how much impact the September 11 event had on 2001 mortality population rates. The answer is "not much." Consider that each decennial age group from 25-54 has about 40 million lives. An additional 1000 deaths in each decennial group would raise the death rate by only 2-3 per 100,000.

The table shows, for comparison, Projection Scale G, which frequently is used to project annuitant mortality. It looks not unreasonable for males, although high at younger ages. For females, Projection Scale G appears high. (In fact, when the Annuity 2000 table was developed, it was developed by taking the prior table and projecting to 2000 using Projection Scale G for males, but only half of Projection Scale G for females.) □

Annual Mortality Improvement – U.S. Population

	Death Rates per 100,000						Annual Rates of Improvement					
Age	1987	1990	1993	1997	2001	Males	1987-90	1990-93	1993-97	1997-01	1987-01	Scale G
25-34	189	204	212	163	143		-2.7%	-1.3%	5.3%	3.0%	1.6%	0.5%
35-44	290	310	329	275	259		-2.4%	-2.1%	3.9%	1.4%	0.7%	2.0%
45-54	638	610	603	548	544		1.4%	0.4%	2.2%	0.2%	1.0%	1.8%
55-64	1,626	1,553	1,480	1,343	1,192		1.5%	1.5%	2.2%	2.7%	1.7%	1.5%
65-74	3,636	3,492	3,411	3,170	2,914		1.3%	0.8%	1.7%	2.0%	1.3%	1.4%
75-84	8,206	7,889	7,700	7,055	6,842		1.3%	0.8%	2.0%	0.7%	1.1%	1.2%
						Females						
25-34	74	74	74	68	66		0.0%	0.0%	2.1%	0.6%	0.7%	1.0%
35-44	135	138	145	135	148		-0.7%	-1.7%	1.6%	-2.4	-0.7%	2.2%
45-54	367	343	334	310	316		2.1%	0.9%	1.8%	-0.5%	0.9%	2.0%
55-64	910	879	868	806	754		1.1%	0.4%	1.7%	1.6%	1.1%	1.8%
65-74	2,070	1,991	2,010	1,937	1,892		1.3%	-0.3%	0.9%	0.6%	0.6%	1.8%
75-84	5,102	4,883	4,824	4,832	4,764		1.4%	0.4%	0.0%	0.3%	0.5%	1.5%

Variable Annuity Risk and Seeking "The Perfect Hedge"

by Douglas L. Robbins

Of the many concerns on the mind of variable annuity (VA) pricing actuaries, one of the highest today is investment risk. First, how do we price for it? Better yet, is there a way we can dispense with it outright?

After all, we would like nothing better than a consistent predictable profit stream, risk-free. For VAs, our profit stream comes largely from fees charged as a percent of separate account values, so fluctuations in those values are counter to our main purpose. The addition of guarantees makes the situation worse. And the proposed RBC requirements for variable products has additional pricing implications regarding those guarantees.

As risk managers we seek to acquire something that is negatively correlated to the profit stream we now possess. The closer that "something" is to 100 percent negatively correlated with VA profits, the closer we are mathematically to being able to create a fixed profit stream. The negatively correlated instrument is well known to risk managers as a "hedge." We might seek to hedge our position regarding either guarantee risk (in order to minimize required capital) or total profitability.

Obtaining the perfect hedge is easier said than done. The first complicating issue is cost. The fact that we are seeking to "acquire" something generally implies that we have to pay something for it. If the price exceeds the value we are trying to protect, there is obviously no future in the transaction.

If we attempt to build a strategy on the asset side, via options and/or futures contracts, we may be able to hedge very well indeed. But the more perfect we attempt to make the hedge, the more trading we will have to do to keep the assets and liabilities in balance as conditions change, increasing trading costs. (Uncertainty about future decrement rates makes this especially tough for some benefits.) More importantly, market volatility could turn out to be higher than anticipated when a hedging strategy is devised. If so, our hedging cost will turn out to be higher than budgeted as well, all other things being equal.

Hedging our risks via reinsurance might seem attractive, and a few reinsurance solutions for guarantee risk still can be found at times. One factor making reinsurance potentially appealing is that the cost is often charged as a percent of asset fees. This leaves us to simply enjoy the remainder, if any. Another nice feature is that, if the reinsurance completely covers the risk, we do in fact have 100 percent negative correlation. The guarantee-based reinsurance cash flows (net of premiums) exactly mirror our direct flows.

The problem with reinsurance recently is that many programs do not completely cover tail risk. Such "partial tail coverage" programs often assign losses over a certain level back to the direct writer. This means that the 100 percent negative correlation only extends to the cap. Scenario testing of such a program might determine that required capital levels are barely reduced by the intended hedge. Thus the hedge fails to achieve the intended pricing impact (reducing RBC). Lastly, one more risk to consider is reinsurer insolvency.

One relatively new rider to variable annuities was initially billed as a good hedge for

total VA profitability, at essentially no net cost to the writer. That was the enhanced earnings death benefit (EEDB). For an additional asset fee, this rider would add 40 percent or so of contract gains to the annuity death benefit, ostensibly to cover income taxes on gains. The gains considered in the additional benefit were capped at some multiple of premiums paid, but because this death benefit paid off in an up market (rather than a down market, like most other guarantees), it was considered to be negatively correlated with other VA features and riders.

In fact, stochastic pricing of a VA with an EEDB added in produces quite similar tail results to those of the VA alone. At the upper tail, the cap on the EEDB limits its potential cost to the insurer, although its asset fees grow just like those of the base VA (and other riders), in very good scenarios.

More importantly, at the lower tail, where the EEDB costs nothing, the additional EEDB fees generated (since they are asset-based) are also at their lowest levels. And at that point, the worse things get for the VA and GMDB, the worse they get for the EEDB too.

In fact, like the situation discussed above with "partial tail coverage" reinsurance, the negative correlation between the EEDB and VA/GMDB is only over a band of fund value ranges. In this case, it is a narrow band, between premiums paid and the benefit cap. More importantly, the correlation outside that band is not merely zero. It is positive, due to EEDB charges being based on the same fund value as other asset charges.

It is apparent that many things might appear to be hedges, but fail to do the job in some cases. We have been in a market over the past three or so years that would have been perceived as unlikely at its outset. This scenario would have defeated some of the strategies we have discussed here, but not all potential ones.

Product development actuaries are continuing to seek the "golden bullet" for managing VA risk. They will continue to look on both the asset and liability side, and may also consider hedges between different products (e.g., VA vs. EIA, a topic for another day). The most diligent actuaries will carefully test any potential new strategy over a wide range of potential future scenarios. □

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Risk-Relevant Resources

by The SOA Risk Management Task Force

Looking for timely, thought provoking information on risks affecting your line of business? Why not visit the SOA Risk Management Task Force Web site at http://www.soa.org/sections/rmtf/rmtf.html

Created back in 2002, task force subgroups have been researching and writing about all facets of risk that affect the industry. Not only will you benefit from the research and documentation available on the site, you'll find useful links to other risk-oriented resources, network opportunities and events. Subgroups include:

- Economic Capital Calculation and Allocation
- Enterprise Risk Management
- Equity Modeling
- Extreme Value Models
- Health Risk Management
- Policyholder Behavior in the Tail
- Pricing for Risk
- Risk Based Capital Covariance
- Risk Management Metrics

Please take this opportunity to visit the site, add it to your list of favorites for frequent review and send your comments, questions and considerations to RMTF contacts.

The RMTF welcomes and needs your participation too! If you would like to learn more about the Risk Management Task Force in general or any of its subgroups, contact Dave Ingram or Valentina Isakina at *david.ingram@milliman.com* or *visakina@soa.org*. □

Pricing for Internet Distribution

by W. Howell Pugh

What does Internet distribution look like three years into the downturn? There is some indication of stability in the marketing groups after they suffered sharp drops in sales. A recent survey that I performed found 175 sites that sold life insurance on the Internet. Over 100 of those were multi-company sites that sold at least 10 companies' products.

The most prominent sites probably account for the majority of sales, although I do not know of any measurements of the total market. Two of the main sites are publicly quoted companies and thus have published their own results.

QuoteSmith had its second best sales year in 2002. Their reported term sales (number of policies) are showing stability over last year's sales and overall appear to parallel the industry pattern. (See table on top of page 23).

InsWeb reports the fee income it gets for providing term leads to companies. Their drop in sales occurred in 2002. The second half of the year is down by one-third from the previous year (See table on bottom of page 23).

Term still remains the most common product sold on the Internet. The belief is that it is less complicated and can be more readily self-bought by the consumer. There are several attempts to sell annuity products on several sites. Almost no one is attempting to sell universal life.

Underwriting Techniques

The biggest area of innovation is on the underwriting front. Attempts to bring new underwriting tools to replace full underwriting are coming from new directions on a frequent basis. In general, the idea is to supplement simplified issue questions with nonconventional underwriting tools such as credit reports and prescription databases. The goal is to have the trade-off between price and convenience at an acceptable level to minimize anti-selection. The Internet also allows easier access to some affinity groups, which will help mitigate anti-selection.

Pricing Assumptions

Distribution costs have a very different profile for Internet sites than for other direct or agent distribution. Many of the sites have up-front fees to handle setup of your policy and rates on their system. They also will charge an annual fee to carry your product on the site. These costs must be spread across the expected sales. You can compare your product to those on the site and estimate your expected traffic.

In addition to the bulk charges for the Web site, there are often per-lead or application fees. They typically range from $80 to $125. Thus, a key pricing assumption is the pull-through rate—the percentage of applications that turn into policies. Sometimes companies have requested a guaranteed minimum on the pull-through rate or even have negotiated to not pay for leads above twice the number who close. This is a critical item to manage the cost, in order to achieve overall profitability.

Internet distribution is more likely to have a flat commission per policy or lead. Such an arrangement is not typical for agent distribution. This means that there is a need for good information on average size or age. However, the Web site may be able to filter out applications for small amounts or young ages and reduce the less profitable cases to a very small percent of your product's sales.

Internet distribution is also common using company-owned Web sites or affinity sites. The sites are accessed by a click through button on a general company home page. Sometimes a banner ad is used to bring customers into the Web site. The main advantages that the sole company Web site

QuotesSmith 2002 Reported Term Sales (number of policies)	
Year	**Quantity Sold**
2002	17,622
2001	16,915
2000	33,491
1999	17,039
1998	10,920
1997	8,755
1996	6,649

InsWeb Quarterly Reports (fee income $1000s)			
	2002	**2001**	**2000**
4th Quarter	$733	$1,202	$642
3rd Quarter	938	1,411	544
2nd Quarter	1,100	1,142	422
1st Quarter	1,000	970	511
Total	$3,814	$4,677	$2,119

brings are that the prospects are more uniform and costs can be better controlled.

Underwriting and issue costs are similar to direct marketing costs. The use of a call center to manage the application process is recommended. This can also be a key weapon to manage the pull-through rate. Exam requirements generally are similar to agent-sold products. Some companies are attempting to use technology to control these costs.

Lapse experience for some of the earlier companies is about half the rate of agent sold business. The buyers are in control. They feel good about their choice of product and the shopping process to obtain it. There is not a need to repeat the shopping experience. There is no agent to push for new application.

Mortality for fully underwritten Internet distribution is the same as for agent distribution. However, because of the Internet, if you have an "underwriting hole," word can spread quickly. Since Web sites now have flexibility to handle substandard conditions, it is important to monitor your own underwriting rules and how the Web sites have constructed their rule set to make sure that you have not created an outlier.

Reinsurance is used for Internet term to mitigate the XXX reserve strain. Sometimes the reinsurance allowances can help mitigate the risk on the direct side. Using a normal allowance structure would mean that per-policy distribution costs would be mismatched by percent of premium allowances. See if the reinsurer will share some of the policy issue risk.

Internet term is a product for a new distribution. Some of the pricing assumptions are unique, while other assumptions are familiar to those who price agent-sold term. □

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2001 CSO Table—The Road to 2009

by William Carroll

Introduction

Once in a generation a new mortality table becomes the legal standard for statutory reserve liabilities and nonforfeiture benefits for ordinary life insurance in the United States. In December 2002, the National Association of Insurance Commissioners (NAIC) adopted a model regulation formally known as *RECOGNITION OF THE 2001 CSO MORTALITY TABLE FOR USE IN DETERMINING MINIMUM RESERVE LIABILITIES AND NONFORFEITURE BENEFITS MODEL REGULATION*. This action marked the end of an extensive development process and the beginning of a transition period that may extend until 2009.

This marks the first time that a major valuation table was developed as a joint project of the AAA and the SOA...

State laws and regulations specify standard mortality tables to measure life insurance reserve liabilities required to be held in insurance company financial statements filed with state insurance authorities. Mortality tables are also used under state law as standards for minimum cash surrender values and paid-up insurance benefits provided in life insurance policies. Under federal income tax law, these tables affect life insurance company reserve deductions and the definition of life insurance for federal income purposes.

The 2001 CSO Table

The 2001 CSO Mortality Table was developed by the American Academy of Actuaries working with the NAIC Life and Health Actuarial Task Force (LHATF). The table was based on the 2001 Valuation Basic Table developed by the Society of Actuaries for that purpose. This marks the first time that a major valuation table was developed as a joint project of the AAA and the SOA with the Society acting in its basic research role and the Academy serving in its public interface role. There was extensive liaison between the organizations at every step of the process. Hopefully this will serve as a model for future joint projects.

Like the 1980 CSO Table that it replaces, the 2001 CSO Table is a family of tables. There are nonsmoker/smoker versions, as well as composite versions that do not distinguish by smoking habits. There are gender-blended versions for nonforfeiture purposes that combine male and female mortality rates. There are select and ultimate versions as well as ultimate versions. The select/ultimate tables are presented in the classical format, rather than in the form of select factors used with the 1980 CSO. The length of the select period is 25 years, which is significantly longer than the 10 years used with the older table. There is no new Commissioners' Extended Term (CET) Table to replace the 1980 CET Table; therefore, the new minimum basis for the computation of values related to extended-term insurance benefits will be the 2001 CSO Mortality Table. The volume of insurance continued under extended-term insurance provisions has declined, and the SOA task force did not find sufficient differences in experience under that provision to justify recommendation of a new CET Table.

A complete discussion of the development and extensive analysis of the 2001 CSO Mortality Table, including all the tables in Excel spreadsheet format, may be found on the SOA Web site (*www.soa.org*) in the Report of the American Academy of Actuaries' CSO Task Force. The Society of Actuaries Report on the Valuation Basic Table is also included as an appendix to that report.

The NAIC Model Regulation

The NAIC model regulation sets forth the rules for use of the 2001 CSO Mortality Table.

Authority to adopt the new commissioners' mortality tables by regulation is found in the Standard Valuation Law and the Standard Nonforfeiture Law for Life Insurance. An important exception to this is the state of Florida where legislative action is necessary to authorize adoption of the regulation.

Unlike the 1980 CSO Table, where the smoker/nonsmoker and gender-blended versions were adopted at different times subsequent to the composite table, the 2001 CSO Mortality Table is a complete package. Consequently, the entire enabling regulation is contained in one NAIC model regulation.

That regulation was developed by LHATF after extensive discussion among regulators and industry. Regulators were nearly unanimous and all industry concerns were adequately addressed. Consequently, it should eventually be adopted by all states.

Timetable for Use of Table

Under the NAIC model, companies are permitted to elect to use the 2001 CSO Mortality Table as the minimum standard on a plan-by-plan basis for policies issued on or after January 1 of the year next following or coincident with the effective date of state adoption of the regulation.

Companies must use the 2001 CSO Mortality Table as the minimum standard for policies issued on or after January 1, 2009.

Key Provisions

The flexibility that developed over the past 20 years is continued under the model.

There was never any thought given by LHATF to restricting the flexible use of the smoker/nonsmoker or composite tables. Companies may continue to use either the composite table or the smoker/nonsmoker tables for all valuation and nonforfeiture purposes. Or, companies may use the smoker/nonsmoker tables to determine the valuation net premiums and additional minimum reserves, if any, under Section 8 ("Deficiency Reserves") of the Standard Valuation Law (SVL) and the composite tables for basic reserves and nonforfeiture benefits. This remains optional on a plan-by-plan basis.

Flexibility was not so easily arrived at when it came to flexible use of the ultimate or select/ultimate tables. One leading state actuary believed that a company should not be able to use one form of the table for basic reserves and the other form for deficiency reserves. This issue first arose with the introduction of the 10-year select factors for use with the 1980 CSO table.

The SVL merely says that the table for use in determining the minimum standard is the 1980 CSO with or without 10-year select factors. Soon after adoption of the 1980 amendments to the SVL, the practice of using the ultimate form for basic reserves and the select/ultimate form (the 10-year factors) for "deficiency reserve" testing emerged. When the NAIC adopted the initial version of Valuation of Life Insurance Model Regulation (Regulation XXX) in 1995, it was made clear that the choice of table for basic reserves and deficiency reserves was independent. After much discussion by LHATF, this flexibility was continued.

The 2001 CSO Mortality Tables also apply to Regulation XXX. Actuaries who enjoy details will relish this section of the model. Others will be satisfied to learn that the 2001 CSO replaces the 1980 CSO and everything else remains about the same. An entire section of this model regulation is devoted to this issue. The NAIC staff has painstakingly located every reference in the existing Regulation XXX to a mortality table or rate and has indicated which part of the 2001 CSO Table applies. To oversimplify without much loss of accuracy, parts of the 2001 CSO replace corresponding parts of the 1980 CSO. This is not quite precise because the two tables do not have exactly corresponding parts. (For example, where Regulation XXX permitted 1980 CSO with or without 10-year select factor, but did not permit the 20 year select factors developed for Regulation XXX, the 2001 CSO model permits only the 2001 CSO ultimate table.) Importantly, the use of X-factors with the select 2001 CSO Table is continued for deficiency reserve subject to generally the same conditions.

There was brief, but never serious consideration, of extending the use of X-factors to basic reserves. One new aspect is that the actuarial demonstration required when X-factors are used may not combine the results of tests that utilize the 1980 CSO Mortality Table with tests that utilize the 2001 CSO Mortality Table unless the combination is explicitly required by regulation or is necessary to be in compliance with relevant Actuarial Standards of Practice.

continued on page 26

Companies may use the gender-blended versions of the 2001 CSO Mortality Tables for nonforfeiture purposes. Those with a keen interest in this issue will notice that some of the minor limitations that applied to the use of the 1980 CSO Gender-Blended Tables have been removed. Use of these tables is also optional on a plan-by-plan basis. Protection against violation of the unfair trade practice statute is continued for those that take advantage of the plan-by-plan feature. In response to a request for clarification, new wording was added to clarify that these tables are not permitted by this regulation as the minimum valuation standard. Only a handful of states explicitly provide that gender-blended tables may be used as a valuation standard.

Finally, under an important new provision, use of the 2001 CSO Mortality Tables triggers a requirement that the actuarial opinion filed by companies with the annual statement be based on asset adequacy analysis. This will affect companies that file the alternate form of the actuarial opinion included in the older version of the NAIC Actuarial Opinion and Memorandum Regulation that is still found in most states.

New York advocated that companies be required by the NAIC model regulation to annually file mortality experience data with the states.

Unresolved Issues

The American Men (5) Mortality Table never replaced the American Experience Table as the valuation standard in all of the states. Critics of that table pointed out that it was based on the average experience of the contributing companies and, consequently, not adequate for all of the industry. The same issue arose during the LHATF discussions of the 2001 CSO Table. New York advocated that companies be required by the NAIC model regulation to annually file mortality experience data with the states. This would facilitate state review of company mortality experience and deal with the decline in the number of companies participating in the SOA experience studies. LHATF rejected this, choosing instead to rely on asset adequacy analysis to protect against inappropriate use of the new table.

Discussions of this issue have continued in New York. An announcement from the New York Superintendent of Insurance to the New York domiciled companies on this matter is expected shortly. Indications are that the letter will strongly encourage companies to participate in the SOA-LIMRA Mortality Study and indicate that New York will consider a regulatory solution if voluntary participation is not satisfactory. The American Council of Life Insurers (ACLI) also will write an announcement asking its members to consider voluntary participation in the study to avoid a regulatory mandate.

Federal Income Tax Reserves

When the 2001 CSO Mortality Table becomes permitted in computing reserves under the insurance laws of at least 26 states, it will become the "prevailing commissioners' standard table" for reserves under section 807(d) of the Internal Revenue Code. The law provides a full three-year transition period during which the previous prevailing table may be used. For example, if the 26th state adopts the 2001 CSO Model Regulation during 2005 with a permissive date of January 1, 2006, then the 2001 CSO Table would become prevailing on January 1, 2006. Tax reserves for policies issued during 2006-2008 could be based on either the 1980 CSO or the 2001 CSO. For policies issued on or after January 1, 2009, the 2001 CSO Table would apply. It is not coincidental that this hypothetical date coincides with the mandatory use date in the NAIC model. Of course, the state regulators could act more quickly and the 2001 CSO Table could become required for tax reserves before the 2009 state mandatory date.

The 2001 CSO Table, like the 1980 CSO Table, is a family of tables composed of more than one table with options under those tables. Consequently, more than one table meets the criteria for prevailing table. In these cases, section 807(d) calls for use of the table that "generally yields the lowest reserves." The 2001 Valuation Basic Table and the 2001 CSO Mortality Table were developed with this issue in mind. The Report of the American Academy of Actuaries' CSO Task Force says essentially the following about the relative magnitude of reserves under the available options:

- Reserves on the Ultimate Table are generally less than Reserves on the Select/Ultimate Basis.
- Reserves on the Smoker/Nonsmoker

Basis are generally the same as reserves on the Composite Basis.

This is the same fact pattern that was presented for the 1980 CSO Table. Consequently, it is reasonable to expect that tax reserves would continue to be based on the ultimate table and that either smoker distinct or composite tables could be used for tax reserves.

Definition of Life Insurance

Section 7702 of the Internal Revenue Code provides that in order to be a life insurance contract under the Internal Revenue Code, the contract must be a life insurance contract under applicable law and must also meet one of two alternative computational tests. Both of these tests include an element for "reasonable mortality charges." The code further provides that reasonable mortality charges shall not (except as provided in regulations) exceed the mortality charges specified in the prevailing commissioners' standard tables. The Department of Treasury Notice 88-128 set forth "interim rules" for the determination of the reasonable mortality charge requirement. Specifically, the Notice provided a safe harbor for the use of the 1980 CSO Table that taxpayers continue to rely on.

Unlike section 807, section 7702 has no explicit transition provisions that would provide for an orderly transition in the prevailing table. The ACLI concluded that the most immediate need for guidance relates to transition rules and the effect of the new tables on existing contracts. In October 2002, the ACLI requested that Treasury provide the following transition guidance:

1) The provisions of Notice 88-128 with certain clarifications shall continue to apply to all life insurance contracts issued before January 1, 2009 that do not utilize the 2001 CSO Tables in the underlying computations.

2) For contracts issued using the 2001 CSO Tables, there is a safe harbor of 2001 CSO Tables for all reasonable mortality charge computations to the same extent as Notice 88-128 provided a safe harbor for use of 1980 CSO, except that the reasonable mortality charges for a contract cannot exceed the amount of mortality charges guaranteed under the contract.

3) After December 31, 2008, the only safe harbor will be the 2001 CSO Tables for newly issued contracts. Existing contracts can continue to use 1980 CSO to the same extent as provided under Notice 88-128.

4) Contracts using 1980 CSO Tables that undergo material changes or adjustment events can continue to use their existing mortality tables. In the case of an exchange of a contract for a newly issued contract, however, the date of issue of the new contract will determine the appropriate mortality table. This exception should apply only in the case of an actual exchange and not in situations where an insurance contract merely undergoes a modification, such as the addition or removal of a rider.

The ACLI met with representatives of the Department of Treasury in late 2002 to discuss this request for guidance. While no formal action was taken regarding transition courses, ACLI remains optimistic that work on the requested guidance will proceed this year.

Current State Activity

As this article is being written, only a few months have passed since the NAIC adopted the model in December 2002, so it should not be surprising that only two states, New Mexico and Texas, have adopted the regulation and only three others, Oklahoma, Pennsylvania and Utah, have issued proposals. Bureaucratic machinery moves slowly. An apparent slow start should not be taken as an indicator of future developments. When the number of states adopting the rule reaches the 26 required to make the new tables prevailing for FIT purposes, pressure to complete the remaining states will naturally arise. Sooner than we realize, 2009 will be upon us and the implementation effort that lies ahead will be history. □

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Upcoming PD-Sponsored Sessions at the Annual Meeting in Orlando

Do You Know How Much You're Spending?–The Hidden Costs Of Product Complexity

This session looks at the behind the scenes costs that are often missed when designing newer, more complex products. They can run the gamut from increased systems and administrative expenses to the need for more robust marketing materials and, in the extreme, market conduct costs. Participants:

- Develop a better understanding of new product design
- Learn methodologies for estimating the additional cost of new product features
- Learn how to measure, account for and mitigate market conduct risk

Risk Management Through Product Balancing

Most pricing risk management tools are used for one specific product. However, risk in one product may be offset by expanding a company's product portfolio. This session explores the possibilities of reducing risks using a combination of products. Some of the risks that are discussed include asset and liability durations, mortality risks and multiple guarantees within a product design.

Several case studies are presented that allow attendees to gain increased understanding of risk management through product balancing.

Everything Old Is New Again—The Revival Of Traditional Life Products (with a twist)

This session examines the resurgence of whole life, term and universal life products, both from a market and product perspective.

At the conclusion of this session, participants have a better understanding of:

- Renewed growth in life insurance market share of these products
- Customer demographics and economic trends driving the resurgence
- New product features that are modernizing traditional life products
- New reserve and tax regulations to consider

Equity-Indexed Annuities Or Variable Annuities Guaranteed Living Benefits? Which Is Better?

Annuity purchasers are attracted by the prospect of equity-based returns while retaining a floor of protection. Equity-indexed annuities and guaranteed living benefits on variable annuities are two different ways to address this desire, but the returns and risks for both purchasers and insurers are very different. What are the important considerations for an insurer in this market? Panelists debate the merits and risks of these two products. This session addresses:

- Differences in benefits that can be offered
- Insurer investment risks under each product
- Impact on distributors
- Influence of reinsurance and available hedging

Product Development Section Hot Breakfast

The Product Development Section invites section members to a hot breakfast buffet, a short business meeting and a speaker. This is a great way to meet and socialize with other section members and learn about section activities.

The breakfast is open to Product Development Section members only. There is a nonrefundable charge of $10. Please include the additional fee with your registration.

Less Uunderwriting: More Profits Or More Problems?

Many insurers are moving toward less underwriting on their life products. Panelists discuss what measures they are taking to make their underwriting requirements less stringent and how the market is reacting to these measures. Specifically, table-shaving programs and simplified issue underwriting are addressed.

The panelists answer the following questions:

- How are insurers handling the competitive pressure if others are paring down their underwriting requirements?
- How are reinsurers handling this reduced under-writing in their reinsurance quotes?

- What are the cost/benefit trade-offs of these changes?

Attendees learn the underwriting changes being considered and the impact of this on mortality and pricing.

"One Shoe Doesn't Fit All:" Using The Appropriate Pricing Measure

There are many measures of profitability in the life insurance and annuity product development processes, including internal rate of return, return on equity, return on assets, profit margin and break-even year. Which are the most appropriate, and what are they telling you? How does the answer differ by product and why? How might profit targets differ under changing circumstances?

Attendees develop a better understanding of pricing measures and how they can be most appropriately applied to varying products and environments.

Which Distribution Channel Will Win?

Insurers struggle to distribute products that are customer-driven and profitable. Various competing distribution channels attempt to achieve the most prominent position. They include national and regional marketing organizations, agency forces of various kinds, group and worksite specialists, Internet marketers and others.

Representatives from three of these channels discuss:

- Their value proposition for customers and insurers
- Their relative strengths and weaknesses
- The reasons they will increase their position with insurers and customers in the future

Attendees increase their understanding of the dynamic development of various distribution channels.

Risk-Based Capital Requirement On Variable Annuities With Guarantees

New risk-based capital requirements for variable annuities with guaranteed benefits such as GMDBs and GMIBs have been developed by the AAA and are being considered by the NAIC. The proposed requirements may significantly increase the level of capital required on such products from today's typical levels. As well, the approach to determining the required capital involves stochastic modeling of guaranteed benefits.

Industry experts discuss:

- Overview of the new capital requirements
- Implementation issues such as model validation, number of scenarios, grouping, interest rates andpolicyholder behavior
- Anticipated impact
- Methods to reduce the necessary number of scenarios

Attendees benefit by learning about the new requirements and how they affect the bottom line.

United States vs. Canada—Regulatory Product Filing Processes

This session involves a brief discussion on the regulatory filing processes in the United States and Canada followed by a lively debate on the current and future processes for each country. Regulators from each country discuss current filing processes and other product-related issues.

Attendees develop a better understanding of the regulatory filing issues from each country as well as the possible evolution of these processes.

North and South Of The Border–Product Distinctions

The Canadian marketplace is one where preferred term insurance is relatively new, critical illness insurance products are proven sellers and life insurance policy forms are not subject to provincial approval. In the United States, current developments include shadow accounts, speedy issue products and guaranteed benefits on variable annuities. What makes these neighbors different?

Representatives from both sides of the border discuss:

- Market and regulatory differences and similarities
- The comparison of product offerings in each country
- An overview of current issues in product development

Attendees gain increased understanding of the differences and similarities between the United States and Canadian marketplaces. □

SOA Report on Mortality Improvement Survey

by Douglas C. Doll

The Society of Actuaries released in March the report of the Mortality Improvement Survey Subcommittee. This article highlights just a few of the interesting results in the report. The complete report can be accessed on the Internet at www.soa.org/research/mortality_improvement.html.

The report provides results of a survey of life insurance company practices in the summer of 2000 regarding the use of mortality improvement assumptions in pricing. 61 U.S. companies and six Canadian companies responded. All companies were direct writers (i.e., not reinsurers).

The survey asked about "generational" improvement (projecting historical experience up to the current date) and "durational" improvement (projecting current mortality to improve into the future). I am less interested in the generational improvement results. Although only 35 percent of respondents said they used generational improvement, most of those who did not use it said it was because their experience table already reflected current expectations or were already up-to-date.

With regard to durational (future) mortality improvement, only 25 percent of respondents said they use this. Of those that use this, in the first 10 policy years, the annual improvement for male age 45 best nonsmoker preferred class ranged from .50 percent to 2.00 percent, with an average of .89 percent. Approximately half of these companies grade the improvement to zero after a period of 10 years or so. Although only 25 percent of companies priced using durational improvement, 52 percent of respondents believe it is appropriate to use durational improvement.

The reasons given for why durational mortality improvement is *not* assumed are listed in the table below.

Of course, the issue of mortality improvement should not be considered in isolation—it should be combined with consideration as to the steepness of the underlying mortality table, which is an issue described in another article in this newsletter (See page 13). □

Reasons Durational Improvement was not Used

Reason	Percentage of Respondents
Creates problems with Illustration Certification	62%
Company does not believe durational improvement factors are appropriate.	56%
Creates problems with XXX X-Factors	36%
Company does not believe durational improvements factors are needed	28%
Other	28%