



The Emphasis on Financial Strength—Implications for Product Development

by Esther Milnes, FSA

How will the current concerns about financial strength and solvency affect product development? The editor of this newsletter asked me to speculate about this question and write an article on the subject. What follows is a montage of ideas—some my own, some from lunchtime and corridor conversations with colleagues. I hope it will provoke comment and further ideas from readers.

The Market

Consumers increasingly will want to deal with strong companies that have good track records, and they will want more information about what they are buying. Opinions assigned by professional rating agencies will continue to have significant influence in the marketplace, even as these agencies and their rating systems are subject to intense scrutiny and criticism.

This preference won't necessarily mean a particular type of product will be favored. Instead, the actions companies take to enhance their financial

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A Method for Option-Adjusted Pricing and Valuation of Insurance Products

by David N. Becker, FSA

The manner in which prices are determined for all insurance products (life, annuity, and health), including prices for closed blocks and entire companies, varies widely. Some actuaries determine prices by using the accumulated value of profits; some, the present value of profits. Some price without federal income tax (thus ignoring the expense and the significant timing differences); some, with tax. Some reflect in the price the cost of holding a risk-based surplus target needed to support the liability; some do not.

This article presents an appropriate economic quantity for determining price given a desired return and for determining return given a specified price. It is assumed that capital is rationed and the decision criteria are provided by the techniques of capital budgeting, that is, internal rate of return and net present value-based measurements. The classic quantities that actuaries have traditionally used do not reflect the interest-sensitive nature of the liabilities and the assets backing them that arise because of "embedded options." The article

demonstrates how the classic pricing model, enhanced to reflect asset and liability cash flows, can be combined with recently developed techniques in the valuation of fixed-income securities to result in option-adjusted pricing measures. This paradigm can be applied to single cells, in-force blocks, and appraisals of entire companies. Finally, additional applications are outlined.

What Should Be Measured To Determine Price?

The principle underlying the valuation of common stocks and fixed-income securities is that the market value equals the present value of the security's "free cash flows," where the discount rate is a risk-adjusted rate of return ("free cash flows" means cash distributions from the issuer of the security to the owners of the security). Such distributions are "freely" usable by the owners for any purpose, including the payment of taxes resulting from the distribution. Examples are cash dividends on common stock and interest and principal payments on fixed-income securities. The free cash flows for many securities are dependent on the future economic environment.

If the "security" is a block of insurance policies or an insurance company, then the free cash flows are the amounts of after-tax "adjusted" statutory earnings generated by the policy, the block of business, or the company that can be paid to shareholders. Statutory earnings are chosen as the starting point, because state law normally limits the amount that can be paid in shareholder dividends to the prior year's statutory income. (Free cash flows may include an adjustment for an extraordinary dividend, which requires approval from the

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Editor's Notes

by Charles E. Ritzke, FSA

Recent financial and solvency issues appear to be causing a fundamental shift in perceptions of the life insurance industry. Life companies are being scrutinized as never before by agents, consumers, regulators, rating agencies, politicians, and journalists. The hyper-competitive, product-driven decade of the 1980s appears to be fading fast as the major marketing thrust for the 1990s is to preserve and promote financial strength and stability.

It wasn't that many months ago that a company's financial ratings were generally nothing more than a small footnote in the sales material, accorded all the attention intended for items in fine print. The projection of cash values, premiums and/or commissions almost always made or broke the sale. Although these latter items are still very important, it is amazing how quickly they have become secondary to the need to sell a company's financial strength and stability. While financial strength is measured in many different ways, a company's financial ratings are becoming increasingly important measures.

What will these changes mean to product actuaries and the products they design? When deciding on a competitive posture, will the ratings of the company in relation to those of its

competition become a major factor? All other things being equal, how much lower an interest rate can a AAA rated company "get away with" compared to a AA or A rated company? Could it go 50, 75 or 100 basis points lower and still be competitive? I believe that many companies are currently wrestling with these questions. When this all shakes out, will the competitive position of companies with different ratings be compared in the same way that the interest rates on AAA corporate bonds are compared to A rated corporate bonds? Then, turn the situation around. If an A rated company wants to be AAA rated, which comes first, the higher rating or the lower interest rate? Will the rating agencies pay more attention to the details of how a company's products are priced and designed? Currently the attention they direct to product price and design appears to me to be superficial.

If company ratings become more analogous to bond ratings, will the perceptions of company ratings change? In general, an A rated corporate bond is not viewed as "bad" and a AAA rated bond as "good." Both are investment grade, but with very minor graduations or perceived higher risk in exchange for higher yields. For companies,

however, the "bad" versus "good" perception currently seems to apply. I don't think that the rating agencies (at least the ones that also rate bonds) believe that the "bad" versus "good" perception is correct.

I believe that trying to anticipate and understand the effects of these financial and solvency issues will be very important to members of the Product Development Section as we prepare to develop products in the 1990s and beyond. So this is a call to action for all those members who are also prognosticators, soothsayers, palm readers, or just "all-knowing, all-seeing visitors from the East." Write to us and share your thoughts on how these issues will change the face of product development.

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The Section would like to encourage articles and papers on product development topics or subjects of interest to product development actuaries. If you have an article or an idea for an article that you think might interest Section members, please contact:

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insurer's domiciliary state, but these are not considered here.) In addition, prudent management requires that some amount of risk-based surplus be held for the existing liabilities and the supporting assets, and the free cash flows are adjusted for the amounts set aside for this purpose.

These two constraints (one accounting/regulatory and the other prudent management) determine the amount of free cash flow that can be paid as dividends to shareholders. This amount is also referred to as "distributable earnings" or "capital transfers," as well as free cash flows. For a block of insurance business, this quantity can be defined by:

$$FCF_t = DE_t = CT_t = SBP_t - (RS_t - RS_{t-1}) + (1 - \tau_t) \times i_t \times RS_{t-1}$$

where SBP_t is the after-tax statutory book profit (that is, where investment income is earned only on the statutory reserve plus net cash flow of the liability); RS_t is the risk-based surplus target for the liability at the end of period t ; τ_t is the tax rate for period t ; and i_t is the pretax investment income rate on the risk-based surplus target at period $t-1$. Investment income would reflect realized capital gains and losses net of taxes.

At the beginning of a project (whether it is pricing a product, pricing a block of business for purchase, or appraising an entire company), the initial free cash flow or "distributable earnings at time zero" is typically a negative amount, reflecting the investment by the purchaser to cover any statutory and tax timing strains and to increase the surplus to the risk-based surplus target for the liability.

It has been said that distributable earnings do not represent the underlying economics of the insurance transaction, that is, the pretax cash flow patterns of the actual assets and liabilities, and that these distributable earnings are a result of the artificial constraint of the accounting/regulatory system. This statement is not accurate because these "so-called" artificial values are the amounts that can be paid to the

shareholders of insurance companies. For shareholders, then, the distributable earnings represent the economic reality of being the owner of an insurance company or block of business. They are what the shareholders receive in exchange for their purchase price of the insurance company stock or block of business. For quantifying a price for the "security" or the return to the shareholders, distributable earnings are the appropriate free cash flows to measure.

Limitations to the Liability-Only Pricing Model

Most insurance liabilities have some degree of interest sensitivity and many have significant sensitivity to changes in the interest rate environment. Clearly the assets backing those liabilities are interest-sensitive. Thus the actual cash flows, and therefore the distributable earnings, are interest-sensitive as well. The Anderson book profit or "liability side" computation traditionally used in pricing makes implicit assumptions about the interest rates. These assumptions are that the yield curve is flat and unchanging over time. Thus asset maturity and investment income timing are irrelevant, and all assets can be considered to be invested in cash. Sometimes the model allows the interest rate level to change on an annual basis (parallel shift up or down), but the yield curve remains flat; and in this case the assets backing the liabilities are implicitly assumed to "roll over" on an annual basis or on the same basis as shifts occur. In this case, the resulting distributable earnings will not reflect the interest sensitivity in the real world.

Application of Stochastic Valuation Techniques to Insurance Pricing

By incorporating an "asset side" (including the accounting rules for assets) to the traditional liability model, one can reflect the effects of investment strategies, actual investment cash flows, crediting strategies, and policyholder/producer behavior on liability cash flows. It also permits the computation of realistic distributable earnings

that are now interest-sensitive. If the stochastic techniques for the valuation of interest-sensitive cash flows are applied to interest-sensitive distributable earnings, then a new block can be priced or an existing block or entire company can be valued in a manner that reflects the interest rate risk of embedded options in the assets and liabilities. In this manner the decision rules of capital budgeting, return on investment and net present value can be extended to distributable earnings that reflect the interest-sensitive character of the assets and liabilities.

The valuation of fixed-income securities has been advanced by the use of stochastic techniques that project the security's cash flows over a range of future possible term structure (interest rate) scenarios or paths. Ideally, these paths should be arbitrage-free; that is, they should not permit riskless arbitrage, which would result in positive wealth from an investment with zero net outlay. There are various levels of "arbitrage free," however, with the more strict definitions requiring significantly more computation. There is a trade-off that can be made in terms of sacrificing some accuracy for shorter computation time; see the text by Hull [12] and the papers by Ho [10], Jacob, Lord, and Tilley [13], Miller [14] and [15], Pedersen, Shiu, and Thorlacius [16], and Tilley [20].

The basic terminology and formula used by the continuous model for the stochastic valuation of securities with interest-sensitive cash flows are given below. If one is given a set of P equiprobable arbitrage-free paths $\{r_{p,t} : 1 \leq p \leq P \text{ and } 1 \leq t \leq N\}$, where $r_{p,t}$ is the risk-free rate, that is, the one-period forward rate for path p during period t , each path having N periods, and oas is defined as the option-adjusted spread over the risk-free rates for the security, then the option-adjusted price for the security is:

$$S^{\infty} = (1/P) \sum_p [\sum_t [FCF_{p,t} \div \text{PROD}_{j=1} (1 + r_{p,j} + oas)]]$$

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The benchmarks for the risk-free rates are the U. S. Treasury rates. Note that if the option-adjusted price, S^{∞} , is given, then the value of *oas* can be computed. The option-adjusted price, adjusted for the cash flow convention that amounts paid by the buyer are negative, represents the free cash flow at time zero.

Currently, these financial valuation techniques are often applied to the *cash flows* of the assets and liabilities. These pretax quantities together with their periodic change provide useful and important information about the financial impact of embedded options in the assets and liabilities due to changes in the interest rate environment. The difference between these two option-adjusted values, that is, the option-adjusted value of assets less the option-adjusted value of liabilities, is often called the option-adjusted value of "surplus." ("Surplus" is used in quotes because it represents a cash-flow-based measure of surplus, not an accounting/regulatory-based measure of surplus.) Examining previous periods' changes in this quantity reveals the creation or destruction of "surplus" during the period due to existing and new business activity, the character of the investment portfolio, and the changes in the term structure and interest rate volatility. When applied to asset and liability cash flows, such techniques provide a tool to assist in managing the business by analyzing hedging techniques that will immunize the option-adjusted value of "surplus"; for examples, see [1] and Griffin [9].

This option-adjusted value of "surplus" does not enable determination of the price or the yield (expressed as either a flat amount or an *oas* over the risk free rates) to the owner.

But these goals can be accomplished if the financial valuation techniques are applied to the distributable earnings computed in an asset/liability model as described previously. For an insurance liability or an insurance company, free cash flows or distributable earnings are defined to be

$$FCF_{p,t} = DE_{p,t} = SBP_{p,t} - (RS_{p,t} - RS_{p,t-1}) + (1 - tr_{p,t}) \times i_{p,t} \times RS_{p,t-1}.$$

When this definition is used in the previous formula, the *oas* represents the "spread over Treasuries" that an investor can earn on the block of insurance in exchange for a given price. Alternatively, S^{∞} is the price to be paid to achieve a desired return of *oas* over Treasuries. It enables the investor to compare alternative investments using the classic tools of capital budgeting, internal rate of return (IRR), or net present value (NPV). IRR is typically expressed as a flat rate of return over the horizon of the investment. It may also be expressed as the fixed add-on, *oas*, to the risk-free Treasury term structure. Similarly, for individuals pricing insurance products, this value allows alternative product designs, investment, and crediting strategies to be compared for their impact on profitability as measured by distributable earnings. Note that computing the distributable earnings along each path will necessitate the evaluation of actual assets for sale or purchase using option-pricing techniques at each point along the path.

The concepts of option-adjusted duration and option-adjusted convexity, which are very useful in the characterization of assets and the immunization of asset/liability cash flows, can also be applied to distributable earnings. Such duration and convexity measures need not be limited only to parallel shifts in the term structure, but may also reflect any change in shape and/or level of the term structure using techniques such as multifactor duration and convexity (Reitano [17] and [18]), "key rate durations" (Ho [11]), and yield curve dynamics expressed by "shifts, tilts, and bends" (Epstein [6]). By applying these tools to distributable earnings, a program could be developed to immunize distributable earnings. This raises the possibility that a strategy to immunize asset/liability cash flows may not immunize distributable earnings, and

vice versa. It is natural to inquire under what circumstances there is merit in hedging asset/liability cash flows if there is no hedging of distributable earnings or if there is a negative impact. Insights into these situations may provide guidance into the development of accounting rules.

Option-Adjusted Yield and Option-Adjusted Spread

Some investors prefer to state their profit objective by reference to a flat hurdle rate instead of an *oas*. This statement of the profit objective can be generalized by using the financial techniques described and changing the basic formula for S^{∞} . Let *oay* be the option-adjusted yield or internal rate of return. Then, given S^{∞} , *oay* can be solved for by using the factor $(1 + oay)^t$ in place of $PROD_{j-1}(1 + r_{p,j} + oas)$ for discounting the distributable earnings. Alternatively, given a value for *oay*, S^{∞} can be computed. In a similar manner, an investor can use his/her cost of capital or other benchmark rate in lieu of the hurdle rate for decision-making.

The Risk in Applying Classical Discounting to Distributable Earnings

A problem that can arise for insurance products is not often found in the valuation of traditional securities, especially bonds or mortgages. The problem is that the distributable earnings can be negative, zero or positive with multiple sign changes over time along a given path. The presence of multiple sign changes jeopardizes the use of the classical discounting techniques and can result in economically meaningless results. The demonstration of this and the development of a methodology for removing this difficulty is found in Becker [2]. The method for computing option-adjusted values is modified by this technique. The notation used in demonstrating the modification is that of the cited paper. *PVB* means the present

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value balance. The modification is made in the following way:

Let

$$PVB_{p,N}(i) = DE_{p,N}$$

and

$$PVB_{p,t}(i) = PVB_{p,t+1}(i)/(1 + r) + DE_{p,t}, \text{ for } t = N-1, \dots, 1;$$

where

$$r = i, \text{ if } PVB_{p,t+1}(i) > 0,$$

and

$$r = (1 - tr_{p,t}) \times r_{p,t}, \\ \text{if } PVB_{p,t+1}(i) \leq 0.$$

Here i equals any of the following choices, depending on the measure the user wants to examine:

- (1) $r_{p,t} + oas$;
- (2) oay ;
- (3) the cost of capital; or
- (4) $r_{p,t}$.

The formula for S^{∞} can be revised to read:

$$S^{\infty} = (1/P) \sum_p [PVB_{p,t}(i)].$$

Economic Interpretation of the Alternative Discounting Choices for i

When management states its decision-making on a fixed hurdle rate, then the use of $i = oay$, the option-adjusted yield, is appropriate.

If it is desired to compare products on a cost-of-capital basis, then that value should be used for i .

Recall that interest or yield rates are often viewed as the sum of a real rate of return, an inflation component, and a risk adjustment. If the preference is a return equal to oas in excess of the risk-free Treasury rates (that is, the real rates plus inflation), then $i = r_{p,t} + oas$ should be chosen. This may be especially appropriate when the volatility is such that a current fixed-yield target, that is, oay , is likely to be too low (or high) in comparison to what the risk-free rate plus oas returns over an extended time.

Discounting at $i = r_{p,t}$ provides information about the present value of the distributable earnings in excess of the risk-free rate.

Given S^{∞} , the corresponding oas or oay can be found, and given values for any of oas , oay , the cost of capital, or $\{r_{p,t}\}$, the corresponding S^{∞} can be found.

Having obtained the option-adjusted price (which is an option-adjusted net present value) by using i equal to the cost of capital or $r_{p,t}$, the option-adjusted break-even year can be computed by combining the traditional definition of break-even year (the least duration such that the present value of distributable earnings from time 0 to that duration is positive and remains positive for all future durations) with the financial valuation techniques described. If an option-adjusted present value of premium is calculated, then an option-adjusted profit to premium ratio can be obtained.

Appraisals and Value-Added Analyses

The classical appraisal displays the following values: surplus, present value of future book profits on existing business, and present value of future book profits on new business. These values are often displayed on both a pretax and after-tax basis. New business is usually included for a limited number of years.

A superior approach for appraisals is to create an option-adjusted appraisal whose values are: actual surplus less risk-based surplus target with indication of book and market values (an amount that could be distributed today), the option-adjusted value of distributable earnings on existing business, and the option-adjusted value of distributable earnings on new business.

A valuable management tool is provided by value-added analysis; for examples, see Brinkman, Nicholson, and Sondergeld [5] and Clay, Conwill, Kerper, and Taylor-Gooby [7]. The techniques of financial valuation can be applied to distributable earnings to

produce an option-adjusted value added analysis by discounting the cost of capital.

Additional Applications

There are additional applications of these techniques. Other pricing assumptions are stochastic, for example, asset default, mortality, and lapsation, but are often treated as deterministic in classical pricing. The model described here can be enhanced to reflect the stochastic nature of these other risks. Specific recognition of AIDS or random fluctuations in mortality due to epidemics can be modeled. The user's perception about the correlation between higher rates of lapse and higher consequent mortality among the persister group can be incorporated in the model; for examples, see Becker [3], Becker and Kitsos [4], Dukes and MacDonald [8], and Shapiro and Snyder [19]. This could be very useful in modeling interest-sensitive life products that can experience material "interest-sensitive" lapses if the difference between the competitor's rate and the crediting rate becomes large.

This model, when coupled with the financial valuation techniques described, can be used to assess the level of the risk-based surplus target needed to be held to ensure solvency from a specific risk (asset default, pricing inadequacy, asset/liability mismatch, general contingency, or other) or combination of risks at a given confidence level. If the model allows sufficient asset-modeling flexibility, then product designs, investment and crediting strategies, and reinsurance alternatives can be examined that will minimize one or more of the risk-based surplus target requirements. Although hedging strategies have a net cost, this cost can be offset at least partially both by the potential reduction in risk-based surplus that needs to be held and by the possible reduction in the variance of financial results, which when coupled with the owner's risk aversion results in improved utility.

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The technique can be applied to determine risk-based surplus requirements in the following manner. Define the risk-based surplus requirement for a given risk along a given path (denominated either as a dollar amount or as a percentage of the statutory liabilities) as the least amount of surplus to be held at the beginning of the study such that the statement value of the accumulated surplus along the path never becomes negative. If adequate solvency protection is described as having positive statement value of surplus over a given percentage of paths (the confidence level), then the amount of risk-based surplus can be found by performing a stochastic projection of the retained earnings and solving for the level of risk-based surplus that needs to be held at the beginning of the projection to ensure a nonnegative statement value of surplus along the specified percentage of paths. This can be repeated for each risk, and the total risk-based formula can be tested for any correlation of risks that might affect the total amount of risk-based surplus that should be held. If the statement value of an insurer's capital and surplus, plus items in the nature of surplus, equals or exceeds its risk-based surplus target for the given percentage of paths, then the opining actuary should be comfortable in signing a valuation actuary opinion. Note that this procedure assumes that no shareholder dividends are paid. This can be remedied by building in a provision for shareholder dividends. By computing various "balance sheets" within the solvency-testing framework for the periods for which distributable earnings are determined, liquidity risk can be examined from several perspectives. Let "assets" represent the assets backing liabilities and retained earnings (surplus). Over the time horizon of the study, it is possible to compare: statement value of assets with statement value of liabilities, market value of assets with cash surrender values, and option-adjusted (that is, market) value of assets with the option-adjusted value of liabilities.

Finally, by incorporating multiple liabilities and reinsurance transactions into the model, the pricing, valuation, determination of a risk-based surplus

target, and management of overall risk for a complimentary collection of liabilities with different characteristics can be achieved. This allows hedging to be performed first within the company, with any residual risk being hedged externally via investment vehicles or reinsurance.

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Proposed Revision to Standard Nonforfeiture Law

by Douglas C. Doll, FSA

The NAIC's Actuarial Task Force has exposed for comment a proposed revision to the Standard Nonforfeiture Law (SNFL). The proposal would place maximums on universal life charges and would restrict persistency bonuses. An extra adjustment for cash surrenders (but not on paid-up options) would be available to compensate insurers for the "change in interest rate risk."

This article describes the proposal in more detail. Note that there may be substantial changes before any actual revision is adopted.

Universal Life

Minimum values for flexible-premium universal life are defined in terms of a retrospective accumulation formula, in which:

- Interest is a minimum 3 percent in any year
- Mortality charges are no greater than the nonforfeiture basis mortality
- Acquisition expense charges are limited to traditional nonforfeiture expense allowance, and
- Maintenance expense charges are limited to \$6.00 per month plus 12 percent of premiums.

The limits effectively place an absolute maximum gross premium that can be charged for a given set of guaranteed benefits. This maximum premium restriction would be unique to universal life; it would not apply to traditional participating and nonparticipating products. The limits are intended to be fairly liberal; the most restrictive limit probably is that for mortality charges. (A few states already limit mortality charges.) Most current flexible-premium universal life products easily satisfy the proposed interest and expense requirements.

Fixed-premium universal life would have to satisfy *both* the flexible-premium universal life limits and traditional minimum values. Several current

products have surrender charges or cost-of-insurance charges that would fail the flexible-premium universal life maximums.

Change in Interest Rate Risk Adjustment

This new provision applies to all products, both universal life and traditional life.

An insurer could elect to adjust cash surrender values (but not paid-up nonforfeiture values) by one of two methods:

1. A fixed charge of up to 10 percent of the cash value before adjustment, or
2. A formula that adjusts the cash value up or down depending upon interest rates.

The proposed law provides some general criteria for the adjustment, but specific details would be provided by a regulation yet to be drafted.

Smoothness Test

The smooth cash value test (Section 8 in the current SNFL) would be expanded two ways:

1. Universal life would be explicitly included. It would be tested by using guaranteed cash values generated by payment of the level guaranteed maturity premium. This would limit "cliff" surrender charge scales.
2. The current SNFL requires test premiums be level percentages of gross premiums for at least five years. There is no limit on cash value discontinuities as long as the discontinuity is graded over a five-year period. The proposed SNFL would add a further restriction that the test premium percentage vary by no more than 10 percent from one level period to the next.

Persistency Bonuses

The Task Force wants to restrict non-guaranteed persistency bonuses, which they call "enhancements" in the proposed law. The Task Force has struggled with this issue. Even defining enhancements has been difficult, because the Task Force wants to continue to permit participating termination dividends and small increases in credited interest rates in later policy durations and because regular nonguaranteed elements follow no precise pattern.

One restriction considered was to require earlier nonforfeiture values for any future illustrated enhancement, even if it is not guaranteed. The current exposure draft does not contain this provision. A second consideration was to forbid illustration of nonguaranteed enhancements payable more than 12 months after the date of illustration; this, too, has been deleted.

The current proposal (as of October 15) is to have a section authorizing the commissioner to promulgate a regulation "implementing rules relating to equity in nonforfeiture values, dividends and nonguaranteed elements." This would then require the development of a model regulation. A concern here would be whether individual states would follow the model regulation.

Enhancement regulation eventually may be deleted from the nonforfeiture proposal and moved to the disclosure or advertising regulation areas.

Outlook

The proposals are likely to be controversial, and adoption of a revision to the Standard Nonforfeiture Law will not occur soon.

Douglas C. Doll, FSA, is with Tillinghast/Towers Perrin in Atlanta, Georgia.

Chairperson's Corner

by David N. Becker, FSA

The season of fall is once again upon us. With the turning of the leaves comes the colorful end to another year for the Society and the Product Development Section, celebrated this year in Toronto. At the same time, new Council members and officers are elected to serve for the coming year. This edition of "Chairperson's Corner" recounts the activities for the past year and points towards next year.

At the Spring Meeting in New Orleans, the Section sponsored a very successful seminar entitled "Living Benefits" attended by more than 75 individuals. Seven speakers explained product design, assumptions, marketing, regulatory constraints, and valuation for an array of living benefits. These living benefits provide payments for terminal illness, catastrophic illness, and long-term care. Guest speakers included: Robert T. Worley, Jr., President of Living Benefits, Inc.; John T. Adney, Esq., partner in Davis & Harman; Steve Lewis, President of First Penn-Pacific Life Insurance Company; and Sandra Meltzer, insurance contract consultant for Tillinghast/Towers Perrin.

Also at the Spring Meeting, the Section sponsored a luncheon featuring M. Danny Wall, former Chief Regulator, U.S. Savings and Loans; Board Member, Resolution Trust Corporation/Federal Deposit Insurance Corporation; and Director, Office of Thrift Supervision. He spoke on the factors that influenced the solvency crisis in the savings and loan industry. Because of the timeliness of the topic, we asked the Financial Reporting Section if it wanted to cosponsor the session so that Mr. Wall's presentation would be available to its membership, and the Section wholeheartedly agreed. The success of the session was demonstrated by the large attendance for a Friday afternoon presentation in New Orleans!

The Section is on record as strongly supporting research and continuing education. For research, the Section is funding two projects. The first project, on interest-sensitive cash-flow analysis, will search for characteristics that

significantly affect the cash flows of single-premium deferred annuities. The second project will investigate option-pricing as an alternative to cash-flow analysis and its use in pricing. In addition, the Section has committed an allocation of 25 percent of its dues to research projects.

Our commitment to continuing education is evidenced by several efforts. The Section's ongoing plan is to sponsor a seminar each year and to provide members access to high-quality speakers on important matters ranging from industry issues to new management skills. The Section will create a committee assignment that establishes a permanent link with the Society's Education Committee. Of course, there is the continuing support of our newsletter. New this year is the initiation of work on four Professional Actuarial Study Guides; they will be completed late in 1991 and early in 1992. The topics and their editors are: Life Product Development, Bernard Wolzenski; Annuity Product Development, Timothy Pfeifer; Individual Underwriting, Richard Bergstrom; and Marketing, Lucian Lombardi. We hope to further these efforts by identifying educational and other needs through a membership survey in 1992.

Our speaker at the Annual Meeting was Dr. Allan Cohen. Dr. Cohen, Vice President for Academic Affairs and Dean of the Management School at Babson College, specializes in implementing strategic and organizational change, conflict resolution and experience-based management training. He has been a consultant to such diverse organizations as General Electric, LIM-RA, Chubb Life, Paul Revere, Digital Equipment Corporation, and Access Technology. Dr. Cohen, along with David Bradford, wrote the book *Influence Without Authority*; this subject is one not only of general importance for all professionals but also of special importance for members of our profession because of the technical sophistication and financial significance of the work product itself and the need to effectively communicate the results and

to secure senior management's "buy in" of our professional recommendations.

As a first-time event, the Section professionally videotaped Dr. Cohen's presentation. The videotape can be borrowed without charge from the Society's office by individual members, actuarial clubs, and Society and Council officers for use in professional activities. (You *do* have to send it back!)

The newly elected members of the Product Development Section Council are: Sheila Hart, Vice President, Zurich Life, Canada; Greg Jacobs, Consulting Actuary, Milliman & Robertson, U.S.; and Mark Tullis, Consulting Actuary, Tillinghast/Towers Perrin, U.S. The new chairperson is Chris DesRochers, Consulting Actuary, Chalke, Inc. The Section's new Board Advocate is John Palmer.

With the end of Chris's term in October 1992, the Product Development Section will complete ten years of service. This presents me with the opportunity to identify those who have served as chairperson over the years and to recognize them for their efforts, which have carried us so far and will do so into the future. They are:

- Greg Carney (1982-1983)
- Richard Kling (1983-1984)
- Don Sondergeld (1984-1985)
- Bill Carroll (1985-1986)
- John Palmer (1986-1987)
- Alice Neenan (1987-1988)
- Shane Chalke (1988-1989)
- Donna Claire (1989-1990)
- Dave Becker (1990-1991)
- Chris DesRochers (1991-1992).

I want to express my appreciation to all the Council members: Nick Bauer, our outgoing Board Advocate; Judy Yore, our Society Liaison; Tim Pfeifer, our Newsletter Editor; but especially to two outgoing members of the Council, Doug Doll and Brad Smith. All of us owe a debt to these two individuals.

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Chairperson's Corner
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Doug has flawlessly brought to completion several Section seminars that began only as ideas among the Section Council members. He has also found homes for the Professional Actuarial Study Guides. Brad has provided much valuable input to the Program Committee and represented the Section's interests as Program Committee Chairperson. In addition, he has served as Treasurer for the Section for two years. Both Doug and Brad have recruited speakers and often served as panel members themselves.

For myself, it has been an exciting three years on the Council. My term has allowed me to assist in setting direction for the Section, to work with many extremely talented people, and to become exposed to new ideas. I thank the membership of the Section for the opportunity.

David N. Becker, FSA, is Second Vice President at Lincoln National Corporation in Fort Wayne, Indiana.

The Emphasis on Financial Strength—Implications for Product Development
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strength will have more influence on how products are developed and marketed.

The Product Development Process

The trend toward closer ties among investment management, product development and financial reporting will continue. In companies that have traditionally separated these functions, there will be further pressure to align them more closely. Rating agencies want to know how these functions are related, and they consider this relationship an important element in management strength.

Investment Risks

Many companies will be emphasizing control of investment risk by using more conservative investment strategies and emphasizing asset/liability management. This could lead to renewed promotion of variable products, in which investment risk is shifted to customers. Will this be an effective strategy in an environment in which consumers are looking for financial strength and stability? Will consumers be more willing to accept the uncertainty of equity returns if they believe that the returns on insurance and annuities are not as guaranteed as they thought?

The current NAIC draft of the "Second Standard Nonforfeiture Law," a replacement for the current law, includes a provision for adjusting guaranteed cash values to recognize changes in the interest rate environment (see Doug Doll's article on page 7). This may become popular with companies as they look for more ways to control investment risk. Again, will this be accepted by consumers who are looking for a more certain outcome?

Concerns about investment liquidity might lead companies to pressure the NAIC to change the cash value required by the Standard Nonforfeiture Law. The presence of guaranteed cash values that are available on demand has exacerbated the investment problems of companies in financial trouble. There will be renewed pressure to permit

contracts without guaranteed cash values or with small cash values compared to today's minimums.

Illustrations

More consumers and agents will become wary of illustrations based on high interest rates. Companies may be tempted to compete by "stretching" their mortality and expense assumptions. Judging the realism in these assumptions is much more difficult than evaluating the interest assumptions. Still, we can expect more emphasis on credibility of illustrations, more review of companies' track records, and further development of scenario illustrations as consumers demand more information.

Capital Use

One way for companies to build financial strength is to control capital use. Companies might try to design products that use less capital at issue or that replenish capital faster. One possibility is spreading compensation rather than heaping it in early years; another is to develop simpler products to reduce both development and administrative expenses.

There will be pressure on the NAIC to keep reserve standards up-to-date to avoid inefficient redundancies in reserves. Products will not be developed when current reserve standards seem unduly conservative. At the same time, companies will seek to maintain reserves at a level adequate to convince regulators and rating agencies of their financial strength.

Finally, there may just be less product development. As companies work to control expenses, they may seek new methods to market existing products rather than incur the research and development costs associated with new product development.

Esther Milnes, FSA, is Vice President and Associate Actuary in the Actuarial and Product Development Department at the Prudential Insurance Company of America in Roseland, New Jersey.

Considerations in the Development of a First-to-Die Policy

by Brian Kavanagh

A First-To-Die (FTD) policy pays a death benefit on the first of a group of insureds to die and then terminates.

Proceeds from an FTD policy can be used as part of a buy-and-sell agreement or in a stock redemption agreement, so that the survivor(s) can maintain ownership in a business.

The motivation to buy an FTD policy is that it requires a lesser premium outlay than multiple individual policies. This savings occurs only if the policy has a common account value (cash value) build-up. This reduces the net amount at risk on each insured and hence the cost of insurance. Although term insurance may meet the particular need, there is no economy in a term FTD policy and less flexibility. Therefore, the FTD market is centered in business situations in which owners decide to fund their buyouts with cash value insurance.

Because of the flexibility needed in business situations, a universal life policy is often the best type of cash value insurance to use as the FTD policy. Ownership percentages often vary, and insureds should be able to elect different death benefit amounts. Automatic increases in death benefits can accommodate situations in which the value of a business is expected to increase.

Policies covering only two lives account for more than 80 percent of the market, and for practical reasons limiting coverage to two lives may be a wise restriction. If there are more than two lives, it could be complicated to vary death benefits, which may be a very important feature.

When there are more than two lives, multiple FTD two-life policies can be utilized. However, there will be multiple account values, which will increase the required outlay compared to a single policy. For example, three lives, needing \$500,000 proceeds on the first death, could purchase one policy insuring "A" for \$500,000 if "A" dies first and "B" for \$250,000 if "B" dies first, and another policy insuring "C" for \$500,000 if "C" dies first and for \$250,000 if "B" dies first.

There are other marketing situations for which a FTD policy may be suitable, such as coverage for two working spouses, but this market is adequately covered by many existing policies using term contracts or term riders to permanent policies.

An FTD policy should be considered by a company that has or plans to have:

- A field force that specializes in business insurance (An FTD product would help in recruiting such a field force.);
- Good financial ratings (This is not as necessary if working spouses are the target market.);
- Generally competitive rates;
- Systems that can process multi-life policies such as last-to-die (LTD) policies;
- Financial underwriting expertise;
- Good relationships with its reinsurers. Reinsurers tend to stay away from products that are different and for which the anticipated volume is small.

In fact, if a company already is successfully selling LTD policies, an FTD policy is a natural add-on to the product line. In some business situations, a combination of these coverages is the best solution. An example is a buy-and-sell arrangement in which the survivor wants to be insured for the entire value of the business.

Pricing—Base Policy

Assumptions that go into the pricing of a single-life policy must be reconsidered for FTD policies.

Not-taken ratios can be expected to be higher. These policies are often sold in a competitive situation with more than one company bidding. A 50-60 percent placement ratio may be as good as can be expected.

Persistency patterns may be atypical. A principal reason for terminations will be a change in a business arrangement. This may be more likely to occur many years from now rather than next year, because business changes tend to occur

gradually over a period of years. A level lapse rate may be more appropriate than a decreasing lapse rate.

The average policy size will be high, \$250,000 and up. Annual premiums usually will be in the \$5,000-\$15,000 range.

Inhouse marketing costs may be higher for an FTD policy than for a single-life policy, especially if it is anticipated that the field force needs to be educated directly or through promotional material.

Maintenance costs also should be higher, because inquiries can come not only from the two insureds but also from their consultants who prepare financial reports or give advice. There may be some savings over two policies, such as one premium to process, but expenses may still total twice that of single-life policies.

Of course, underwriting costs reflect expenses incurred in underwriting two insureds.

It is advisable to have preferred underwriting classes. Otherwise, there may be little savings over two preferred-risk policies.

After initial rates for the base policy have been derived, it is useful to compare the premium outlay to that of two comparable individual policies issued by your company or by competitors. If the savings is less than 10 percent and you are unable to justify any revision in pricing assumptions, there would not be much point in introducing the product. Because an FTD plus an LTD policy provides the same coverage as two individual policies, savings should be the cost of a competitively priced LTD policy, about 20 percent.

Continuation Rider

A surviving insured may have continuing insurance needs. This could be handled through an automatic feature in the policy. This coverage can be provided for via an elected continuation rider, purchased for the period of the

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Considerations in the Development of a First-to-Die Policy *continued from page 10*

anticipated need. The subsequent insurance requirement may be different from the original need, and some flexibility in the amount to be continued is desirable. An attractive provision would be to allow all or part of the account value to be transferred to the continuing policy. The death benefit would be reduced by the same amount.

The rider should contain a provision that enables the insureds to divide the policy into two policies if business needs change. This feature could be built into the base policy, but, as before, for economic reasons, it should be in a separate rider. To prevent anti-selection, the net amount at risk on the split policies should not increase. This will usually require that death benefits be reduced. If the continuation rider allows for higher amounts of insurance, the death benefits could remain the same. The election should have some restrictions; for example, it should be applied for at least five years before it expires.

In the event of a split, the account value could be divided between the two insureds on an actuarial basis, which takes into consideration the factors used for each insured to determine the premium charged. This split could be specified in the policy schedule at issue. The owner at issue or subsequently, while the policy is in force, can specify a different split of the account value.

Pricing—Continuation Rider

There is not much experience data available for pricing this rider. A simple approach would be to view the coverage as last-to-die coverage for the term elected by the insureds. In theory, after the first death, the survivor could continue coverage by paying the rider premium. In practice, a new policy

will be issued and single-life rates charged. The cost of insurance rates could be at the attained duration using the original issue age. Instead of issuing a new policy, the agent could continue the old policy with the single-life rates that were used to develop the two-life costs; this has certain advantages:

- The contestability period does not restart.
- The charges can be contained in the original policy and the insureds know their ongoing costs in advance.
- If the rider has a provision that allows the carry-forward of all or part of the account value at the first death, a constructive receipt problem may be avoided if the amount to be retained is specified before the first death.

Policy Provisions

The policy provisions are much the same as those in an individual policy. Additional provisions are required to cover simultaneous deaths (pay the higher death benefit) and contestability (allow the other insured to have an individual policy). Because the specified amount can vary between the insureds, the cost of insurance for each insured must be stated separately in the policy schedule. Some states may also require that the cost of insurance rates for each insured for single-life coverage be illustrated.

Although the policy provisions for the owner and beneficiary can be the same as those for a single-life policy, they could be changed to allow for the usual business situation in which the owner is a corporation or trust. In any event, special designation forms should be prepared to guide the agent. If the designations are not done correctly,

unnecessary taxes could be incurred when a death benefit becomes payable. The underwriters should review the designations to ensure that they will accomplish their intended goals.

Conclusion

In recent years, only a few companies have taken on the expense of developing a product for this limited market. The real competition is from term policies that may be more suitable, or from two permanent policies that provide more flexibility, especially if the business structure subsequently changes.

If current systems cannot process an FTD policy and a company still wishes to proceed, it can be expensive, especially with mainframe systems. Some companies have solved this problem by developing or buying microcomputer systems for multi-life processing that tie into their mainframe operations. However, the number of policies sold may not be high.

Developing an FTD policy can be an expensive undertaking, and careful analysis is required. There is little sense in developing a competitive product only to find that your systems cannot process the policies or that no one will sell it because your financial rating is not adequate. However, there are markets for such a product, and it can be a tool in recruiting or keeping agents who specialize in the business market.

Brian Kavanagh, MAAA, is Consulting Actuary at The Taft-Hartley Company in Chicago, Illinois.

Letters to the Editor

Dear Mr. Pfeifer:

I'd like to comment on the article "California Universal Life Reserve Regulation" by Carolyn Stontz in the June 1991 issue of *Product Development News*.

She states that the nonforfeiture rate of interest is equal to 1.25 times the valuation rate. In fact, the nonforfeiture rate may not exceed 1.25 times the valuation rate. It need not be exactly that; the 1.25 is a maximum.

Although the nonforfeiture interest rate may exceed the valuation rate, the reverse is not true. Rather, the valuation rate may not exceed the nonforfeiture rate. This has always been true on the basis of actuarial principles and statutory valuation principles.

It has been stated that the California department has confused the nonforfeiture interest rate (a term used in traditional permanent life insurance) with the minimal guaranteed interest rate (a term used within universal life plans). We recognize the difference; however, the effect on reserves is the same.

In the case of universal life, if the Guaranteed Maturity Fund (GMF) and Guaranteed Maturity Premium (GMP) are calculated at 4 percent, reserves cannot be developed based on 5.5 percent. The reserve is related to the

GMF through the r factor. Mixing interest rates would be tantamount under a traditional plan to calculating net premiums at 4 percent and then calculating reserves (present value of future benefits less present value of four percent premiums) at 5.5 percent. Such a procedure is neither actuarial nor statutory.

Tables 1 and 2 show a comparison with 5.5% CRVM whole life reserves. They really are not comparable. The whole life plan would have level premiums, not the pattern shown. Does such a nonparticipating plan still exist in the marketplace? For a participating plan, dividends are a separate item, unlike the universal life plan in which the extras above guarantees remain within the plan. For comparability, the paid-up additions derived from dividends should also be shown; thus the comparison is not inappropriate.

Graphs 1 and 2 do not show the effect of use of the California method, which is the mean of the account value and the cash surrender value. For example, in Table 2 the reserves are more than 20 percent less at durations 5 and 6 than under the so-called NAIC model. The statement in the conclusion that our regulation will have a major impact on future universal life reserves has not been demonstrated. In addition,

we believe the reserves shown in the NAIC model reserve column are a misapplication of the NAIC model for reasons mentioned above.

*John O. Montgomery, FSA
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Author's Response:

In response to Mr. Montgomery's letter, I stand corrected on the calculation of the nonforfeiture rate of interest—it may not exceed 1.25 times the valuation rate rather than being equal to 1.25 times the valuation rate.

The purpose of the article was two-fold: (1) to alert the audience to the reserve requirements and (2) to give some numerical examples to allow a realization of the impact of the requirements with the assumption that many companies have applied the NAIC Model as outlined in the article. The charts were added as a visual aid to the discussion. The reserve numbers under the California method are shown in Tables 1 and 2 of the article.

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