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First NAAJ papers announced

When the new *North American Actuarial Journal* debuts in January, readers will see an extensive range of views and interests reflecting the contemporary actuarial profession.

Articles in the first issue run the gamut of current issues faced by practitioners — retirement income models, use of financial derivatives by insurers, application of stochastic models for continuing care communities, and statistical independence and fractional age assumptions. One paper broadens one's perspective of great literature, exploring the financial and actuarial issues central to the novels of Jane Austen.

SOA members can receive early release copies for \$5 per article from the SOA Books and Publications Department (847/706-3526).

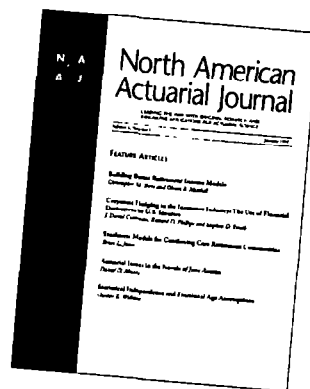
Corporate Hedging in the Insurance Industry: The Use of Financial Derivatives by U.S. Insurers

by J. David Cummins, Richard D. Phillips, and Stephen D. Smith

This paper investigates the extent to which insurance companies utilize financial derivatives contracts in the management of risk. The data set employed allows observation of the universe of individual insurer transactions for a class of contracts, namely, those normally thought of as off-balance-sheet (OBS). Information is provided on the number of insurers that use various types of derivatives contracts and the volume of transactions in terms of notional amounts and the number of counterparties. Life insurers are most active in interest rate and foreign exchange derivatives, while property-casualty insurers tend to be active in trading equity option and foreign exchange contracts.

Using a multivariate probit analysis, the authors explore the factors that potentially influence the existence of OBS activities. They also investigate whether certain subsets of OBS transactions (for example, exchange-traded

are related to interest rate risk measures, organizational form, and other characteristics that may discriminate between desired risk/return profiles throughout a cross section of insurers. Evidence is found consistent with the use of derivatives by insurers to hedge risks posed by guaranteed investment contracts (GICs), collateralized mortgage obligations (CMOs), and other sources of financial risk.



Stochastic Models for Continuing Care Retirement Communities

by Bruce L. Jones

Continuing care retirement communities (CCRCs) offer housing and a variety of services, including long-term care. Typically, the cost of this long-term care is wholly or partially covered by entry and/or periodic fees. Thus, CCRCs provide a long-term-care insurance benefit, so actuaries should be involved in the financial management of CCRCs. To carry out actuarial analyses of CCRCs, appropriate models are required to describe the status of individual residents and the CCRC population.

This paper presents models that assume that, at any time, a resident is in a given "state," which is determined by the individual's care requirements. The resident may make "transitions" between states at various times, and randomness is associated with both the transition times and the states entered. Actuarial calculations using such a model are discussed, and numerical

illustrations are provided. A simple model is examined; then, generalizations are considered. The model for an individual resident can be embedded in a model for a CCRC population. This is explored with particular attention given to the "high-demand" situation in which a community always has potential residents waiting to enter it. With this model, the goal is to analyze the future care requirements of the CCRC population.

Building Better Retirement Models

by Olivia Mitchell and Chris Bone

U.S. policymakers interested in retirement issues are awakening to the fact that changes in the nation's retirement income systems are absolutely essential in the years ahead. Predicting and understanding the effect of alternate policy choices require a concerted effort to build powerful retirement models. This paper assesses state-of-the-art retirement income research and data, and it identifies important knowledge gaps that actuaries and economists can strive to fill in the near future. The paper also describes recent collaborative efforts involving actuaries, economists, pension sponsors, and government policymakers that may be of interest to pension actuaries and others concerned with retirement issues.

Actuarial Issues in the Novels of Jane Austen

by Daniel D. Skwire

The novels of Jane Austen have enjoyed a resurgence of popularity recently, and many new readers have come to appreciate the relevance of her stories to modern times. This relevance should be particularly evident to actuaries; the novels deal quite explicitly with the issues of wealth, inheritance, mortality, and life expectancy confronting the nonworking classes of the early 19th century.

This paper examines the six novels of Jane Austen from an actuarial perspective. It provides historical background

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The credit officers have what Livingston calls "a two-bucket approach" to the analysis. The insurance carrier's status is analyzed and also the status of the individual policy. The whole process usually takes several weeks.

Accelerated death benefits

Meanwhile, over 200 of the 2,000 life companies in the United States offer accelerated death benefits. This business niche isn't considered a prime prospect for large profits. According to Abraham Gootzeit, principal, Tillinghast-Towers Perrin, St. Louis, it is a segment that life insurers see as a service to the terminally ill, rather than a potential market.

Larson thinks more people should consider accelerating benefits, but he knows that many are unaware of their existence. "Patients interested in selling their policies may do well to accelerate the maximum amount and viaticate the rest," he said.

Comparing the options

For the terminally ill, the current three

options to raise cash to pay uncovered costs resulting from their illnesses are:

- 1) Loans against their life policies
- 2) Accelerating the death benefit, also known as living benefits, so they can use the money while still living
- 3) Viaticating the policy for a cash or annuity settlement

According to Larson, any of these options, or a combination of them, could be the answer for any given patient. The critical factors are life expectancy and financial status of the patient and his or her beneficiaries.

In a recent article he wrote for *Case Review*, a health care providers journal, Larson said that patients use the sale of life policies to "fulfill life dreams, pay for nonreimbursed medical costs, stabilize their families, reduce stress, and improve the quality of family life. No amount of cash from life insurance can replace medical insurance. Private medical insurance is statistically associated with higher chances of survival."

"A layer cake of funds is usually the best solution," he said. "The key in all layers is liquidity. No one layer is enough. Together, they can enable people to prevent illness from destroying their lives."

In comparing the advantages of each option, Larson said viatication is the most commonly used because of its wide applicability. Loans are desirable under these circumstances:

- Beneficiaries have access to funds other than the proceeds of life insurance.
- Proceeds from sale or acceleration of the policy would be taxed.
- The sale of the policy boosts the seller to an income level that would keep him or her from receiving government needs-based funds.

Accelerating the benefits can be tricky because group policies offer it only rarely; individual policies offer it only sporadically; and it is not available on policies smaller than \$25,000.

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on inheritances, clerical livings, and mortality, and it analyzes the way in which these issues are central to Austen's novels. It uses a contemporary mortality table to assess the accuracy with which Austen's characters estimate life expectancies and annuity calculations. It presents a close study of *Sense and Sensibility*, a novel in which several actuarial issues are central to the plot and are presented in great detail. Finally, it suggests that Austen's own background and family life meant that actuarial issues were important in her life and therefore reflected in her novels.

This paper offers a new argument for the relevance of great literature and a new perspective from which actuaries can explore and understand the history of their profession.

Statistical Independence and Fractional Age Assumptions

by Gordon E. Willmot

This paper considers the issue of statis-

tical independence of the curtate future lifetime and the fractional part of the future lifetime of a general status.

Statistical independence is often employed in actuarial contexts, primarily because it leads to simple relationships between quantities of interest and statistical information that is of a discrete nature, such as a life table. This uniform distribution of deaths (UDD) assumption is the most commonly used because of its simplicity and intuitive appeal, but it can be somewhat restrictive. For example, all deaths or withdrawals may be assumed to be at a particular point in the year, such as the middle. Assumptions of this type are often made in a multiple decrement context. This paper attempts to unify these assumptions and extend their applicability in an actuarial context.

The conditions for independence need to be stated carefully, and the last-survivor status is cited as an example in

which failure to do so can lead to erroneous conclusions.

The fractional independence (FI) assumption is defined, and it is demonstrated that many of the formulas for life table functions that hold under the more restrictive UDD assumption are extended easily to the general FI case. The simple relationship under UDD between insurances payable on other than an annual mode and those payable at the end of the year of death is extended to the FI case as well. These results are then used to obtain results for annuities and reserves, again generalizing UDD relationships. It is then demonstrated that many contingent probabilities in the multiple life context are exactly the same under the FI assumption as under the more restrictive UDD assumption. Finally, a very general result that holds in the multiple decrement context is shown to hold under the FI assumption.