



SOCIETY OF ACTUARIES

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Early-release copies of TSA papers available

The following papers have been accepted for publication in Volume 46 of the *Transactions*.

Members who would like an early-release copy before it is published in a preprint should send \$5 for each paper to the SOA Books and Publications Department.

"Economic Security in an Aging Population: Implications for the Design and Marketing of Group Products" by Robert L. Brown

This paper provides an overview of the impact that population aging will have on the design and marketing of group life, health, and pension products over the next 40 years in the United States and Canada. The paper reviews demographics and redefines correctly terms such as "population aging" and "baby boom." It looks at the impact of these demographic shifts on each of the group coverages. The extension of these implications to individual products is easy and worthwhile.

"The Projected Unit Credit Method with Benefits Apportioned by Interest-Adjusted Salary" by Gerald Lee Giesecke

This paper discusses how pension benefits should be allocated to individual years of service for those persons expected to leave at each exit point. As an ideal solution, the author develops the approach of "perceived value" allocations, under which benefits are allocated according to how employees assess their value at each point in their careers. While impractical, these perceived value allocations suggest the desirability of something more back-loaded than allocating equal benefits to each year of service.

The paper advances an interest-adjusted salary allocation as a reasonable and practical alternative. Also considered are the method of combining exit points and years of service to obtain a weighted normal cost, procedures for allocating costs for persons

transferring between cost centers, and why it is not a good idea to use the benefit formula to allocate the benefit at an assumed exit point. The perceived value allocations also suggest the desirability of recognizing negative accruals for senior employees.

"Dependent Decrement Theory" by Jacques F. Carriere

Currently, multiple decrement theory is based on the assumption that competing causes of decrement are stochastically independent, even though this assumption usually is not true.

First, the paper examines the current state of the art and identifies the results that are based on the independence assumption.

Next, the well-developed theory of copula functions is used to model dependence. A theorem that characterizes the mathematical relationship between the crude and net rates when the decrements are dependent is presented. The paper discusses the issue of identifiability and the related issue of measuring the effect of removing causes of decrement.

Finally, the paper uses an identifiability result to analyze the effect of removing heart/cerebro-vascular diseases for the U.S. population when these diseases are correlated to other causes of death.

"A Select and Ultimate Parametric Model" by Jacques F. Carriere

This paper presents a parsimonious 11-parameter model that explains the pattern of mortality for the female and male mortality rates of the 1975-80 Select and Ultimate Basic Tables. This parametric model is useful because it can predict the select mortality rates beyond the 15-year select period, and it can predict the select rates for issue ages greater than 70 years old. Moreover, the parameters in this model provide insightful statistical information about the data.

"Option Pricing by Esscher Transforms" by Hans U. Gerber and Elias S. W. Shiu

It is assumed that the logarithm of the price of stock is a stochastic process with independent and stationary increments. The price of derivative security is calculated as the discounted expected value of the payment, where the original probability measure is replaced by the Esscher transform that is compatible with the observed price of the stock.

Several alternatives to the geometric Brownian motion assumption that underlies the Black Scholes formula are proposed, and their implication on the price of a European option is documented numerically.

The Esscher transform also can be used to value options that are contingent on several risky assets. In particular, the price of the right to exchange a stock of one kind against a stock of another kind is calculated.

"Actuarial Calculations Using a Markov Model" by Bruce L. Jones

Many insurance and annuity products can be described in terms of multi-state processes. This is the case when the cash flows required by a policy depend on the insured's presence in a given state or movement from one state to another. An example is the disability income policy in which the premiums are payable while the insured is in the "active" state. Benefits are payable while in the "disabled" state (after a waiting period), and the contract terminates when the insured moves to the "dead" state or attains the maximum age.

The paper describes a general approach to finding probabilities needed to calculate actuarial values in situations that can be modeled as multi-state processes. Since the method assumes an arbitrary number of states, it is particularly useful in

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Factuaries

This is another in a series of profiles of members of the Society's Board of Governors.

Name: Cecil D. Bykerk

Current hometown:
Omaha, Nebraska

Current employer and function: Chief actuary at Mutual/United of Omaha

Marital status: Married

Children's names and ages: Andrea, 13, and Jean, 10

Birthday: August 4, 1944

Birthplace: Lexington, Nebraska

My first job was: Paper boy (first childhood job); actuarial student for New York Life (first permanent job)

With experience, I've learned: To not worry as much

I completed my FSA in: Six years

I'd give anything to meet: Hillary Rodham Clinton

The book I recommend most often: *Centennial* by James Michener

The movie I'd most like to own the tape of:
A League of Their Own

Nobody would believe it if they saw me: Ironing

The TV show(s) I stay home to watch: None

If I could change one thing about myself, I'd:
Have more hair

When I'm feeling sorry for myself, I: Pout for 30 to 60 seconds and then get busy with something else

If I could do anything, I'd: Solve the health care reform problems in the United States in a way that makes use of the insurance industry's (and actuaries') knowledge and expertise

If I could do it over, I'd: Have children earlier in my life than I did

I care most about: My family

My favorite way to spend a Sunday: Doing anything with my family

My proudest actuarial moment: When I testified to a Congressional hearing the first time

Early-release copies (continued from page 9)

applications where the number of states and possible transitions are large.

The results depend on the assumption that the process is Markov. This means that the future of the process depends only on the current state, and not on the time since entry to this state. Since this assumption is often inappropriate, it is proposed that certain states be represented by two or more sub-states. In the disability example, the disabled state could perhaps consist of the two sub-states, "unstable" and "stable." It may then be reasonable to assume that the expanded model is Markov.

"Mortality Rates by Marital Status" by Charles L. Trowbridge

Actuaries, as well as demographers and sociologists, may be surprised to learn that marital status has as much influence on rates of human mortality as the better known factors of gender and smoking habits. At ages 25-55, unmarried death rates are more than twice those for the married. For many of these age groups, married males have lower death rates than unmarried females.

Using U.S. census data and official death records, this paper demonstrates the potency of the marital status effect. It then examines the validity of the various explanations offered.

IN MEMORIAM

William Rainey Battle
FSA 1952, MAAA 1965

John W. P. Earle
ASA 1973, FIA 1962

Gilbert Eugene Hawkins
FSA 1966, MAAA 1966

John A. Mahon
ASA 1959

James D. Reid
FSA 1972, FCIA 1972

Robert T. Tipping
FSA 1969, FCIA 1969

George C. Wicks
ASA 1956, MAAA 1966, EA 1976

R. Norman Wood
ASA 1952, MAAA 1965,
FCA 1963, FIA 1949