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## Book review

# A fresh look at actuarial mathematics

by William B. Frye

*Actuarial Mathematics, Proceedings of Symposia in Applied Mathematics, Volume 35*, edited by Harry H. Panjer. Published by the American Mathematical Society, 1986. 127 pages.

This book reviews the thirty-fifth in a series, which began in 1947, of short survey courses designed to acquaint mathematicians with various topics in applied mathematics. The course on actuarial mathematics was conducted in Laramie, Wyoming, in August 1985. The proceedings of that meeting, as presented in this volume, include a preface by Harry Panjer, an introduction by James Hickman and seven papers.

The first paper, "Updating Life Contingencies" by James Hickman, describes the mathematics involved in calculating premiums and reserves. The loss variable is an integral part of the exposition, and its variance is used as a measure of risk.

The next paper, "Models in Risk Theory" by Harry Panjer, focuses on the various probability distributions available for modeling claim frequency. Compound distributions and mixed models are also examined. Stop-loss reinsurance is given as an application of the distribution of total claims.

"Loss Distributions," a paper by Stuart Klugman, considers the advantages of fitting claim distributions to a parametric model. Several methods of fitting are considered, and the advantages of one, the maximum likelihood method, are discussed.

Another paper, "Overview of Credibility Theory" by P. M. Kahn, explores various methods of determining the credibility factor,  $Z$ , in the basic equation: New estimate of claims =  $Z$  (actual claims) +  $(1 - Z)$  (old estimate of claims).

Kahn studies various distributions of claim frequencies and uses a Bayesian approach to the problem, as well as the least-squares theory. He also provides a brief overview of recent developments in credibility theory.

The fifth paper, "A Survey of Graduation Theory" by Elias Shiu, introduces the concept of graduation of data and reviews three of the better-known graduation methods – Whittaker-Henderson, moving weighted average, and smooth-junction interpolation. The presentation emphasizes the use of linear algebra.

John Beekman's paper on "Actuarial Assumptions and Models for Social Security Projections" discusses factors used in making estimates for the Old-Age, Survivors, and Disability Insurance System (OASDI). In addition, Beekman examines the short-, medium- and long-range projections needed in managing the OASDI program. Among factors that must be projected are population distributions by age, sex and marital status, and effective taxable payroll. These estimates require demographic and economic assumptions. Several formulas used by the Social Security Administration are presented and discussed.

The final paper, "On the Performance of Pension Plans" by Cecil Nesbitt, discusses the benefit formulas used in the TIAA and CREF pension plans and the plans' performance with respect to the actual benefits paid out to various groups of retirees. Several tables are included in the paper. In addition, Nesbitt reviews the problem of loss of real value of vested benefits before they are received.

While actuaries were not the book's intended audience, the actuary who wants a fresh look at some basic topics of actuarial mathematics may find the book of interest. Also, an extensive bibliography at the end of each paper provides a rich source for a closer look at new developments in some familiar areas. This book accomplishes its purpose of acquainting mathematicians with actuarial mathematics and is recommended to any mathematician interested in beginning or continuing to build a knowledge of actuarial science.

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## Becoming an actuary in The Netherlands

by Ron van Oijen

The following information about actuarial education in The Netherlands is offered in response to the article, "Competition, communication, and cooperation" in *The Actuary* of March 1989.

There are two ways to become an actuary in The Netherlands. Both require study at the University of Amsterdam. The following is a short description of the two courses of study:

1) When you have finished your study at the V.W.O. (a comprehensive, pre-university school) and completed required courses at that school, including mathematics, you can enroll at the University of Amsterdam in the study-direction of actuarial science. The course of study usually takes four years (see accompanying sample study program).

During your course of study you can specialize in pensions, life insurance or casualty. If you successfully complete all the courses at the university, including the required exams, you receive a degree in actuarial science, and you also become a member of the Dutch Actuarial Society.

2) The other route to membership in the Dutch Actuarial Society involves combining study and work, as an "outside-university student." These students take the same required courses as the regular students but do not complete other courses required for a university degree. If they pass all the exams, they become members of the Society too. They do not get a degree from the university, as they have not taken all the courses. The students in this group are generally older than the students in the first group.

The numbers of regular and outside students enrolled at the university are about equal. "Graduates" of both types are respected members of the Actuarial Society.

The relationship between faculty members of the university and members and administrators of the Dutch Society is good. In addition, there are members of the Dutch