



SOCIETY OF ACTUARIES

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## Early release copies of TSA papers available

These two papers have been accepted for publication in Volume 47 of the *Transactions*. Members who would like a copy of these papers should contact the SOA Books and Publications Department.

### “Operations Research in Insurance: A Review”

by Patrick L. Brockett and Xiaohua Xia

Operations research methods have been applied to modeling and solving many problems in insurance and actuarial science. This paper presents a review of the applications of these operations research methods in the insurance industry. The paper is organized according to the categorization of operations research methods rather than sub-fields or subjects in actuarial science and insurance, as in some previous review papers. Specifically, the paper introduces various mathematical programming models and their applications. A discussion on game theory and some newly emerging operations research approaches and their applications in insurance and actuarial science follows. The paper ends with a general discussion on developments and trends in operations research and insurance.

For the student who studied specific operations research techniques mandated by SOA exam systems, this paper provides a set of examples of the techniques pertinent to actuaries and shows how the expanding field of general quantitative reasoning in risk management can positively affect the insurance industry. For research actuaries, we finally present an updated bibliography of operations research applications in insurance, cross-classified by authors, operations research methodologies, and insurance areas of application.

Patrick L. Brockett, Ph.D., is the director of the risk management and insurance program at the University of Texas at Austin. He also holds the Gus S. Wortham Memorial Chair in Risk Management and Insurance in the College and Graduate School of Business. He is the director of the Center for Cybernetic Studies and holds joint appointments in the departments of Management Science and

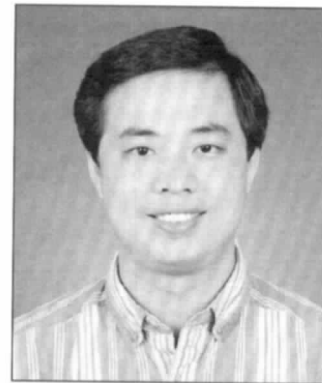


Patrick L. Brockett

Information Systems, Finance and Mathematics. In addition, he is the former Director of the Actuarial Science Program in the Graduate School of Business. He is a Fellow in the following organizations: the Institute of Mathematical Statistics, the American Statistical Association, the Royal Statistical Society, and the American Association for the Advancement of Science. He is a Chartered Statistician by the Royal Statistical Society, and a Full Member of the Operations Research Society (now INFORMS). He has published two books and more than 100 journal articles. He is an associate editor of the journal, *Insurance: Mathematics and Economics*, and of the new SOA publication, *North American Actuarial Journal*. His articles in actuarial science, risk management, and

insurance have won numerous awards.

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Xiaohua Xia

Systems for AutoBond Acceptance Corporation, a consumer finance company in Austin. He has coauthored two other papers that will appear in *Insurance: Mathematics and Economics* and in *IMPACT*. He is a member of the American Risk and Insurance Association and a 1983 graduate, with a B.S. in computer science, from Zhejiang University, Hangzhou, People's Republic of China.

### “Analysis of Health Carrier Insolvencies”

by James B. Ross and Criss Woodruff  
A grant from the Society of Actuaries, under the direction of William J. Bugg, chairperson of the Project Oversight Group, made this study possible. This research had its genesis when the Health Financial Issues Task Force identified “...the need to quantify the number of financial impairments that have occurred among health carriers and to identify the reasons for such situations.”

(continued on page 14)

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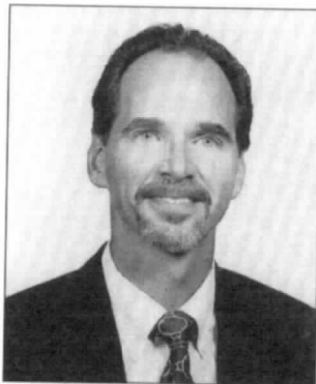
Research objectives were, 1) to identify health carriers that became financially impaired because of the operations of their health business during a relatively long time, and 2) to identify the reason(s) that each company became financially impaired. Health carriers specifically included were commercial insurance companies, Blue Cross/Blue Shield plans, and health maintenance organizations (HMOs).

Research included developing a meaningful definition of "financial impairment" (which might differ by type of health carrier), reviewing relevant studies, conducting necessary additional research, and presenting a written report of results and analysis.

The report is organized as follows:

- Section II explores relevant definitions of "financial distress" and allied terms. It looked at other studies, textbooks in insurance and finance, and articles in academic journals.
- Section III details the methodologies used in the research and gives the findings.
- Section IV comments on problems of definition, difficulties in data collection and findings. It also contains recommendations to the Oversight Group on how additional research in this area might be carried forward.

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M.Ed., M.B.A. and D.B.A. degrees from Mississippi State University. Prior to joining the Texas A&M faculty, he was assistant professor of finance at Radford University in Radford, Virginia. He has also worked in retail management and state government. His research recently appeared in the *Journal of Economics and Finance* and the *Journal of Actuarial Practice*. He is a member of several professional organizations including the International Financial Management Association and Decision Sciences International.

**James B. Ross**, Ph.D., FSA 1954, MAAA 1965, is associate professor of finance in the College of Business and Economics at Radford University in Radford, Virginia. His business experience includes service with Connecticut General Life, CIGNA, and Continental Insurance and as a senior officer of Metropolitan Life and Insurance Company of North America. He received an A.B. in mathematics from Harvard College, an M.B.A. from the University of Rhode Island, and a



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doctorate in finance from the University of Connecticut. His papers have appeared in the *Transactions*, *Journal of Actuarial Practice*, *Journal of Economics and Finance*, and *Journal of Financial Services Research*.

### Experience studies survey gets outstanding response

In April, the Experience Studies Oversight Subcommittee sent surveys on the value of the various experience studies to users and committee members and put the survey on Actuaries Online. The response was good. By the first week in May, respondents returned more than 300 surveys. The Experience Studies Oversight Committee thanks all who responded. After the results are tabulated, they will be used to improve the Experience Studies process. Those interested in a summary of the survey results should contact Judy Yore in the SOA Research Department at 847/706-3573 or e-mail at 76041.2336@compuserve.com.