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The Actuary

DUKE CONFERENCE ON SIMULATION

by Edward A. Lew

In its continuing endeavors to explore new mathematical and statistical techniques which might be of value to the actuarial profession, the Society's Committee on Research co-sponsored a conference on simulation at Duke University, Oct. 31-Nov. 2. The other sponsors were Duke University and the committee on Mathematical Theory of Risk of the Casualty Actuarial Society.

The conference focused on applications to insurance of mathematical and simulation models developed for complex business processes. With computer simulation techniques, it is now feasible to construct elaborate models that include a variety of realistic complications which cannot easily be encompassed by a mathematical model alone. Involvement in the construction of simulation models provides a very effective way for visualizing complicated operations.

Some 106 individuals, including nearly 100 actuaries, took part in the conference, which was built around ten papers on key topics, supplemented by prepared and informal discussions. The participants gave their undivided and enthusiastic attention to the proceedings over a two and one-half day period, which not only indicates the interest in simulation but is also a tribute to the expository ability of the speakers.

The conference opened with a broad review by Professor Thomas H. Naylor of Duke University of computer simulation models for economic systems and firms, Professor Naylor is the principal author of the recommended text, *Computer Simulation Techniques* (John Wiley, 1966). In his remarks, he stressed the value of tying in the effects

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ACTUARIAL SCIENCE PROGRAM AT UNIVERSITY OF CONNECTICUT

by William T. Fisher, Ph.D.

The enrollment in the actuarial science program at the University of Connecticut School of Insurance in Hartford has increased steadily since its inception in July 1966. The program is offered in the late afternoon and evening to persons employed in actuarial work who are seeking the professional designation of Associate or Fellow of the Society of Actuaries.

Designed to follow the syllabus of the examinations of the Society of Actuaries, the courses deal with the subject matter relating to Parts I through VIII. The schedule has been arranged to permit students to complete courses relating to a particular Society examination shortly before the examination is to be written either in May or November.

To be admitted to the program, the applicant must have earned a bachelor's degree from a college or university of approved standing and submit a recommendation from an actuarial official of his insurance company. The courses do not carry credit at the University of Connecticut, but they are of such level as to be intellectually challenging and provide academic experiences equivalent to those normally expected in graduate study.

Since membership by examination in the Society of Actuaries is an important criterion of professional actuarial status, the relation of the courses in the program to the actuarial examinations is of interest. Courses offered by the University of Connecticut are as follows: General Mathematics; Probability and Statistics; Finite Differences, Compound Interest and Annuities Certain; Life

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FINAL REGULATIONS ON INTEGRATION WITH SOCIAL SECURITY

by E. F. Boynton

The revised Income Tax Regulations pertaining to integration of qualified pension plans with Social Security benefits were published in final form on Nov. 13. As expected, the principles underlying the determination of the basic integration limit remain essentially unchanged from the proposed Regulations issued in July. The basic integration limit is set at 30% of excess compensation, and represents a decrease of 20% from the prior limit of 37½%.

Although there have been no major changes from the proposed regulations, a few modifications have been made in the direction of simplification of certain rules which were particularly complicated in the original proposal. The principal modifications made from the proposed Regulations are:

(1) The effective date has been postponed from Jan. 1, 1971, to Jan. 1, 1972, thus giving an extra year to make any necessary amendments.

(2) The moving wage base concept which required a separate "bend point" in final average plan formulas for each year of retirement has been simplified somewhat by using an averaging device, so that a single fixed bend point can apply for an extended period of time. For example, the bend point in a final average excess plan can be $6000 for employees retiring in the period 1972 to 1978, $6600 for the period 1979 to 1993, etc.

(3) Any compensation level up to the applicable maximum average Social Security earnings for the year of retirement can be used as a bend point. For example, if the change is made effective Jan. 1, 1972, a final pay excess plan could use a fixed bend point of $6000

REVEILLE AT SLEEPY HOLLOW

by Martin Stempel

(Editor's Note: We are indebted to the author and to Prudential's house organ, "Ack-Ack," for permission to reprint this article.)

On Oct. 3, the Actuaries Club of New York met at the Hilton Inn in Tarrytown, N. Y. The morning program on the "Social Responsibility of the Insurance Industry" was the most interesting part of the meeting to this observer.

Robert W. Goldfarb's keynote speech was designed to be rousing. He stated that he would be satisfied if he stimulated one member of the audience to volunteer to work for the Urban Coalition. He listed investments, sales, personnel, and social security and medicare as areas in which actuaries could become involved professionally to aid in the solution of social problems. He urged consideration of the social impact of an investment besides the concern for safety and yield which result directly from our fiduciary responsibilities. According to Mr. Goldfarb, this third factor would be included in investment policy not only out of concern for humanity, but also for reasons of self-interest in the protection of the existing investment in our cities.

Sales, Employment

In the area of sales, Mr. Goldfarb, who is the Associate Director of the Urban Coalition, stated that a diminishing number of the poor have insurance. He suggested trying to sell insurance at cost without commissions in ghetto storefronts to break the cycle of one poor generation following another. Mr. Goldfarb may have overstated the influence of actuaries in these matters, but his talk fostered awareness of our social responsibilities as corporate citizens.

Professor Lawrence F. Johnson of the University of Massachusetts spoke about hiring the hard-core unemployed. He is black and has been successful in projects in this area. His tone was calm and his outlook practical. He began his talk with a description of what it means to be black in America. He reported statistics on the number of cases of rat bite, poverty level income and broken families. Professor Johnson urged that we recruit black actuaries as well as clerks.

He stated this requires commitment by the highest levels of management, objective study of hiring rules and tests, the allocation of funds for training and efforts to convince the current staff of job security and equal opportunity for all. He urged going to the ghetto to hire and to establish neighborhood offices to do business in the community.　□

Duke Conference

of changes in the national economy to models in the insurance business. Later, Professor James L. McKenney of Harvard discussed corporate models with emphasis on their use in management planning.

Professor Donald S. Burdick of Duke presented a summary of the essential theoretical issues involved in simulation techniques and dealt at some length with experimental design and data analysis.

Professor C. West Churchman of the University of California at Berkeley provided a thought-provoking conclusion to the conference. He touched on the reliability of mathematical models for business purposes and enlarged on the special merits of simulation as a fundamental scientific approach towards a better understanding of complex systems. He stressed the need for looking at such systems from many different viewpoints, for more careful examination of the logical assumptions made about such systems, and for more experimentation with the aid of computers.

Sidney Benjamin, Chairman of the Research Committee of the Institute of Actuaries, was the opening speaker in the area of simulation applications in insurance. Mr. Benjamin has been a pioneer in the simulation of mortal fluctuations. He discussed a number of problems illustrating the wide range of applications of simulation in insurance, and showed how most of them might be tackled with his own ingenious adaptations of Monte Carlo methods. Among the problems dealt with were reversions, graduation, maturity guarantees in equity-linked policies, retention limits, delays in distribution of claims, and profit sharing formulae.

John Boermeester read a paper on "A Russian Roulette and Splitting Simulation Model." This method can be used with advantage to estimate claim distributions when analytical models are not appropriate.

Hilary Seal gave a lucid exposition of the probabilities of ruin in a risk business, and described his simulation experiments with the Erlang-Lundberg model. His results would appear to indicate that even in well-run businesses the probability of ruin may be greater than is sometimes supposed. The subject of risk theory will be brought within easier reach of American actuaries wl. Seal's forthcoming book, *Stochastic Theory of a Risk Business,* is published by John Wiley in the spring of 1969.

Dwight K. Bartlett III and Edward A. Lew discussed applications of simulation to agency problems, within the framework of Markov processes. Douglas O. Sanders presented the results of his investigations with individual life reinsurance retention limits, using simulated distribution samples. Space does not permit personal acknowledgment of the many other significant contributions.

David G. Halmstad and Robert E. Hunstad offered conference participants an opportunity to play a "management game," which simulated the decisions of top management in a life insurance company. This required a complex variety of judgments on actuarial, agency, financial, and underwriting questions. Despite premature termination of the exercise due to the failure of the computer print-out, it was among the major successes of the conference.

A limited number of copies of the addresses, papers, and discussions will be available at the office of the Society in April.　□