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# The Actuary

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## TIME SERIES ANALYSIS AT WATERLOO

### by David G. Halmstad

The Society's Committee on Research and the Department of Statistics of the University of Waterloo jointly sponsored the seventh of the Committee's annual Research Conferences on September 28-30, 1972 in Waterloo, Ontario.

This year's topic, Time Series Analysis, covered the more recent advances in statistical analysis of time series, particularly in economic data. While actuaries are accustomed to the use of forecasts of economic series (such as the level of interest rates), remarkable progress in statistical analysis of such series has not received actuarial attention.

Professor George C. Tiao of the University of Wisconsin introduced the participants to Box-Jenkins time series methods and models, and did so in exceptionally clear and direct style. Robert B. Miller, also from Wisconsin, followed with several case studies of actuarial data, including indices of paid claim costs and frequencies. Frank Reynolds of the University of Waterloo added case studies of life insurance data for cash flow and insurance sales series. Richard Ziock and Jack McGuinness also discussed the role of time series analysis and forecasting in insurance.

Eugene F. Fama of the University of Chicago discussed his recent and important work on the balance between risk and return within the efficient market theory. The importance of Prof. Fama's portfolio model work was supplemented by a recent study by Der-Ann Hsu, now at Princeton University, on the behavior of stock prices. James C. Hickman added some important comments on long-term interest rates, and Messrs. Ziock and Reynolds added studies of bond and

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To All Our Readers,
A Happy New Year!
*The Editors*

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## INSURANCE SALE NEEDS SALESMAN

### by Thomas Mitchell

Life insurance will continue to be sold on a one-on-one basis between the client and salesman, according to the panel at the annual meeting of the Actuaries Club of Indiana, Kentucky, and Ohio, held on October 4, in Fort Wayne, Ind. Ralph Waldo, President of Columbus Mutual Life, Richard Phillips, Agent for Fort Wayne for Lincoln National, and Charles Williams, FSA, comprised the panel on the future of life insurance marketing.

Mr. Phillips stated that the agent's job was to communicate and explain ideas, not sell policies. The industry is not able to keep enough good agents. Even with the elaborate testing, there are still unknown factors. The agent's basic earnings are from first-year commissions, which creates problems for the agent in servicing policies, especially after a long time in the business. A successful agent eventually needs a partner and clerical help.

Mr. Phillips was enthusiastic about the trend to a corporate form of life insurance shop. A corporate form creates a value to the agent's estate through the redeemable net worth of the corporation. To the client, it offers continuity of service. It is a good way of bringing new men into the business. The old practice of the general agent assigning orphaned business to new agents does not create as strong a relationship.

## ACTUARIAL EXAMINATIONS IN THE PHILIPPINES

### by R. L. Bergstresser

In *The Actuary*, April, 1969, I submitted a short article about the Actuarial Society of the Philippines and its activities. Up to that time, the ASP had no program of examinations, but recognized membership in foreign actuarial bodies, or else evaluated a person's college actuarial studies and practical experience as a basis for membership. In 1969 we embarked on a formal program of our own exams, leading to Associateship and then to Fellowship.

One basic decision was not to require an exam in the basic mathematical subjects, e.g., General Mathematics, Accounting, Probability, Statistics, Finite Differences, and Compound Interest. We decided to list these as recommended foundational subjects, which the applicant would need in order to pass our exams in Life Contingencies and in Construction-Graduation. Some applicants with practical experience in actuarial work may have sufficient background in these subjects to take the exams mentioned; others may have to take some college courses for the necessary background. We felt also that with our small membership our members' efforts would be fully occupied in developing a study-examination program for the later exams. Our exams on Life Contingencies and Construction-Graduation will reveal whether or not an applicant is equipped with the basic mathematical knowledge.

Our formal examination requirements for Associateship consist of two exams:

Part 1: Life Contingencies, including continuous functions of compound interest.

# NOTATION

members of the establishment. The result was that the Committee will be continued with broader representation, with instructions to report to the 1976 Congress in Tokyo.

In addition, President Ed Franckx of the International Actuarial Association has appointed Dr. J. Englefreit, Vice President of the I.A.A. for the Netherlands and Mr. E. A. Lew as a new official Subcommittee on Notation. This new Committee has the responsibility of working with the reformed group and gathering opinions on changes in notation.

There are gaps in the present notation—for example, there is no standardized notation for pension funds or for sickness insurance. It is only right that such gaps should be closed. In addition, it is highly desirable that the notation be compatible with standard statistical and demographic notation.

There have been proposals other than those submitted by Dr. Boehm's committee. Mr. David Jamieson's ACT (*The Actuary*, January, 1972), not a new notation but an adaptable programming language, must be considered. In 1971 the Institute of Actuaries of Australia and New Zealand issued a report on "A New Actuarial Notation" and in 1972 Mr. P. J. Turvey published a paper on "Some Provisions for a Revision of the International Actuarial Notation" in the Journal of the Institute of Actuaries Students' Society.

There are now four proposals for the Committee to consider, from Dr. Boehm, Mr. Turvey, the Institute of Actuaries of Australia and New Zealand, and Mr. Jamieson. For the benefit of the actuaries on the North American continent, here is one example of the suggested changes:

| Present | Boehm | Turvey |
|---|---|---|
| $\alpha^{(m)}_{x:\overline{n}\rvert}$ | a(x,n,k) | apnm(x,n,m) |

| ANZ | Jamieson ACT |
|---|---|
| b2(x,n), etc. | ANXNM X N M |

The notation to be used, whether linear, halo, or some other, is a matter for all actuaries. Any members of the Society with any suggestions on notation should write to Mr. Lew or myself.     ☐

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## Right Answer

The student went on to say that if he were not limited to physics solutions, there were many other answers he could have given, such as saying to the superintendent of the building, "If you will tell me the height of this building, 1 will give you this barometer."

At that point Calandra asked him if he knew what the answer was that the professor expected to get. The student admitted that he knew the answer, but that he wanted to show his ability to think and solve a problem in a manner other than that routinely expected.

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## Time Series

stock price movements. On Saturday morning, Donald Jones of the University of Michigan added yet another case study to the participants' load of papers with a study of hospital insurance claims through time.

Papers from the Waterloo Conference will be distributed through the Committee's distribution service ARCH, and those who are interested in obtaining copies of these papers should write to

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## ARCH

The first number of *Arch* was reviewed in the May issue. Two issues of *Arch* have since been published and the list of contents thereof is given below. Puzzle fans will be glad to know that *Arch* now has a Problems (and Solutions) Section.

### Issue 1972.2

*Comments on the First Number of ARCH*, Cecil J. Nesbitt

*Actuarial Criteria for Aging*, Richard G. Driskell, James C. Hickman

*Discounting for Risk*, Richard W. Ziock

*Some Thoughts on Generalized Distributions (and the Mathematicians who Produce Them)*, Hilary L. Seal

*Credibility for Loss Ratios*, Hans Buhlmann, Erwin Straub

### Issue 1972.3

*Net Stop-Loss Premiums*, Melvin C. McFall

*Further Remarks on the Basic Mortality Functions*, J. J. McCutcheon, C. J. Nesbitt

*Actuarial Criteria for Regeneration*, Donald Brackey, James C. Hickman

*Smooth Polynomial Interpolation Formulas and Linear Transformations*, Brian Harvey, James C. Hickman

*The Solvency Problem in Risk Life Insurance*, Hans Ammeter

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for details. Regular ARCH subscribers will receive details on the distribution shortly.

In light of the extreme interest that was generated in Time Series Analysis by the Conference, the Committee on Research is planning to present several similar case studies at 1973 Society meetings.     ☐

### ERRATUM

In the 1972 *List of Members by Business Connection*, the name of Mr. Paul V. Montgomery should be in the *Consulting Actuaries Section* under Montgomery & Chamberlain (page 50). Mr. Montgomery's name was inadvertently listed under Section XI.