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IMMUNIZATION WITH (ALMOST) NO MATHEMATICS

by Irwin T. Vanderhoof

Having talked (and written) about immunization for years, I've found a glazed look followed shortly by loud snores to be the normal audience reaction. Yet, after three or four of these lectures, faithful listeners tell me that the subject is simple and they can't understand why they ever had a problem. So, with some concern about disturbing readers' sleep habits, I offer a simple illustration requiring only high school algebra rather than the ordinary and stochastic calculus that has been applied to this subject. Once a simple example is understood, the elaborations that now stud actuarial and financial literature become comprehensible.

Illustration

Assume that today's interest rate for all maturities is 10%, that you now have \$1,000 and that you need \$1,100 one year from now. Assume further that the only investments available are a money market fund, where interest rates change daily, and a two-year obligation, without coupon, that matures for \$1,210. How can you invest your money so as to be assured of \$1,100 in one year regardless of changes in the interest rate?

Needing to avoid the losses that may ensue if either you invest short and interest rates fall, or if you invest long and interest rates rise, what do you guess to be the right investment strategy? You are absolutely correct! You have instinctively made the right decision—to invest half your money short and half long. Let's see why.

If the interest rate remains at 10%, the following expression displays the identity between our investments and

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"THE EDUCATION AND TRAINING OF ACTUARIES"

The above is the title of an extraordinary paper presented to the Institute in London in January 1982 by W. W. Truckle, F.I.A., Director of that body's Actuarial Tuition Service. Written to provide a framework for oral and written discussion, it features questions rather than opinions.

This summary is limited to subject headings and the questions that end each section, but we cannot resist giving also the apt quotations Mr. Truckle has picked to headline each of his topics. For his paper as a whole he quotes Francis Bacon: "I would live to study, and not study to live."

(1. is an introductory section.)

2. Policy

2.1 *What an actuary needs to know*

"A smattering of everything, and a knowledge of nothing"—Dickens

Ques.: What are the limits of knowledge to be demonstrated by a qualified actuary, distinguishing between essential subjects (to be examined) and incidental subjects (to be treated as post-examination education)?

2.2 *Adaptation to change*

"Knowledge advances by steps, and not by leaps"—Macaulay

Ques.: How do we ensure that developments in the actuarial and allied fields are adequately monitored and tested?

Ques.: Do we need to clear a route by which the results of research into new ideas are filtered into the educational and examination system so as to create and maintain a momentum of change?

2.3 *The scope of actuarial education*

"I don't know why they make all this

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COMMITTEE ON ELECTIONS INVITES VOLUNTEERS FOR LEADERSHIP

The Committee on Elections cordially invites any Fellow who would like your availability as a nominee for election to the Board of Governors to be drawn to our voters' attention on this year's first ballot, to write to its chairman (Julius Vogel, Senior Vice President & Chief Actuary, Prudential Insurance Company, Newark, NJ 07101) giving a brief summary of your background and accomplishments. You should do this before May 7, 1982.

In 1981, for the first time, a "reference list" of over 70 names, compiled on specific criteria having to do with past services to the Society, was offered as possible nominees for the Board. This year's committee will repeat this procedure, and will include in that same list such names from among those who respond to this invitation as the Committee picks on the strength of the material those volunteers submit. The list won't identify which actuaries volunteered their names.

Service on the Board of Governors is for a three-year term and requires attending three or four Board meetings a year. Meetings, frequently held on weekends adjacent to Society meetings, may last a day or a day-and-a-half. Board members (or their employers) pay the costs of attending these meetings. Board members occasionally serve on special committees that require additional travel and correspondence. Board service necessitates careful advance review of lengthy and detailed agendas.

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Education and Training

(Continued from page 1)

fuss about education"—Melbourne
(No question raised here).

2.4 Admission standards

"Abandon all hope, you who enter!"
—Dante

A table here shows that, of a typical cohort of new students, after 5 years, 45% have dropped out, 17% have qualified; after 10 years, 55% have dropped out, 32% have qualified; after 15 years, 60% have dropped out, 35% have qualified, and 5% are still sitting for examinations.

Ques.: Should the selection criteria for entry to the profession be made tougher?

Ques.: Should the entry requirements include some sort of aptitude test to identify those attributes which may not be associated with academic qualifications alone?

2.5 The subjects to be examined

"This'll sort out the men from the boys"—Sports commentator

Ques.: Is the present course of study too extended; and consequently should the content of the examination syllabus be reduced? If so, how?

Ques.: Should there be a qualification to recognise formally the status of 'actuarial technician'?

2.6 The role of post-qualification education

"It is melancholy truth that even great men have their poor relations"
—Dickens

Ques.: Should more resources of manpower be diverted into post-qualification education?

Ques.: Does the structure of post-qualification courses need to be strengthened and expanded?

Ques.: Should there be some element of compulsion to participate in post-qualification education (e.g., as a condition of being allowed to sign actuarial certificates)?

2.7 Limitations on examination attempts

"To spend too much time in studies is sloth"—Bacon

Ques.: Should there be a limitation on the number of examination attempts, or on the time allowed to pass part or all of the examinations?

2.8 The decision-making structure

"Grant unto her whole Council and to all that are put in authority under her, that they may truly and indifferently minister justice"—
Book of Common Prayer

This is a descriptive section, giving a chart of the Institute E. & E. structure.

3. Implementation

3.1 The relationship with policy

Introductory.

3.2 The form of the examinations

"Examinations are formidable even to the best prepared, for the greatest fool may ask more than the wisest man can answer."—Colton

Ques.: Should the examinations be augmented by some form of continuous assessment?

Ques.: Is there a case for relaxation of the fixed time limits for completing the examination papers?

Ques.: Should candidates be allowed some choice of questions in the exam papers?

Ques.: Should we reconsider the frequency at which examinations are held?

Ques.: Is it necessary to revise the course of reading every year?

3.3 Examination standards

"To be, or not to be: that is the question"—Shakespeare

Among the statistics in this section is a showing that the proportion of candidates who pass a Part declines with repeated attempts.

Ques.: Would the excellence (of the profession's reputation) be significantly diminished if there were some relaxation of the examination pass standard?

Ques.: To assist students who lack practical experience in particular subjects, should the subjects in the later Parts be examined at a two-level option (ordinary and advanced)?

3.4 The role of the examiners

"The quality of mercy is not strain'd, . . . It blesseth him that gives and him that takes"—Shakespeare

Ques.: Is there support for the suggestion that the examiners should publish at least outline notes of guideline solutions to the examination questions?

Ques.: Should the examiners make marked examination scripts available to failed candidates (direct or via their tutors); on the understanding that there would be no question of their being used to challenge the marking?

3.5 Tuition: the choice of methods

"Example is always more efficacious than precept"—Samuel Johnson

Ques.: Should the Tuition Service continue to develop the provision of various forms of class teaching as a more effective form of tuition than correspondence courses alone?

(From here on, some subjects and questions not applicable to the Society's system are omitted from this synopsis).

3.7 Tuition: the students

"Hope springs eternal"—Pope

Ques.: Does the time-honoured philosophy of part-time study any longer provide the best approach to the education and training of actuarial students? If Yes, do we need a more controlled and disciplined system of tuition? If No, should we develop and expand a tuition system based, at least in part, on full-time study (e.g., university courses in actuarial science)?

3.11 Manpower

"Never in the field of human conflict was so much owed by so many to so few"—Churchill

Ques.: How can we use the limited resources of (educational) manpower to be most cost-effective, in terms of the performance of the system in providing trained and qualified actuaries?

Ques.: How can we best use outside professional teaching to assist and to release our own limited resources for educational work outside the examination system?

And this thought-provoking analysis ends with Churchill again: "This is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning."

E.J.M.