



SOCIETY OF ACTUARIES

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LETTERS

Society Examinations

Sir:

In the past few years lots of discussions have been going on regarding the Alternate Route. I would like to raise another question concerning the dates of the Society examinations. It seems to me that with the increasing number of colleges offering actuarial science courses we ought to give some thought to coordinating the timing of the examinations with the regular school terms. The Spring examinations are fine but why don't we give the Fall examinations in December rather than in November? Maybe there is some good reason why this is not feasible but I know such a change would be greatly appreciated by many.

Marianne Baeckstrom

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Alternate Route

Sir:

As a Part 4 student and former math professor, I am distressed by the Alternate Route proposal.

The academic climate is changing, and today many students believe that paying tuition and attending class are sufficient to entitle them to an "A" or "B." Schools hurting for those tuition dollars are inclined more than ever to go along with them. As one dean put it to me, "After all, they're the customers."

While teaching "Math for Elementary Teachers" at a small college and again at a large university, I had students who couldn't add fractions and didn't want to learn. I must admit that I gave them a "C" as a compromise between the "F" I felt they should have gotten and the "A" I knew several of my colleagues would have given them. Most of these students are now certified as competent to teach in the elementary schools.

Lest you think this sort of thing is restricted to lower level courses, I also sat in on the defense of a dissertation which made no reference to math above the sophomore level and yet earned its writer a Ph.D. in mathematics.

Partly as a result of the inner conflict this sort of thing produced, I decided to change fields. I chose the actuarial

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ACTUARIAL NOTE

by Thomas H. Shelby III

An algorithm for calculating a life contingent annuity providing m equally spaced payments per year of \$1 each.

Let us say the desired annuity is given by:

$$m \cdot \ddot{a}_x^{(m)} = \sum_{t=0}^{\infty} v^{t/m} \cdot {}_t/m P_x = \sum_{t=m}^{\infty} v^{t/m} \cdot {}_t/m P_x + \sum_{t=0}^{m-1} v^{t/m} \cdot {}_t/m P_x$$

$$= v P_x (m \cdot \ddot{a}_{x+1}^{(m)}) + m \cdot \ddot{a}_{x:\overline{1}}^{(m)},$$

a familiar recursion formula.

Examining the one year annuity:

$$m \cdot \ddot{a}_{x:\overline{1}}^{(m)} = \sum_{t=0}^{m-1} v^{t/m} \cdot {}_t/m P_x = \sum_{t=0}^{m-1} v^{t/m} \frac{l_{x+t/m}}{l_x}$$

Let us assume "linear" deaths, that is

$${}_t/m q_x = t/m \cdot q_x = \frac{(t/m) \cdot d_x}{l_x}, \text{ and } l_{x+t/m} = l_x - (t/m) \cdot d_x$$

Substituting

$$m \cdot \ddot{a}_{x:\overline{1}}^{(m)} = \sum_{t=0}^{m-1} v^{t/m} \left(\frac{l_x - (t/m) \cdot d_x}{l_x} \right) = \sum_{t=0}^{m-1} v^{t/m} - \sum_{t=0}^{m-1} v^{t/m} (t/m) q_x$$

$$= m \ddot{a}_{\overline{1}}^{(m)} - m (I^{(m)} a)_{\overline{1}}^{(m)} \cdot q_x$$

Let:

$$F = m \cdot \ddot{a}_{\overline{1}}^{(m)}, \quad G = m (I^{(m)} a)_{\overline{1}}^{(m)}$$

Substituting, we have the useful recursion formula:

$$\underline{\underline{m \ddot{a}_x^{(m)} = v \cdot P_x \cdot (m \cdot \ddot{a}_{x+1}^{(m)}) + F - G \cdot q_x}}$$

By induction, we also see that:

$$m \ddot{a}_x^{(m)} = \sum_{m=0}^{\infty} v^m \cdot {}_m P_x (F - G \cdot q_{x+m})$$

If we redefine F and G such that:

$$F = v^{k/m} \cdot m \cdot \ddot{a}_{\overline{1}}^{(m)}, \quad G = m (I^{(m)} a)_{\overline{1+k}}^{(m)}$$

then $k = 0 \Rightarrow$ annuity due,

$k = 1 \Rightarrow$ immediate annuity.

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Actuarial Note

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This recursion formula has been used in evaluating pension benefits and life insurance policies where they have modal—non-annual—characteristics. It lends itself to use in computer programs, particularly with (annually) varying interest since only v , F and G change.

It is sufficiently general to include temporary life annuities with obvious modification. The results will of course differ from traditional values by a percent or so due to the difference in approximating assumptions.

This "linear" assumption would seem to be a reasonable, practical one even at the clouture of a table. Double life annuities are easily found by first generating a joint life mortality table using actual ages. □

Letters

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profession because, among other things, I was attracted by its tradition of practical on-the-job training for those entering the field. I was also attracted by your nationally administered, uniformly graded actuarial exams which I felt would be recognized anywhere I went. To me this is vastly preferable to a series of almost meaningless grades received from beleaguered professors whose cost of living raises frequently depend in part on how well they fare on "faculty evaluations" by their students. Most of my former colleagues agreed that these evaluations correlate with the professor's liberality in grading.

While it is conceivable that a single comprehensive examination could serve to equalize between the associateship exams and the academic route, my feeling is that it would have to be 19 hours long before I'd really have confidence in it.

I beg of you: Please maintain the rigorous standards that led many of us to enter the actuarial profession!

E. Torrance

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Actuarial Notation

Sir:

Mr. Di Paolo's article in the March *Actuary* on actuarial notation is excellent but, as to the Halo Notation, I am reminded of the old gray mare: She ain't what she used to be and never was.

I admit that the Halo Notation "... is very concise and unambiguous and ... easily read and quickly understood."

I suppose you can write an expression for the net annual premium for a k -year deferred, n -year, t -pay, endowment. This makes me feel like the school-boy Churchill when he was obliged to decline *mensa*. The vocative, *mensa*, means "O Table", and is used when speaking to a table. "But I never do", Churchill is said to have replied.

The Halo Notation is all right as far as it goes but it doesn't go very far. How do you say "gross premium" in Halo Notation? "Policy fee"? "Conversion rate"? "25% of either the adjusted premium for the first policy year or the adjusted premium for a whole life policy of the same uniform or equivalent uniform amount with uniform premiums for the whole of life issued at the same age for the same amount of insurance, whichever is less"?

How do you handle unit expenses? Interest rates varying by duration? The premium for the renewability provision in term insurance? Stochastic analysis of risk?! GAAP reserves?!!!

The list is endless.

Mr. Di Paolo asks whether we should extend "... the scope of ... actuarial notation ... to cover fields such as pensions, disability, demography, social insurance, and non-life insurance?" I would like to propose that the Halo Notation be extended to cover modern ordinary life insurance — if it can be.

Kenneth T. Clark

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Sports Section

Sir:

I would like to make two points relative to the tennis tournament in Miami.

Chicago Corner

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showing the exact description of each session, the number of persons estimated to be at the session, the arrangement of chairs and tables required, and other information needed by the hotel to make its arrangements.

Throughout the meeting, the Society staff is in constant touch with the hotel convention personnel in order to handle any problems which may arise. For example, an unexpectedly large number of persons may turn up at a luncheon, requiring additional tables and chairs to be set on a moment's notice, or someone may have failed to set up a particular room the way it was supposed to be set.

Not all meetings go as well as others. Some hotels are better than others in planning conventions, and sometimes problems develop which no one could have foreseen. For example, in Cincinnati last year, a great many more persons registered for the meeting than had been anticipated.

Although we work hard to give the members of the Society the best possible meetings, we recognize that there is always room for improvement, both in the content of the programs and in the hotel arrangements. Readers are encouraged to send their suggestions to the Executive Director.

P.W.P.

First, recognition of Gerry Levy's outstanding job of organizing and running the tournament. I enjoyed it a great deal, despite getting beaten so badly that I needed four days in Puerto Rico to recover. Without Gerry's effort (and his company's sponsorship), the event would not have been possible.

Second, a south-of-the-border viewpoint of R. A. Nix's request for "equal time" for golfers (March 1976). In the U.S. (if Boston in the 60's and Chicago in the 70's are typical), golfers have been rather well taken care of at the Club level. (I have never seen an announcement for an annual "Tennis Outing"). With bridge tournaments at both Club and Society levels, it has been the tennis player who has felt out in the cold. Until Miami! Thanks, Gerry, for the breakthrough.

C. M. Underwood