



# The Actuary

The Newsletter of the Society of Actuaries

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DECEMBER, 1980

## ACTUARIAL LIVERYMEN

by Geoffrey Heywood, F.I.A., F.F.A.

The Livery Companies of the City of London date back to the 14th Century and have their origins in the ancient craft guilds. Their original purpose was to ensure that anybody becoming a Liveryman was fully qualified to carry out his trade or craft. These days the link between liverymen and their occupation has become tenuous; their functions have become largely social, although they enjoy electoral power and have charitable responsibility as an essential requirement.

Some eighteen months ago, it occurred to a few actuaries that it would be a good idea to form a Worshipful Company of Actuaries, i.e., a Livery Company for this profession in London. A petition by these actuaries to the Lord Mayor and Court of Aldermen was approved on 18th September 1979, bringing into being the Worshipful Company of Actuaries as the 91st Livery Company of the City of London.

The oldest such Company, No. 1, is the Mercers Company (1393), and the order of seniority is jealously guarded. There were no new Companies from 1709, when No. 76 was set up, until 1932, since when, particularly during the last twenty years, there has been a resurgence of interest. Already there is one junior to us, by a hairsbreadth, the Worshipful Company of Insurers, No. 92.

On 30th January 1980, at a most impressive ceremony in Mansion House, all of us being fully robed, the Lord Mayor presented to the Master our Letters Patent. This was followed by a luncheon there for the Lord Mayor, the Court of Aldermen and the Members of the new Livery Company.

(Continued on page 5)

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

## SOCIETY FELLOW ADDRESSES ACTUARIAL SOCIETY OF INDIA

Rajendra P. Sharma (F.S.A. 1979) of Philadelphia had the opportunity in July 1980 to address the Actuarial Society of India in Bombay. As his topic he selected *The History of Private Pension Plans in the United States of America*, and gave his audience of about 150 actuaries and other insurance executives the following reason for this choice:

"I selected the topic primarily for the reason that I see a lot of similarities between the initial stages of pension plans in the U.S. and the existing gratuity and provident-fund schemes of retirement income security in India. Examining the path of development towards the current system in the U.S. may be a useful indication of what future course the retirement income security system in India may take."

The speaker described the growth pattern of U.S.A. private pensions, and the successive economic and societal influences that determined that pattern. He gave also a succinct analysis of theories that have been advanced to account for pension development — the gratuity theory, the human depreciation theory, the deferred wage theory—and then expressed this view:

"However persuasive some of these theories are, it is doubtful that the private pension expansion can be explained in any one social, political, economic or philosophic concept. The only real explanation

(Continued on page 5)

## SUMMARY OF NON-ROUTINE BUSINESS BY BOARD AND EXECUTIVE COMMITTEE, FOUR MONTHS TO OCTOBER 31st

by Myles M. Gray, Secretary

At meetings of the Executive Committee on September 18th, and the Board of Governors on October 18-19, the following non-routine business was transacted:

(1) *Education and Examinations.* The Executive Committee and the Board discussed a proposal for joint sponsorship and administration of examination Parts 1 and 2 with the American Society of Pension Actuaries and concluded that this was not an appropriate time to pursue the matter.

A liaison representative has been appointed from the Society to the Mexican Actuarial Association to explore possible further cooperative educational efforts.

(2) *Sections Within the Society.* The Board approved institution of Sections and reviewed proposed by-laws and operating rules and procedures.

(3) *Society Operations.* The Board adopted the budget for fiscal year 1980-81. It includes increases in seminar fees (\$20 for one-day and \$35 for two-day seminars), and a \$20 increase in registration fee for Spring Meetings.

The Executive Committee removed the maximum limit on reimbursement of reasonable expenses for the President and President-Elect.

(4) *Public Relations.* The Board received the report of the Council of Presidents' Task Force on Public Relations and authorized the President to appoint two Society representatives to a new Joint Committee on Public Relations.

(5) *Professional Conduct.* The Board received two proposed Opinions on professional conduct: a revised Opinion

(Continued on page 2)



**STUDY NOTE SERVICE**

Do you know that for a modest fee, covering expenses, a person or a company can have a complete set of all study notes presently in use for the Society's examinations?

The material available contains both Canadian and U.S. versions, and excludes only previous exam questions and illustrative solutions. It is more suitable for reference than for students' use since it isn't sent out till all study note orders by students have been filled. The package now offered incorporates the extensive changes that have been made for the 1981 exams, including much new writing.

The charge in 1981 will be: (a) \$200 for new subscribers, who will get a complete set for the 1981 Course of Reading, or (b) \$175 for renewing subscribers, who will receive everything except notes already sent them for new Part 7. The whole package covers more than 30 subjects, and weights 20 lbs.

Send your enquiries and orders to the Society office, Chicago. Pay in U.S. funds, please.

**RECENT SOCIAL SECURITY DISABILITY EXPERIENCE**

by Bruce D. Schobel

Social Security Disability Insurance (DI) experience in 1980 is continuing most recent trends, but changing somewhat in a few others. The table herewith displays statistics for calendar years, 1970, 1975, 1979 and 1980, this last projected from data available at the end of September. (Ed. Note: Figures for 1971-74 and 1976-78 are in the October 1979 issue of this newsletter).

**Social Security Disabled Worker Experience**

	1970	1975	1979	Projected 1980
Number Recorded in Year (thousands):				
Applications	868	1,285	1,188	1,250
Awards	350	592	409	390
Recoveries	41	39 <sup>e</sup>	72	65
Beneficiaries at Year-End (thousands)	1,493	2,489	2,870	2,860
Gross Annual Rates per thousand:				
Incidence/Insured	4.84	7.11	4.51	4.24
Recovery/Exposed	27.9	16.3 <sup>e</sup>	25.0	22.6

Benefit applications appear to be slightly reversing their five-year decline in numbers, but the approval rate continues downward, the net effect being continuing decrease in awards. The gross disability incidence rate is expected to be the lowest since 1964. The 1980 recovery rate is significantly higher than was experienced in the mid-1970's, even though not matching the 1979 result.

Since 1978, the combined monthly number of benefit terminations, from recovery, death and transfer to the old-age rolls at age 65, has exceeded the number of awards in all but three instances; the resulting general decline in number of beneficiaries is expected to be about 10,000 this year.

**FIT PERSONS' DISCOUNTS**

by Robert L. Whitney

In his *Second Book of Running*, James Fixx, with whom I'm acquainted, presents studies that show a cause-and-effect relation between exercise and cardiovascular health. For at least 25 years correlation between exercise and good health has been demonstrated, but always the possibility lurked that favorable results merely reflect healthy people exercising more than the unhealthy. Now, as Mr. Fixx reports, Dr. Ralph S. Paffenbarger, Jr., a respected epidemiologist (and a prominent marathoner) has completed studies of Harvard and Pennsylvania graduates which eliminates this possibility. These studies deal with a homogeneous group whose history, as a consequence of the fund-raising zeal of these universities, is readily traceable.

At first it seemed that the issue might remain in doubt since the data showed that college athletes enjoyed a continuing advantage. But as the evidence accumulated, Dr. Paffenbarger noticed a

striking trend. As the years went by, this advantage kept shrinking, until, 25 years or so after graduation, a man who had been totally unathletic in college but who kept exercising, was highly likely to be healthier than a former campus sports hero.

Using a multiple logistic risk analysis technique, Dr. Paffenbarger plotted combinations of heart attack risk to observe not only their cumulative effect but also to see what activities might have reduced that risk, resulting in the table below.

Actuaries who agree that a reduction in risk of a heart attack (which this study measures) implies a more favor-

able mortality, should find this chart useful in pricing fit persons' discounts.

James Fixx mentions in his book that such discounts exist. This led me to remark to him that although non-smoker discounts, sometimes with a requirement of a favorable family history and perhaps also a satisfactory build, have become common, I thought the number of companies offering a fit persons' discount is small. Please send news of such discounts to my Year Book address. There might be a *Third Book of Running* reporting such practices. I would gladly share this information with readers.

**REDUCING YOUR HEART ATTACK RISK**

Sedentary Life Style	Cigarette Smoking	High Blood Pressure	Heart Attack Rate*	Potential Risk Reduction†
Yes	Yes	Yes	201	88%
Yes	Yes	No	66	60%
Yes	No	Yes	102	76%
No	Yes	Yes	80	68%
Yes	No	No	35	28%
No	Yes	No	50	48%
No	No	Yes	42	41%
No	No	No	26	—

\*Per 10,000 person-years.

†If Yes's are changed to No's.

## PROFESSIONS IN U.K. BECOMING MORE CLOSELY KNIT

by Peter E. Moody, F.I.A.

*Ed. Note: The Society was honored by the presence at our Minneapolis meeting in May of Mr. Moody, President of the Institute of Actuaries. This is an excerpt from his address at that meeting.*

In the United Kingdom the professions are feeling increasing pressure upon them to become a more closely-knit body. This stems partly from a feeling that a professional approach to matters of public controversy and interest might contribute something new and valuable to general discussion, and partly because long established practices, which to a substantial extent make professions what they are, have been under attack. Among such practices are restraints on advertising and on one actuary's intrusion into the relationship between another actuary and client; the "channeling" rule, aimed at preserving the independence of actuaries in the sense that they do not get too much business from a limited number of sources; and the requirement that actuaries operate as partnerships. (In this last, I personally think that before too long we may follow your example and permit incorporation in limited liability form.)

This threat to our customary practices is highlighted by a recent report on the engineering professions suggesting that they be controlled by a statutory body, some of whose members would be government appointees. This would seriously undermine the ability of the engineering professions to regulate themselves, and therefore sets a precedent that would be most unwelcome to most professional bodies.

In the U.K. we have two informal bodies through which senior members of various professions meet each other. The difference between them is that one consists of what the Europeans call the liberal professions, e.g., lawyers, doctors, accountants, architects and actuaries; the other larger body brings together the science-based industries—such bodies as engineers and chemists. Neither of these bodies has so far reached the point of being an effective voice for professions as a whole, but they do a good deal of useful work. Studies have been completed in such subjects as continuing education after qualification,

competence to practice, relations between trade unions and professions where it is common for an individual to be a member of both, and limitation of liability and the related subject of professional indemnity.

Certainly the first of these bodies has acted to oppose the worst aspects of that engineering report I already mentioned. The threats to our professional life come from people who cannot accept the idea that rules of conduct and guidelines can be designed with public interest in mind just as much as the interests of the professionals themselves. I do not maintain that actuaries are uncommercial people striving selflessly to serve the interests of their clients or employers, but I do genuinely believe that the interests of those he serves are a most important factor governing an actuary's conduct.

I bring to all members of the Society from the British Institute fraternal greetings and confidence in the future progress and welfare of your Society. If any of you are in London you would be most welcome at our headquarters in Staple Inn. Charles Dickens in his novel that was unfinished at his death in 1870 gave a description of Staple Inn that is wholly recognizable today except that he called it "a legal nook." It is no longer a legal nook; it is an actuarial nook and, I hope, devoted to constructive purposes.

## THE PART 3 DEFINITION CONTROVERSY

by Arnold A. Dicke

As reported in the October issue, 36 replies have come in to the tricky notational problem that has plagued the Part 3 Committee so long that we finally put it to the membership (with the May issue of *The Actuary*).

We find that 28% of the letters (and 47% of the pages) came from colleagues in the academic world. (Ed. Note: Since a rational explanation is, "If you want something done, ask a busy man", we have deleted a remark here about this providing a gauge of structural underemployment).

Amending our October report, these replies were:

In favor of Definition I	11
In favor of Definition II	21
Undecided or cryptic	4

## ADVANCE, YOU SAY?

Readers, who support this newsletter through your pungent contributions (and through your dues), are entitled to know about our new address for mailing of articles and letters, displayed in our masthead—Advance, North Carolina.

By its denizens, Advance is pronounced *AD*van<sup>ce</sup>; by others it is infrequently pronounced. It lies in Davie County, some 15 miles southwest of Winston-Salem. A close approximation to Davie County's population can be arrived at by dividing the U.S.A. population by 10,000. Advance lays no claim to being the largest community in Davie County.

Davie County was originally called Forks-of-the-Yadkin because it nestles in the "V" formed by the converging Yadkin and South Yadkin Rivers. Yadkin is an Indian word meaning "big trees"; an 18th Century explorer, for whose veracity we do not vouch, spoke of trees so tall that a gun would not kill a turkey perched in the top.

The operations of our office at Mail-Drop 20-7 in New York City are not changed at all. That is where our Editor Emeritus patrols his beat, contributes his always needed suggestions, and watches for blunders. That is where our excellent production staff converts typed copy to grist for the printer, lays out the format, and in general creates the tidy and relatively error-free eight pages that you receive.

All that we have done is to shorten the line of communication between you and the Editor in his Davie County hide-away.

E.J.M.

Two articles from the *American Mathematical Monthly* and one textbook were quoted. The score here was: one for Def. I, one for Def. II, one clearly in favor of chain rules. To counter the advantage attributed to Def. II because of the better defined chain rule, several respondents pointed out that Def. I affords a generalized binomial theorem.

Students and former Part 3 chairmen rated the resolution of this conflict as a matter of some urgency, a view not shared by other correspondents. *No resolution has been reached, but work goes on.* (Emphasis added—Ed.) □

## A FUTURIST'S TECHNIQUE IN PRICING

by Claude Chau

In our rapidly changing world, it is becoming hopeless to try to arrive at a satisfying description of future conditions, even in the short run. Yet prices for new life insurance must somehow reflect one's view of events even in the far distant future. It has become so hazardous to base financial decisions upon a single view of what lies ahead that preference is developing for examining a variety of possibilities, some favorable, others distinctly unattractive.

A second reason for making calculations on a range of possibilities is that the door is thus opened to relating profit loadings to the risks undertaken. Profit, after all, is the compensation for taking risk as well as for giving service. It is reasonable to aim for a basic profit for services, supplemented by an additional return related to risk of loss, defined as the difference between the outcome considered today as most likely, and that perceived as the most adverse.

### Scenarios

Historically the word "scenario" has meant a plot in theatrics; futurists have appropriated it as their label for each member of an array of outcomes considered within the range of practical possibility. Each of these possibilities is a hypothetical sequence of events intended to illustrate a point. Perhaps none of the scenarios is necessarily to be taken seriously by itself, but together they serve to help us understand what might happen.

A difficult but essential requirement of this approach is that each of the outcomes be internally consistent. Grotesquely unhelpful results emerge if any scenario is inadvertently permitted to combine events that cannot conceivably all happen together. It is surprisingly easy to fall into the trap of introducing this form of irrationality.

When examining for internal consistency, it is usually discovered that even the most favorable portrayals must incorporate unfavorable elements; for example, unfavorable mortality increases the likelihood that healthy policyholders will replace their term insurance, and high investment returns are frequently coupled with rising costs and excessive policy loan usages.

Finally, it is necessary to do one's best to place a numerical probability or weighting on the relative likelihood of each selected set of events being the one that occurs. One of the most valuable, and exciting, sessions is that in which company management is presented with a set of possibilities and is asked to help establish these comparative weights.

### Competitive Considerations

The approach outlined here does not, of course, free the actuary in the slightest from the constraints of competition, which are severe. Skeptics may even say that after price competition has been taken into account, premiums will turn out about the same as they would have under traditional methods of calculation. This may largely be true, but the alternative futures system helps a company to decide where it is worthwhile for it to be strongly competitive, and where it is prudent to be less so.

Pricing is far from being the only use for the system described here. It is helpful in such diverse activities as product design, tax planning, response to regulatory proposals, retention limits, and acquisitions of other companies. □

### Actuarial Society of India

(Continued from page 1)

of the development of pension plans in a free competitive climate such as that of the U.S., is the equation of the market place."

Mr. Sharma went on to describe ERISA, its significance for actuaries, and the role of our Academy. His closing comment was this:

"Unfortunately, to accommodate the changes brought about by ERISA, the Academy relaxed its high standards for admission to membership and adopted the federal requirements for enrollment as one of the alternative means of satisfying membership requirements. However, it is to be hoped that by acting in an advisory capacity to the Joint Board for the Enrollment of Actuaries the Academy recovers in the future by bringing back the previous level of excellence through an upgrading of the enrollment requirements."

Most of the members of the Actuarial Society of India are F.I.A.s. □

### Actuarial Meetings

Dec. 4, Boston Actuaries' Club  
Dec. 16, Chicago Actuarial Club  
Jan. 14, Chicago Actuarial Club

Please let us know when your meetings will be held so that they may be publicized. □

### Actuarial Liverymen

(Continued from page 1)

The procedure for admission to the Worshipful Company of Actuaries is that one is first admitted as a Freeman and then application is made to Guildhall for admission by redemption as a Freeman of the City of London which involves appearing before an appropriate City dignitary and making declarations of loyalty to the Sovereign and protection to the Lord Mayor. One is then "clothed with the Livery" at a meeting of the Court of the Company. The membership of our Company is now approaching 100.

Liverymen are entitled to attend at Guildhall and to take part annually in the election of the Lord Mayor and the Sheriffs. This again is an impressive ceremony, following a tradition unchanged for hundreds of years.

Our new Company, like all other Livery Companies, has a charitable function. Ours is to set aside monies under a covenant to be used for encouragement of actuarial research and education in its very widest aspects.

*Ed. Note: Mr. Heywood's name now goes into actuarial history as the Founder Master of the Worshipful Company of Actuaries of the City of London. A handsome booklet, a copy of which is now in our Chicago headquarters and available for reading by any one requesting it, commemorates the Mansion House ceremony of last January.* □

### UNGARBLING

The third line of the verse, "Actuarial Perry" in our October issue should have appeared thus:

Here's a query almost merry,

We weren't bowdlerizing; we tried to transmit the item from N.C. to N.Y.C. by phone, with less than perfect results. □

## LETTERS

## Curricular Carrot

Sir:

Under the old Course of Study, Part 3 was the first truly actuarial examination, Parts 1 and 2 being preparatory in nature. But now it isn't until Part 4 that one begins to study traditional actuarial science. The result is that students hired by an insurance company without having passed any exams but with the necessary educational background, are well advised to take Part 4 ahead of any of Parts 1-3.

We should seriously consider rearranging the first five exams so as to bring peculiarly actuarial study to as early in the curriculum as possible, the following being my proposal:

- Part 1 Linear Algebra, Calculus, Probability and Statistics (5 hrs.)
- Part 2 Numerical Analysis, Operations Research, Compound Interest (5 hrs.)
- Part 3 Life Contingencies, Beginning and Advanced
- Part 4 Current 5B material, including some practical applications
- Part 5 New Part 6 for 1981, including some practical applications.

An important merit of this arrangement is that it would permit keeping our five-exam requirement for Associateship. I fear that requiring seven exams for Associateship makes that "pot of gold" appear too far off to a beginning student, and that the "professional" designation, "Student" doesn't buy much.

Ira L. Boyle

\* \* \* \*

## Service to Students

Sir:

Recently I began teaching an actuarial course for the new Part 7-E, which is also the EA-2 exam of the Joint Board for the Enrollment of Actuaries.

I soon requested and received from the Joint Board copies of the 150 multiple-choice questions and answers used in 1977-79. My students did the same, although only one had known that these

PACIFIC STATES CLUB EXAMINES  
FUTURE OF LIFE INSURANCE  
DELIVERY SYSTEM

by Ira L. Boyle

Inflation, agreed those discussing this topic at the Pebble Beach meeting of the Actuarial Club of the Pacific States, is resulting in purchase of more term insurance and also is hurting persistency of all plans. Agents are getting hurt because of inflation, and there's fear that the agency system may have to undergo fundamental changes.

Solutions include: new compensation structures, a different delivery system (perhaps direct mail) for term insurance, and fresh products such as "total life" (essentially term insurance with a side fund).

Our delivery system is expensive. (*Ed. Note: This has been pointed out for at least fifteen years—see, e.g., Nathan F. Jones, T.S.A. XVII, D336-7*). Marketing and home office costs, excluding federal income taxes, often account for as much as 50% of the entire first year and renewal premiums. Minimum loss ratio requirements for health insurance in many states would be impossible to meet if they were applied to life insurance!

This discussion closed on a more positive note, however, with the cheering observation that although today's agency system may not be the most appropriate in all markets, there still are, and will continue to be, markets where it is the best. □

could be had for the asking. But the Society hasn't yet distributed copies, nor even said that they are available.

Next time around, the Society should give these students the help they deserve in preparing for what is in fact a government exam, whether we like that or not. The alternative is to continue allowing an unwarranted advantage to certain applicants for the E.A. designation, some of them not affiliated with the Society.

Richard G. Schreitmueller

*Ed. Note: Director of Education Linden Cole thanks the writer for his fine suggestion. The Society happily accepts this opportunity to begin notifying students next year.*

Requesting Suggestions on Our  
Election Process

A large problem with our elections is that so many of our Fellows know so little about the candidates amongst whom we must try to choose. As our membership has grown, this difficulty has grown apace. Maybe this helps to explain why only 56% of our Fellows voted in 1980.

Each candidate's biographical summary printed in the ballot papers is supposed to help, but gives only superficial and partial particulars to those not already acquainted with the candidate. So we ask your help. What additional information would enable you to vote more intelligently? What suggestions can you offer, on how we might provide better information, fairly and efficiently? Or, what new election procedure might alleviate the difficulty?

We are rightly proud of the Society's democratic election tradition, but it takes an informed electorate to make such a system work effectively.

This is a call to any and all Fellows to send me your ideas. The Committee on Elections will give them careful attention.

Write to me, won't you?

Paul Barnhart, *Chairman*  
1981 Committee on Elections  
959 Gardenview Office Parkway  
St. Louis, MO 63141

*Ed. Note: Attention is drawn to the pro and con of one proffered suggestion, in our issues of Feb. (p. 6) and May (p. 7) 1980.* □

## A Point of Order

Sir:

There appears to be no cohesive force behind the policies of our exam committees, as evidenced by the restructures, changes, revisions, additions, deletions, and alterations which the exam structure goes through as the Society tries to appease and fit every exam-giving body that has anything to do with actuarial science.

This flux causes hardship for the students. But more importantly it destroys faith in the Society's leadership. This undermining of members' confidence

(Continued on page 7)

**Letters***(Continued from page 6)*

may eventually lead to a lack of public confidence in actuaries, making the F.S.A. designation meaningless.

Members should demand that the E&E Committee stabilize the examination structure and adopt a policy of reasoned, studied change rather than frantic, haphazard modifications.

Peter A. Fox, Jr.

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**Filtered Truth\***

Sir:

It is difference of opinion that makes horse races. I do not back the horse that you favor in your "Actuarial Blueprint" (October issue).

In my view Prof. Jewell's speech at the International Congress does not merit being "explained and discussed at our 1981 spring meetings."

Several of his assertions demonstrated the speaker's lack of knowledge of actuarial practice. He incorrectly stated that the Supreme Court has determined that sex-classified annuity tables violate the Civil Rights Act. He tried to justify unisex tables on the grounds that they provide actuarial equivalents, without facing the issue that if such tables are necessary for "social" reasons, then age too should be ignored in determining purchasable pension amounts from a given sum.

He favors diminution of risk classification in automobile insurance on the grounds of "a significant overlap between the distribution of losses between two classifications which have significantly different pure premiums." The fallacy in that "overlap" theory is obvious to any qualified actuary.

And Prof. Jewell freely used the word "paradigm" without ever giving a clear and precise definition of it. The only definition I can naively think of is that a paradigm is two 10-cent pieces! If it means "model", why not use the common term?

Robert J. Myers

\*Ed. Note: "Truth is one forever absolute, but opinion is truth filtered through the moods, the blood, the disposition of the spectator." Wendell Phillips. 1859 □

**Debate Reflection**

Sir:

For now President-Elect Reagan to have stated so flatly in Cleveland that Social Security is actuarially unsound is deplorable. I hope that some acknowledged experts in that field have responded in strong terms that no such denunciation is warranted.

Howard Hennington

Robert J. Myers, who in September was named a member of then Candidate Reagan's Social Security Task Force, comments as follows:

Mr. Reagan, according to the text I have of the Cleveland Debate, said, "It is actuarially out of balance," which isn't exactly the same as "actuarially unsound" with its implication of faulty design. OASDI has had significant lack of actuarial balance, to the tune of 1.5% of taxable payroll measured over 75 years, even after the 1977 Amendments were enacted. So, I believe that President-Elect Reagan's statement was correct.

It should be noted that he did not say that the system should be done away with. Rather, in his announcement of the Task Force he emphasized that he would "consider it a sacred obligation to make certain that the integrity of the system is defended and that the benefits of those dependent on Social Security are protected" and that he would make "certain its financing is sound and stable."

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**Message From An Economist**

Sir:

It has been my privilege to read Elmer R. Benedict's book, "Protecting Retirement Against Inflation," ("R For The Inflation Sickness," October issue). We all must hope that actuaries and others will be aroused to ask for the complete text; those who read it will recognize the plan as a weapon to fight this dragon of inflation before he destroys the private pension system and our society. Of course, we have to look for him in his lair, which is Congress.

The countries, like Germany, that have experienced the ravages of inflation are now supporting policies that restrain inflation. In Germany, hyperinflation led to dictatorship; it was a major factor in destroying the democratic Weimar Republic.

If corrective measures are not taken soon in this great republic, inflation will destroy what is left of our work ethic and destroy faith in the capitalist and democratic system, and who will come to our rescue and re-establish democracy here?

Let us spread the word about the Benedict plan to our fellow-workers, and together impress Congress and the Administration with our determination to use this tool to fight inflation.

Henry Walter

Ed. Note: Himself a native of Austria, Mr. Walter is a Boston economist who has lectured widely on financial matters.

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**Almost Actuarial**

Sir:

In an article, *Security Merchants Make Most of Fear*, in *The Toronto Globe and Mail* of October 9, 1980, we find the following:

First you see the gun. The bullets in the chamber look like metallic shrouds. Then you see the whites of the man's eyes as they peer at you from under a hood. Death is stencilled in each half-moon pupil.

Luckily, it's only an advertisement for executive protection.

"Your chances of being kidnapped are greater than your chances of being killed in a plane crash," says the headline on the next page of the security management magazine.

When asked whether the advertisement is trying to frighten an executive to death the communications director of the insurance firm which is advertising defends it with serene ad-agency gobbledy-gook: "That ad has a strong graphic balanced by an almost actuarial headline."

John Gorham

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**Another TV'd Actuary**

Sir:

In response to your enquiry (May issue), my experience adds up to ten times on TV—thrice on Barbara Walters' "Not For Women Only," twice on David Hartman's "Good Morning America," once each on "The Advocates" and "It's Your Business" and three local shows. And perhaps ten times on radio talk shows.

Robert J. Myers

**COMMITTEE CHAIRMEN**

(G.C. denotes General Chairman)

(S.C. denotes Subcommittee Chairman)

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\*Representative of American Society of Pension Actuaries. □





# The Actuary

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SUPPLEMENT

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## SCORING MULTIPLE-CHOICE ACTUARIAL EXAMINATIONS

by R. Stephen Radcliffe and Terry A. Nicodemus

For a number of years, exam scores for Parts 1, 2 and 3 have been based on the number of correct answers plus one-fifth of the number of questions omitted (Method 1). However, until May 1979, the multiple choice scores on all other exams were based on the number of correct answers minus one-quarter of the number of incorrect answers (Method 2).

Starting in November 1979, exams which are 100% multiple choice are being graded uniformly using Method 1. Method 2 will continue to be used on exams that contain both multiple choice and essay questions.

Method 1 and Method 2 are equivalent in ranking the candidate's multiple choice scores. Therefore, exactly the same candidates will pass or fail under either method.

Equivalence of the two methods can be demonstrated as follows:

Let  $T$  = the number of questions on the exam

$R_t$  = the number of correct answers by candidate  $t$

$W_t$  = the number of incorrect answers by candidate  $t$

$O_t$  = the number of questions omitted by candidate  $t$

$S_t^1$  = the score produced by Method 1

$S_t^2$  = the score produced by Method 2

By definition,  $S_t^1 = R_t + .2(O_t)$

$$S_t^2 = R_t - .25(W_t)$$

$$T = R_t + W_t + O_t$$

For two candidates  $a$  and  $b$ , it can be shown that  $S_a^1 \leq S_b^1$  if and only if  $S_a^2 \leq S_b^2$ ; i.e.,  $R_a + .2(O_a) \leq R_b + .2(O_b)$  if and only if  $R_a - .25(W_a) \leq R_b - .25(W_b)$ .

As a matter of fact, these scores are related by a linear transformation.

Since  $5(S_a^1) = 5(R_a) + O_a$ ,

and  $4(S_a^2) = 4(R_a) - W_a$ ,

we have  $S_a^1 = .8(S_a^2) + .2(T)$ .

(Continued on back)

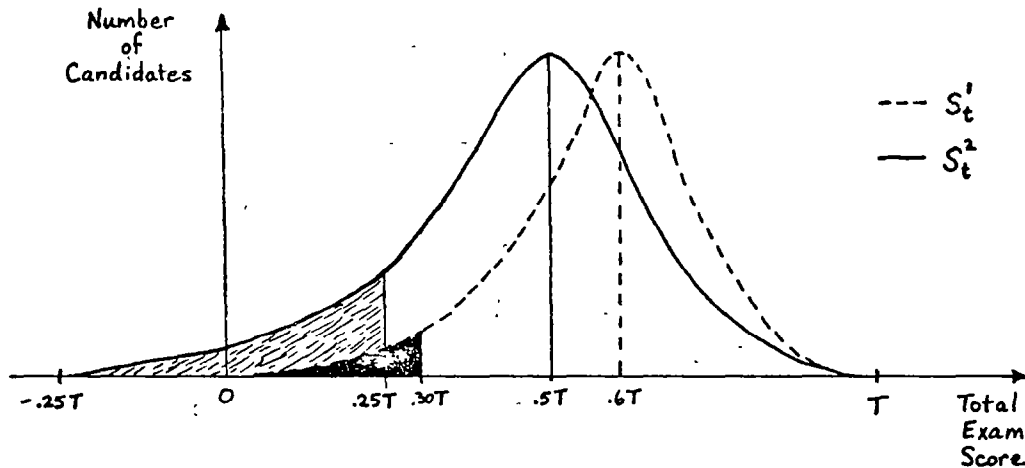
Method 1 increases the scores without changing the ranking of candidates.

Furthermore, the difference in scores for the same candidate, using each of the two methods, increases as the scores get lower because  $S_t^1 - S_t^2 = .2(T - S_t^2)$ .

Although under each of these methods the same candidates pass or fail, the scope of the decile grades (0 to 10) will differ slightly. This is because the range of scores is altered. The range for  $S_t^1$  is from zero to  $T$ , while the corresponding range for  $S_t^2$  is from  $-.25T$  to  $T$ , which is a wider range of scores than under Method 1. It also follows that the median and mean scores will be lower under Method 2.

The graph below shows an example of how the distributions of scores by the two methods range from the minimum up to the maximum.

### DISTRIBUTION OF EXAM SCORES



For the example, suppose the Method 2 pass mark is set at  $.5T$  (the hypothetical median in the table above). Under Method 1, the corresponding pass mark will be  $.6T$ . The solid line shows the distribution of scores under Method 2, and the dotted line the corresponding distribution of scores under Method 1. The shaded areas show that the proportion of candidates classified as ineffective (those receiving a grade of zero) is significantly smaller under Method 1 than under Method 2. Continuing this line of logic, the graph also illustrates how the change in scoring methods also changes the scope of grades other than zero.

To summarize, the critical result — whether the candidate passes or fails — has not changed. But under Method 1, fewer candidates receive the high and low grades (e.g., zero and 10), while more candidates receive median grades (e.g., 5 and 6). □