



The Actuary

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FELLOWS' VIEWS ON SOCIAL SECURITY ASSUMPTIONS

From Benjamin I. Gottlieb in Washington we have his summary of responses to a questionnaire that had been sent to a random sample of 500 Society Fellows with U.S. addresses in our 1981 Year Book. This was a topic by Stephen G. Kellison in the July 1982 Academy Newsletter; we believe actuaries interested in either Social Security or actuaries' economic and demographic prognostications would do well to get a copy from Mr. Gottlieb at his Yearbook address.

Three features of the summary specially struck us:

(1) The gratifyingly high response—500 enquiries, 449 heard from. Our own cynical estimates of our colleagues' inability to handle their mail may warrant revision.

(2) The large proportion of our Fellows who have thought about the subject sufficiently to express their opinions. Only 11% rated themselves not qualified. 25% considered themselves "very well" or "well" qualified; the other 64% placed themselves in "moderately" or "somewhat" qualified classes.

(3) The long-term economic and demographic assumptions that actuaries in 1981 picked as their preferences, e.g.:

Inflation: 4%-7% range, mostly reached after 6 years—81% of replies.

Fertility: 1.7%-2.1% range—88% of replies.

E.J.M.

E. & E. QUIZ

(Answer to Quiz on page 6)

Question: In Spring and Fall 1970, 1,185 students put Part I behind them (180 by the Graduate Record Exam route). How many of these were F.S.A.s no later than 1981 (Spring exams)?

THE U.S. MILITARY RETIREMENT SYSTEM

by Toni S. Husted

Chief Actuary, Department of Defense

The military retirement system is an unfunded non-contributory defined-benefit plan. The Service Secretaries currently approve voluntary non-disability immediate retirement annuities upon credit of at least 20 years of service at any age. There is no vesting before retirement, so only 12% of new entrants ever become eligible for benefits. Retirement annuities are indexed annually to the Consumer Price Index.

On September 30, 1981, there were in the system 2.1 million active duty regular and reserve personnel, 0.9 million selected drill reservists, 1.1 million retired non-disability annuitants, 0.2 million disability annuitants and 73,000 survivor benefit families. Fiscal year (FY) 1981 benefits totalled \$13.7 billion. The most common age at retirement was 43 for officers, 39 for enlistees. Apart from reserve retirees, the average gross monthly annuity in September 1981 for non-disabled officers was \$1,751; non-disabled enlistees averaged \$761 a month.

Valuation, September 30, 1981

Valuation results show an aggregate entry-age normal cost of 47.0% of basic pay. The corresponding figure a year earlier was 46.2%, but this increase arises from a mixture of a regular increase, changes in actuarial assumptions, and tightening of the system, as set forth in the next paragraph.

The pay-as-you-go unfunded liability totalled \$590.4 billion, a \$67.1 billion increase over the previous year. Of this increase, \$15.4 billion arose from changes in our actuarial assumptions; plan deliberalizations reduced the lia-

(Continued on page 7)

"PERSONAL LIFE ASSURANCE—WHAT THE PAST TELLS US"

by Gary Chamberlin,
London Correspondent

Eric Short, F.I.A., actuary and journalist with the London Financial Times, presented his paper under this title to the Students Society of the Institute earlier this year. His conclusion was bleak; he quoted from Hagel:

"What experience and history teach us is this—that people and governments never have learned anything from history or acted on principles deduced from it."

But surely actuaries must be the exception. —else why would more than 100 of us with our guests have turned out to discuss Mr. Short's finding with him? This was his account:

Backing A Horse

For a start, observe the conventional "participating" policies. Suppose that 10 years ago you, a man aged 30, had started paying a £10 monthly premium for a 10-year endowment. What would your proceeds be in 1981? Answer, if you picked the very best company from the field, £1,999. But the average was £1,742, and at worst you would have received little more than £1,500. Conclusion, it *does* matter which horse you choose in the Life Assurance Stakes. And, the longer the race, the more important the choice. At 25 years (same age and premium) endowments yielded in 1981 anything between £5,000 and £10,000. The mean was £7,524, and the standard deviation £1,125.

The paradox, says Mr. Short, is that people who buy policies don't pay enough attention to past results; they look at the brokers' projections which depend on pure assumption as to future bonuses (dividends). If you rank the

(Continued on page 8)

LETTERS

Salary Patterns

Sir:

On George L. Hogeman's letter (February issue), may I venture a comment or two, belated because we in Australia receive *The Actuary* later than most.

Except in special cases, career growth in salary is not exponential; it is the opposite. Following cohorts of entrants—or studying an organization's structure and pay scales—shows that it is more reasonable to assume that career or promotional increments will occur at higher rates at the younger than at the higher ages.

The exponentiality of the customary constant-rate salary increase assumption produces high contribution rates in final salary pension plans; if, however, one combines the suggested anti-exponential career growth assumption with the usual exponential inflation growth assumption, the resultant tends towards a straight line. The consequence, in aggregate funding, is a contribution rate that is a lower percentage of salaries. Identical plans for career and non-career (what you call hourly paid) staff might even require lower contribution rates for the former than for the latter.

For career staff, the "1-2% excess of interest over the salary assumption" ought, I think, to disappear—perhaps ought never to have been used. I doubt that there is a "more realistic excess" to replace it; it might better be replaced, for all staff, by an "x% (positive or negative) excess of interest over the salary inflation assumption."

Even in easier eras when it seemed that tomorrow would be a simple extension of today, salary scale investigations and assumptions were notoriously difficult. How much more so now when corporations, large and small, are going through great structural changes and can see even greater ones ahead. One wonders if the funding methods currently used for private pensions (and the whole idea of the long-term look ahead), originally designed around the idea of institutionalized career employment, are appropriate to the now emerging structure of employment and unemployment.

William D. Owen, F.I.A., A.S.A.

Ed. Note: We welcome these thoughts from an overseas member.

Riding Forth

Sir:

I have followed an injunction by Daphne D. Bartlett that we shoot down misrepresentations before they can develop momentum. I wrote to *Savvy* magazine, whose reviewer said of a financial planning book, "The style is as sober and dry as an actuary's kiss."

Warren A. Wild

Ed Note: Mr. Wild repudiated the calumny by putting two questions to Savvy's editor in chief:

- "1. How does your reviewer know that actuaries have dry kisses? Has she set up a kissing booth at a Society of Actuaries convention? Has she compared actuaries with other groups—politicians and truck drivers, for example? And has this been done with the rigor that Colgate counts cavities and American Tourister bounces luggage?"
- "2. And even if it does turn out that actuaries have dry kisses, is that bad? . . . Maybe dry is better in kisses as in gin."

* * * *

Mind vs. Muscle

Sir:

While actuaries were overrunning the Northeast (Michael J. Cowell, March issue), Los Angeles actuaries were unscrambling the names of California towns in the Los Angeles Times' Tangle Towns contest. There were at least four actuaries among this year's 500 winners, 144 times the expected.

The two activities might support a hypothesis that actuaries tend to study geography, using either experiential or Socratic methods. Or that while actuaries of the Northeast are hustling to get ahead, Southern California actuaries are trying to figure out, "like, where their heads are at, man."

Stephen R. Gold

* * * *

Actuarial Error

Sir:

There is a puzzling error in the Society's tables of 1958 CSO 4% Basic Values for curtate functions, published in 1961.

The theoretical value of a one year endowment of unit face amount is of course $1/(1+i)$, which at 4% is .96153846. But the published values fluctuate around this figure and at the

highest ages deviate substantially from it.

This strikes one as clumsy craftsmanship unworthy of our profession. It did not occur in the 1941 CSO publications; steps should be taken in the 1980 CSO specifications to prevent its recurrence.

Kenneth M. Heck

Ed. Note: Society headquarters is unaware of this mistake having been pointed out during the past 21 years.

* * * *

The Late Marcus Gunn

Sir:

I believe that many actuaries, perhaps specially on the West Coast, have reason to say Amen to the appreciation of Marcus Gunn (June issue).

One example of Mr. Gunn's numerous exceptional contributions to our literature was his paper, "Unemployment Insurance," R.A.I.A. 12(1923), showing his progressive views on a form of coverage then in its youth.

Wilbur M. Bolton

* * * *

New Fellow's Ages

Sir:

Why were there no entries for 1937-1980 in your "Ages of Our New Fellows" (June issue)? Were no Fellows elected during those years, or were they all at the median?

G. B. Saksena

Ed. Note: We have since found, in T.A.S.A. 50 (1949), 64, a table that gives average ages at exam completion from 1920 to 1948, as well as the average numbers of years required to complete the examinations; this shows that World War II absences pushed the average age up by as much as five years. Also, from James L. Cowen in Chicago, comes word that the mean and median for new Fellows from the May 1982 examinations are close to those we showed for 1981, i.e., mean, 31; median, 29; highest, 50; lowest, 23.

* * * *

Ballot On Constitutional Amendment, Art. III

Sir:

Secretary Kenneth T. Clark's listing of pros and cons was excellent. So often, Fellows have been given the pros without the cons; this time we can feel we are making an intelligent decision and are not totally left out of decision-making.

(Continued on page 4)

Letters

(Continued from page 3)

But—why should the Board approve Associateship applications at all? Surely the Committee on Admissions can be trusted to perform that task.

Robert H. Dobson

* * * *

Sir:

I am disappointed that the Board of Governors didn't provide for a period of open discussion before sending out the July 2nd ballot. Had our views been solicited, I for one would have raised the following points:

(1) If the requirement, trivial for most of us, to obtain two nominators is abandoned, how will our Board learn of an applicant who ought not to be admitted because of lack of moral character, for example? The recommendation simply admits anyone who can pass our exams.

(2) The recommendation to soften the Board vote, though less objectionable, decreases yet further the possibility that any candidate will ever be rejected.

(3) The proposed move seems to put a stumbling block in front of opening up alternative routes to becoming a Society member.

If, indeed, the Society prefers to police its membership solely by threat of expulsion, shouldn't we simply specify the admission requirement as successful completion of the exams, an application form and a check for the fee?

Claude Thau

SECOND KING JUAN CARLOS PRIZE

Coincidentally with giving pictures of the award ceremony for the first King Juan Carlos Prize (described in our Feb. 1981 issue), the organizers have announced their next international contest, the new subject being PENSION FUNDS.

The prize, again five million pesetas and an acceptance trip to Madrid, is open to authors engaged in insurance or economics, for a study or work submitted through their sponsoring organization before March 31, 1983. Brochure can be had from King Juan Carlos Prize Secretariat, Alcalá 39, Edificio Metropolis, Madrid 14, Spain. □

FOR YOUR READING

Laurence E. Coward, F.I.A., A.S.A., *Mercer Handbook of Canadian Pension & Welfare Plans*, 7th ed., pp. 342. Available from CCH Canadian Ltd., 6 Garamond Ct., Don Mills, Ont. M3C 1Z5. \$Can. 25.00.

First published in 1956, has become a popular outline of Canadian pension and insurance plans. Covers legislative changes to Jan. 1981. Parts of this text are on Society's Part 7 syllabus.

Carlton Harker, F.S.A., *Self-Funding of Welfare Benefits*, 1981, pp. 169.

Reviews tools and knowledge needed to design, install and administer self-funded welfare benefits, particularly those of private employers. Reflects regulatory and judicial status in January 1981.

Carlton Harker, F.S.A., *Pension Plan Partial Terminations*, 1982, pp. 92.

Guidance for dealing with partial terminations arising from plant shutdown, benefit reductions, or removal of participant groups. Appendix examines 11 issues on which author finds disagreement or uncertainty among practitioners.

Both Mr. Harker's books are available for \$15.00 each, from Intern'l Foundation of Employee Benefit Plans, 18700 W. Bluemound Rd., Box 69, Brookfield, WI 53005.

Lance A. Leventhal & Irwin Stafford, *Why Do You Need A Personal Computer?*, 1981, pp. 278, paperback. \$7.00. John Wiley & Sons, Inc.

Elementary, of interest to the inexperienced who are curious about microcomputers. Order from Society of Actuaries (which is selling a few copies left over from a seminar), Box 91901, Chicago, IL 60693.

Joseph L. Pfeister, C.P.A. & Leonard A. Pacer, C.P.A., F.L.M.I., C.L.U., *Executive Guide to Federal Income Tax Planning For Life Insurance Companies*, pp. 303.

Explores the 1959 Act and developments to 1981. Here's a bargain—before events make this text obsolete, supply is offered gratis to our readers. Request one copy from Sharon Miller, Touche Ross & Co., 2000 1st National Center, Omaha, NE 68102, or (402) 346-7788.

Population Bulletin, *U.S. Population: Where We Are; Where We're Going*, pp. 51, \$3.00. 1982. Population Reference Bureau, 1337 Connecticut Ave., N.W., Washington, DC 20036.

Fourteen articles by Bureau staff and guests, numerous charts and tables. Reviews trends in dynamics of U.S. population, outlook in the 1980s, prospects for long-term growth.

ARCH 1982.1, *Computers, State of the Art, Implications For The Actuarial Profession*, pp. xix, 440.

Papers, 23 of them, and discussion from 16th annual Actuarial Research Conference, Winnipeg, 1981. Yearly ARCH subscription (2 issues) \$25.00. Send request with check to Society office, Chicago.

Bernard Benjamin, F.I.A., *The Span of Life*.

This is a paper by our eminent friend and recent Society speaker, submitted to Institute of Actuaries last March. FIASCO, July issue, reports that it produced a lively and wide-ranging discussion. Why not, indeed? Borrow a copy from any nearby Institute member or, failing all else, from this Editor. □

SPRING EXAM STATISTICS

Because of natural current interest in our Society's growth pattern, sharpened by Linden N. Cole's article in our June issue, we plan to print a few key comparisons after the spring and fall exam results have been announced.

SPRING EXAMS 1980-82

Part 1

	Passed	Grad. Rec. Exam Credit	New Associates	New Fellows
May 1980	664	40	393	186
May 1981	641	32	212	87
May 1982	667	43	225	146

SOME VITAL STATISTICS

Figures in Table I and Table II are for the U.S.A. If a Canadian reader will do us the favor of supplying corresponding data for Canada, we will gladly print them.

Table I. Births, Deaths, Marriages and Divorces
Per 1,000 Population

<u>Year</u>	<u>Births</u>	<u>Deaths</u>	<u>Marriages</u>	<u>Divorces</u>
1972	15.6	9.4	11.0	4.1
1975	14.8	8.9	10.1	4.9
1978	15.3	8.8	10.5	5.2
1981	15.9	8.7	10.6	5.3

—from Population Reference Bureau

Table II. Motor-Vehicle Deaths

	<u>Number of Deaths</u>	<u>Death Rates</u>		
		<u>Per 100,000 Population</u>	<u>Per 100 Million Vehicle Miles</u>	<u>Per 10,000 Motor Vehicles</u>
1972	56,278	27.0	4.43	4.60
1977	49,510	22.9	3.35	3.33
1978	52,411	24.0	3.39	3.41
1979*	52,800	24.0	3.45	3.31
1980*	52,600	23.2	3.48	3.19

* Estimated

Figures for Table II were given us by Frederic Seltzer, whose corresponding article in our April 1979 issue gives those for the missing years 1973-76. He considers that the figures speak for themselves, but we will just mention that the 55 m.p.h. Federal speed limit came into effect in 1974. □

ECHOES OF A 1949 DEBATE

In *The Canadian Journal of Life Insurance*, March 1982 issue, George R. Dinney, reflecting on his actuarial student days, wrote:

"Happily, (my boss) was Darrell Laird, a man of considerable genius, imagination and personal warmth who encouraged reasoned skepticism . . . One of his intriguing theses was that life insurance could be regarded as a commodity and that the industry would benefit from studying the explicit parallels in the product design and the merchandising of ideas and commodities. This idea was unsettling to many conventional insurance people of the 1950s and is just as unsettling to their counterparts today."

Mr. Laird's paper in *T.A.S.A.* 50 (1949), "The Revenue of the Period of Account and Its Relation To Premiums,

Valuation and Dividends," which emerged after lengthy interchange between its author and the then Committee on Papers, set forth some of the views that Mr. Dinney recalls, and is indeed worth pondering today. Reading it now, one needs to remember that it was written long before actuaries in the U.S.A. entered the maze of CAAP statements, before premiums were graded by policy size, and before life actuaries began paying more than passing attention to risk theory.

To summarize, Mr. Laird saw three problems: first, finding a comprehensive way to measure a life company's real performance; second, displaying sales and administrative expenses revealingly to management; third, distributing surplus equitably among holders of individual policies. The paper's major theme was the well-known problem of "low earnings when business is good, high earnings when business is poor," a difficulty which the author aimed to solve partly by full recourse to a form of gross

premium valuation, partly by a new way of displaying company operating results, at least to management if perforce not to regulatory authorities.

Five actuaries—some of whom may be prompted to comment after a third of a century has gone by—discussed Mr. Laird's paper. His views may be said to have garnered no immediate champions; certainly the *lèse majesté* that the author had committed by saying that the venerable creators of the contribution method of surplus distribution may have offered it because the elements of a better system were lacking, evoked expressions of intense loyalty to that method.

After rereading those thoughts of so long ago, we asked Mr. Laird, now in retirement, for his appraisal today. He responded thus:

"I have reread the paper and the discussions, and am pleased to find that I am quite unrepentant.

"Underlying the suggestions I then made about the purpose and arrangement of the Income Statement, the need when calculating premiums to recognize the importance of expected volume of sales . . . and the importance of asking what equity between policyholders can mean, there are two ideas.

"The first is that the actuary's approach to his responsibilities must be firmly and consistently forward-looking, or, in actuarial language, prospective. . . . We can't help being prospective in fact. We should be prospective in thought.

"The second underlying idea follows from this. We don't know the future, but when we plan, we apply opinions about the future. Income statements as well as premiums are matters of subjective opinion rather than of objective fact.

"A book could be written about the implications of these ideas and, in fact, I am writing one. It is, however, difficult to move from the first glimmer of an idea to a clear concept of it. I found that when I wrote my paper; I am finding it now, and so I may never finish the book."

We believe that, whether or not Darrell Laird ever becomes content with the clarity of his concept, our profession will be the loser unless he reveals the outcome of his cogitations.

E.J.M.

DELAYED RETIREMENT CREDITS

by James L. Cowen,
Director of Research

In many pension plans and social insurance programs, monthly pensions are increased if retirement is delayed beyond the normal retirement age. The questions that arise are, first, Should there be a delayed retirement credit?, a query that perhaps has different answers for social insurance than for private pensions; second, How should such a delayed retirement credit be calculated?

Should There Be . . . ?

If social insurance is regarded as a casualty type in which benefits are paid only if the risk insured against (in this case loss of earned income because of death, disability or retirement) occurs, then a delayed retirement credit is not warranted. A social insurance benefit is defined, not in terms of a lump sum equivalent but of a monthly income; the replacement needs met by this income do not depend on when retirement occurs. For OASDI in the United States, the replacement ratio theory has become so dominant in setting benefit levels that continuing the present delayed retirement credit seems illogical.

Turning to private plans, one must ask whether these are savings programs or insurance programs. If pensions are deferred compensation, surely they are savings programs, but if so why doesn't a terminating non-vested employee receive something?

Therefore, it seems that a corporate pension plan should be looked upon as an insurance arrangement for replacing part of an employee's salary when he retires. From this it follows that deferred vested benefits are equivalent to paid up policies—which again argues against delayed retirement credits other than those that arise from additional compensated service.

The argument for delayed retirement credits is that employees should not lose the money they would have received had they retired at the normal age, and that they ought to be compensated for the risk they took by delaying retirement. But, if they continued to work, the usual reason for delaying retirement, have they really taken any financial risk since their earnings would almost always be larger than the foregone pension? By giving a delayed retirement credit, isn't the em-

ployee being paid twice for the same period, especially in a non-contributory plan? Also, if the employee is to be assured of not losing money, why not pay benefits from normal retirement age whether or not retirement occurred?

If Yes, How Much?

Despite the above arguments, many pension plans do provide for delayed retirement credits. The plans typically say that the benefits will be actuarially equivalent to the normal retirement benefit beginning at the normal retirement age. Usually the percentage increase (I) in the benefit is calculated (in standard life contingencies notation) as:

$$I = \frac{N}{N_x} r \quad (1)$$

where r and x are the normal and actual retirement ages.

By this approach, reversions, from those who die while still in service after the normal retirement age, accrue to increase the benefits to those who reach delayed retirement. Thus, measured at the point of delayed retirement, although the total amount paid to the group as a whole is unchanged, the individual survivors receive greater value than if they had begun to receive benefits at normal retirement. This, be it noted, ignores the ERISA requirement that those who have died must be assumed to have elected a joint and survivor form of payment.

Should the reversions go to these survivors, or should they be used for the benefit of the plan as a whole? To leave individual surviving employees in the same position they would have been if they had begun to receive benefits at normal retirement age, the following formula might be used:

$$I = \frac{S_{\overline{x}|r}}{ax} \quad (2)$$

In formula (2), benefits that would have been paid between the normal and actual retirement ages are accumulated at interest to the actual retirement age, and the resulting amount is then spread over the rest of the employees' lives. Reversions remain in the pension fund, and the ERISA requirement is not as great a problem since the joint and survivor reduction can be computed at the normal retirement age.

It must be determined whether the

procedure of formula (2) can be interpreted as being actuarially equivalent within the meaning of the pension instrument. If the words "actuarially equivalent" imply use of probabilities, it can be so interpreted since there is no uncertainty as to the retiree's surviving from normal to delayed retirement age. But to avoid problems, plan designers should put special wording into the plan document to conform to what formula (2) says. \square

Notice To Users Of The Actuarial Aptitude Test

This test was developed for use by those who have not passed Part I; as demonstrated in the Test Manual, its scores correlate with performance on the Scholastic Aptitude Test and the Part I exam. It is essential that a person not take the test more than once, nor have any advance indication what the questions will be.

An employment agency has recently been found to have been administering the test itself to people it was planning to recommend as actuarial students to life companies and consulting firms. In one instance at least, that agency allowed a student who had scored poorly to take the booklet home and work on the questions again. Prospective employers were finding that candidates from that agency were scoring well on the test, even when their S.A.T. scores were not favorable.

WE REMIND EMPLOYERS THAT THE ACTUARIAL APTITUDE TEST HAS NOT BEEN VALIDATED FOR EMPLOYMENT DISCRIMINATION PURPOSES, AND SHOULD NOT BE USED IN MAKING EMPLOYMENT DECISIONS SUCH AS HIRING, PROMOTION, OR CHANGES OF POSITION.

Linden N. Cole
Director of Education

E. & E. Quiz

(Answer to Quiz on page 1)

F.S.A.s numbered 244 (21%). Those given G.R.E. credit didn't do quite as well as those who passed Part I. Another 148 (12%) were Associates.

L.N.C.

Military Retirement

(Continued from page 1)

bility by \$6.3 billion; the balance, \$58.0 billion resulted mainly from increased benefits and population growth. The aggregate entry-age normal unfunded liability was \$476.9 billion.

Population Levelling Off

A one hundred year open-group projection shows that the system is approaching a stationary population. Assuming a level active duty and selected reserve force, the total number of retirees will level out at 1.7 million around the year 2000. Dividing retired appropriation outlays by basic pay outlays gives a ratio of 0.58 in FY81, a ratio that is projected to peak at 0.64 in 2000 and to level out at 0.56 in about 2035.

A Legislative Plan In The Works

Department of Defense is sponsoring a legislative proposal that would place the retirement system on an entry-age-normal funding method. The normal cost payment, as well as a payment on the unfunded liability, would be placed into a fund each year; an outside Board of Actuaries, similar to that used with the Civil Service Retirement System, would set assumptions and select the method for amortizing the liabilities.

Admittedly, this proposed fund arrangement is deprived of some of its point because such a fund would be a part of the Federal government's Unified Budget; hence, payments into it are treated as intergovernmental transfers having no impact on the Federal surplus or deficit. Since taxes, at least in theory, are set relative to a certain desired level of surplus or deficit, current taxes would not be affected by additional payments from general revenues into the military retirement system fund; the added cost of any year's funding would be both a general revenue expenditure and a retirement fund income, these two transactions simply cancelling each other. The total privately-held debt would not change, though the total debt would increase, perhaps requiring the government's borrowing authority to be raised.

Even though reallocation of costs between generations of taxpayers is thus thwarted, funding still would have some advantages. Costs or savings, e.g., from long-range changes to the system would be immediately reflected in the DoD

budget; the pension plan's true cost would be paid during the employees' working lifetime if the fund is kept outside the defense budget. □

THIS MONTH'S QUERY FOR ACTUARIES

Readers are invited to send us analyses of the following exchange of opinions between two United Kingdom actuaries, taken from our opposite number, FIASCO, issues of January and May 1982:

By David E. Purchase, F.I.A.: "We all understand the statement that the probability of ruin for a young man's family is 1 in 1000. Most if not all would agree that he should insure against this risk. . . . We all know why the risk is insurable even if we do not say so explicitly—because there are a large number of broadly similar risks and the law of averages can be relied on.

"At the other extreme we are asked to attach some meaning to ruin probabilities for insurance companies. . . . (This approach) is now being applied to Long-Term business in the context of maturity guarantees (for equity-linked insurance) (where) we have a small number of companies 'at risk' . . . (whose) results all depend on the same economy or small group of related economies. There seems to me to be no useful way in which ruin probabilities can be used in these circumstances . . ."

By Anthony B. Pepper, F.I.A.: "We cannot, with certainty, predict the future fortunes of any company. However we can decide that if a company fails to meet suitable criteria then the chance of failure is unacceptably high. . . . I see nothing wrong with the concept of setting a suitable critical probability level, such that any company whose chance of failure is above this level, should be considered unsound. . . ."

"The profession has realized that maturity guarantees could be exceedingly expensive if the stock market were to fall to very low levels when policies mature. For this reason every effort has been made to assess the danger of this hazard and to insist that suitable reserves are held."

We apologize to these two gentlemen for failing to quote their views in toto. Please send comments to the Editor at his masthead address, for summarization with attribution.

E.J.M. □

Actuaries At Work

(Continued from page 2)

Our insurance industry, together with consulting firms and supervisory authorities, now employs more than 1,000 actuaries; it is estimated that 300 more will be needed to meet demands of the next five years.

New Developments

Until recently there was no institutional training nor any examination system for actuaries comparable to those in North America and Great Britain. We usually recruited mathematicians with university degrees who then developed gradually into actuaries. The German Association of Actuaries has now introduced a special actuarial examination to qualify for membership; this will make it easier for young actuaries to enter our Association and may considerably change its age-distribution. The Association has greatly increased its efforts to encourage young actuaries; for example, by seminars and broadening of our literature.

In actuarial circles here discussions about bonus (policy dividend) distribution have assumed an important role. As all policies must be participating and premium levels are high, this is where competition has become increasingly concentrated. Actuaries face the task of designing distribution systems that are not only technically sound but also competitively attractive. Somewhat less attention has been given, of late, to other problems, even to that of inflation to which a fairly satisfactory solution was found quite some time ago, at least for moderate inflation rates, by a combination of profit sharing and premium adjustment.

Another problem of importance and interest to many German actuaries is the current reorganization and financing of our Social Security system. Its financing problems have arisen largely because benefits are provided primarily on an assessment basis; difficulties increase as the relationship between the working population and the retired population shifts more and more in favour of the latter as a result of population aging and a falling birth rate. □

EUROPEAN 1972 PROPOSAL ON ACTUARIAL NOTATION

by Frank G. Reynolds

(This is Article No. 3 in a series.)

The proposal by Adam, Boehm and thirteen other European actuaries to the 19th International Congress simplified theirs of four years earlier, made it more systematic and overcame ambiguities. Again, upper and lower case symbols and the Greek alphabet were used, making the system still not directly useable by computer.

The base symbol followed by five blocks was retained, but the blocks redefined thus:

- Block (i): Age and order of succession of events.
- Block (ii): Time elements.
- Block (iii): Periodicity of events.
- Block (iv): Interest rate.
- Block (v): Mortality or other table.

As examples:

Current

Proposed

$$\ddot{a}_{x:\overline{n}|}^{(4)}$$

$$a t (x, x:n, 4)$$

$$\ddot{a}_{xy}$$

$$a t (x) + a t (y) - a t (x:y)$$

$$\bar{A}_x$$

$$A c (x)$$

$$t V_x$$

$$V(A(x), P(A(x); \ddot{a}(x)); t)$$

A few common symbols were given special short forms. Translation to computer-useable form was to be made by using capital P in conjunction with upper case letters for normally lower case forms, e.g., a became AP. Punctuation marks were also translated.

This proposal was well thought through but problems of clumsiness persisted.

"The Actuarial Profession"— New and Improved

A revised version of the Society's recruiting booklet, "The Actuarial Profession", is now available. The language has been simplified; the booklet is now suitable for high school as well as college students.

The new booklet encourages prospective actuaries to develop a wider range of interests than just math, as it stresses that actuaries are business executives, not technicians. Casualty insurance is integrated into the new booklet, and a table of broadly estimated salary ranges is included. Another addition is an order form for examination and other career information.

For copies of the new booklet, ask Linda Delgadillo at the Society office, Chicago.

D.A.P.

ADIRONDACK ACTUARIES CLUB

We welcome the newly formed Adirondack Actuaries Club, whose territory includes all of upstate New York and adjacent western New England. Membership totals more than 100, over 60% of whom attended its initial meeting in Albany on June 4th.

Readers interested in joining, write or phone Burl V. Bachman at his Yearbook location.

BOOKS NEEDED

The Actuarial Science Program, University of Nebraska-Lincoln, seeks to acquire copies of Proceedings of International Congresses. Need volumes for First (1895) and any of Tenth and subsequent (1934-80) Congresses. Donations are tax-deductible. Write or phone Prof. Walter B. Lowrie at his Yearbook location.

Personal Life Assurance

(Continued from page 1)

companies by their projections of 10 years ago, the coefficient of rank correlation with emerging results is a ludicrous 20%. Yet, companies that perform well tend to do so consistently.

With-Profits vs. Unit-Linked

Moving on to look at our important unit-linked (variable life) market, Mr. Short finds the comparison instructive. Mean proceeds at £1,778 are slightly higher than the with-profits figure of £1,742; but against this, the standard deviation for the former is £282 compared with £106 for the latter. A slightly higher mean return, but a greatly increased risk—so the investor's choice between them would have to depend on his own utility curve; is he a steady man, or a punter with an eye for a sporting chance? It's noteworthy that in this particular comparison the traditional policies came out surprisingly well against their brash younger cousins.

Mr. Short gives further figures for equity-linked as opposed to property-linked funds, and takes into account the difference between single premium and monthly premium policies. His statement that the timing of surrender of a unit-linked policy is crucial will be appreciated by all familiar with volatility of prices on the stock markets, whether on Wall Street or Throgmorton. The paper confirms what commonsense would have suggested, but teaches the lesson that when choosing or recommending a life policy you need to do your homework and to disregard those enticing projections.

It would be interesting to know whether these points apply as much in America as they do in the U.K. Readers may get Mr. Short's paper from any Institute member or from G. Chamberlin, Clay & Partners, 70 Brook Street, London W1Y 2HN.

BOOKS AVAILABLE

Another retired actuary is contributing a set of the *TRANSACTIONS*, complete back to Vol. I (1949), to somebody willing to pay shipping cost. Apply to: Daniel W. Pettengill, 1028 Farmington Ave., Apt. 3A, West Hartford, CT 06107.