



The Actuary

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THE SOCIETY'S TREASURER

By Michael B. McGuinness,
Treasurer

To most members of the Society of Actuaries, the Treasurer is the individual who stands up each year at the annual meeting and announces that the dues for next year have to be increased. He, or she, is usually able to wear a black tie while doing so, to signify that income exceeded expenses during the previous 12 months; but then may add that fees for meetings and examinations will have to rise.

The financial statement presented by the Treasurer at the annual meeting reports on the operations for the fiscal year ending on the previous July 31, a date chosen to allow sufficient time to complete the necessary work and for the external auditors to complete their review. The statement shows highlights of the balance sheet and income and expenses by major category, with the current year compared both to the budget and the previous year's results. It is a summary of the detailed 16-page statement presented to the Board of Governors at its meeting the previous day. The Board is justified in expecting few surprises during its examination, because either it or the Executive Committee has had a chance to comment on interim statements on five different occasions earlier in the year.

Closely linked with the measurement of the financial results for the current year is the preparation of the budget for the following year. The budget presented to the members (about \$4.6 million for the current fiscal year) has been refined twice by the Board and once by the Executive Committee and, like the financial statement, shows each item of income and expense by major

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PHILADELPHIA: CRADLE OF OUR PROFESSION IN NORTH AMERICA

By E.J. Moorhead

Ed. Note: This is extracted from the author's address to the Actuaries Club of Philadelphia in April 1985.

In 1913, Emory McClintock, who at age 73 was certainly one of the three most eminent actuaries on this continent, contributed a paper in several installments to the *Transactions* of the Actuarial Society of America with the uncompromising title, "Charles Gill: The First Actuary in America". McClintock was the recently retired actuary of the Mutual Life of New York; Gill had had a brilliant six-year career as actuary of that same company, cut short by his death in 1855.

Perhaps it was in deference to Mr. McClintock's seniority that no Philadelphia actuary contributed a discussion contesting that author's assertion that Gill was chronologically first on this continent. It's at least equally peculiar that a leading Fellow of that day, Miles Menander Dawson, said nothing on the subject; 13 years earlier Dawson had published an article, first refuting a claim to that designation made for himself by Nicholas De Groot and then conferring it, at least implicitly, upon Elizur Wright.

It seems clear to me that the person who deserves the title that McClintock conferred upon Charles Gill is one of two Philadelphians — either Rober Patterson or Jacob Shoemaker. Here are thumbnail biographies of these two, from which claims on behalf of each of them may be judged.

ROBERT PATTERSON (1743-1824) was born in Ireland, crossed to America in 1768, and immediately began

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A STATIONARY POPULATION PROBLEM IN THE BIBLE

By Solomon Goldfinger

In light of your recent editorial on Moslem insurance, the following "Stationary Population Problem" in the Bible may be of interest.

The problem involves two censuses of male Israelites between the ages of 20 and 59, taken over a period of six months. One is described in Exodus 30:12 and 38:26, and the other in Numbers 1:2. The first census occurred eight months after the Exodus and the second 14 months after the Exodus. Since the two censuses occurred six months apart, one would expect the ages of the population to be different, so that there would be new entrants and "retirees," not to mention deaths, in the period. Nevertheless, the total count (reported in Exodus 38:26 and Numbers 1:46, respectively) for each census was exactly 603,550. What accounted for this Stationary Population?

Several approaches to this problem are offered in the Commentaries. One offered by the mathematician and philosopher Rabbi Levi ben Gershon (Ralbag - 1288-1344) is that the male Israelites between the ages of 20 and 59 did in truth happen to form a stationary population over this period. If so, the famous stationary population exercises in Chapter 8 of Jordan could be applied to the Israelites of this period.

However, the great commentator Rabbi Shlomo Yarchi (Rashi - 1040-1105) offers a different approach. According to Rashi, the solution lies in the method of determining age for the purpose of these censuses. In general, dates of events in the Bible are based on time elapsed since the Exodus. Thus, the first census occurred in the "eighth month of

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The Society's Treasurer

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category. These are divided into dues-supported activities (such as membership services, public information and the research department), fee-supported activities (examinations, spring meetings, seminars and the annual meeting), and indirect program activities (such as publications and subscriptions). Certain broad guidelines are followed in the budget — meetings should be self-supporting in total, examinations should be self-supporting (except for a subsidy of 10% of the cost of Parts 1 to 4 to encourage students to write them) and dues and examination fees should be increased in small increments. Recently, Section budgets have been added.

Clearly the work involved in accounting for and reporting on the Society's finances for the year and preparing its budgets requires far more than the efforts of one Officer. In fact, this year's preliminary budget described this work as "the result of the combined deliberations, to date, of all staff and appropriate committees having specific program responsibility". The Education and Examination Committee, for example, will spend over \$1.5 million. Four members of the Society's staff, led by Chuck Stanley, our patient but very thorough Director of Finance, work full time on our finances. Carol Perry, Director of Information Services Center, manages the computerization of the Society's financial systems.

The Treasurer serves also on the Administration and Finance Committee which is chaired by a Vice-President and is generally responsible for administering the Society office and for broad management of its financial affairs. In this capacity, the Committee examines the annual budget in detail before it is first presented to the Board. Subject to Board approval, the Committee also establishes a policy to be followed by the Treasurer in managing the Society's investments.

These investments include some \$600,000 held in U.S. Treasury Bonds with maturities spread evenly over the next six years and a fluctuating amount, which sometimes reaches \$2 million, held currently in short-term U.S. Treasury Notes. The Board has decided that this short-term amount is to be in-

EDITORS PRO-TEM

The Editor was on-duty during the late summer even though *The Actuary* takes a breather in July and August. His efforts were directed toward this September issue, and toward the October issue yet to come.

Associate Editor Deborah Poppel will be the Acting Editor for the November issue. Stuart Robertson will take on a similar role for December. These arrangements come about because CLT is taking on an actuarial assignment in Morocco, beginning shortly before this September issue reaches the membership. Astute readers may have realized that Associate Editor Julius Vogel took over the March 1985 issue under somewhat similar circumstances.

The address of the Editor is, and remains, P.O. Box 19253, Seattle, WA 98109. The contents of the P.O. box will be forwarded to Debbie during September, and to Stuart during October; but contributors who wish to reach these editors pro-tem can short-cut the P.O. box and use the appropriate addresses and telephone numbers shown in the Yearbook. Inquiries regarding subscriptions are not editorial matters, and should be made to the Society office. □

vested with the Harris Bank. Because money is received at irregular intervals during the year (as, for example, with examination fees) and paid out equally irregularly (as with paying for printing the examinations), an interesting balancing act has to be followed. We must have funds available as required, but at the same time maximize the return on members' assets. The Society staff manages this most successfully.

One other function assigned to the Treasurer is to chair the Committee on Admissions, whose other members, at present, are the four Vice-Presidents. This Committee, ably supported by the work of staff members Kathleen Lanigan and Carol Perry, reviews all applications to the Society for admission, waiver of dues, resignation and reinstatement, and recommends to the Board what action should be taken. Among the most difficult problems to be dealt with are those arising from requests for waiver of dues. □

Philadelphia: Cradle of

Our Profession in North America

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teaching school in Pennsylvania. In 1779 he joined the faculty of the University of Pennsylvania, where he was Professor of Mathematics 1782-1813, serving also as Vice-Provost 1810-13. He was admitted to the American Philosophical Society in 1783, and was its president 1819-24.

His actuarial qualifications stem from (1) his responsibility for the 1792 annuity premium scale of the Presbyterian Ministers Fund (which scale was given at least a nod of approval by that great Mutual Life actuary, Joseph B. Maclean, in early editions of his textbook studied by many of us in former days, *Life Insurance*), and (2) Patterson's 1818 textbook, *A Treatise of Practical Arithmetic*, which contained a basic discussion of the mathematical principles underlying annuities.

JACOB SHOEMAKER (1758-1822) had been a successful merchant and insurance agent (for British companies) when in 1809 he called together a group of prominent Philadelphia businessmen to form The Pennsylvania Company for Insurance on Lives and Granting Annuities. When, in 1812, the time came to elect an actuary for that company, he was chosen, becoming the first person in America to hold that title, until his death 10 years later. His was a full-time position which he held with distinction.

Shoemaker's *Actuary's Report* of 25 March 1813 to his Company's Board of Directors has survived and has been given me by Charles E. Rickards FSA. It shows that he had studied the writings of leading English actuaries, that he thoroughly understood the need for making mortality studies rather than blindly using British tables, and knew that annuity premiums must not be calculated from insurance mortality tables. A later *Report* (1819) proves also that he was alive to the need to meet price competition.

The Pennsylvania Company's official specifications of the actuary's duties clearly show that Shoemaker was expected to discharge responsibilities that apply to our profession today:

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Next Issue:
Some Magic Numbers

Stationary Population

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the first year" and the second in the "second month of the second year" (Numbers 1:1). Nevertheless, the age of an individual is based on the "Calendar Year" (the same definition of Calendar Year used in the current Hebrew calendar). Now the Exodus occurred in the seventh month of the Calendar Year. As a result, both censuses occurred in the same Calendar Year — the first census in the second month of the Calendar Year following the Calendar Year of the Exodus, and the second census in the eighth month of that Calendar Year (since the censuses occurred eight and fourteen months after the Exodus).

Furthermore, under Rashi's approach, age was not defined as either age nearest birthday or age last birthday (in which case the population would have changed), but rather by the formula:

$$\frac{(\text{Current Calendar Year}) - (\text{Calendar Year of Birth})}{12}$$

This formula may be recognized as the one typically used by actuaries for measuring policy year duration for such purposes as determining valuation rates, if "Issue Year" is substituted for "Calendar Year of Birth" in the formula.

Combining the Calendar Year basis with the "duration" definition of age, the result is that everyone was of exactly the same age at the time of the two censuses.

This explains why there were no new entrants or "retirees," but why were there no decrements due to death? The answer given is that this extraordinary mortality experience was a fulfillment of the Divine promise, "there would be no plague among Israel," stated in Exodus 30:12, if the first census was conducted properly. Not only was there no plague, there were no deaths at all for those six months!

It thus turns out that the population of the two censuses was *literally* a stationary one — exactly the same people were counted in each one, and they were all exactly the same age at each census. The question then arises, why was the second census required at all? Given the formula and definitions used and the known fact that no deaths had occurred, it was obvious beforehand that the second census would result in exactly

WINNERS

Last year the Society announced a contest in which entrants were asked to submit applications of the new text, *Actuarial Mathematics*. The winners are as follows:

The first prize, \$500, is awarded to H. Dennis Tolley and Megan P. Jones for their paper, "Variance in Policy Design". Both authors are at Brigham Young University.

The \$300 second prize goes to Warren R. Luckner of the University of Nebraska for his paper, "Analysis of Premiums".

The third prize, \$200, is awarded to Michael Schachet, The Wyatt Company, Memphis, for his entry, "Evaluating Optional Forms of Payment Available from a Defined Benefit Pension Plan".

In addition to the cash prizes, winners will receive plaques acknowledging their contributions. A workshop has been set aside at the Annual meeting in New Orleans for the presentation of the winning papers. □

the same count of 603,550!

The answer given to this problem involves some further actuarial insight, namely that, depending on the purpose of the census, different questions are asked and different sub-categories of information are obtained. The purpose of the first census was fund-raising for the Sanctuary. Each male between the ages of 20 through 59 contributed exactly one half-shekel of silver. The census was a byproduct of this fund-raising effort — since each male in the age range contributed exactly the same amount, by tallying the total amount of silver collected the population count could be derived. In fact, the population is reported in Exodus 38:26 in terms of the number of half-shekels of silver donated. Because the purpose was fund-raising, no demographic information was obtained from the first census other than the total population count.

The purpose of the second census, on the other hand, was to derive the actual count of the Israelites, not only in total, but by demographic breakdowns, i.e., by tribe and family. These breakdowns are all reported in detail in Numbers 1-4. Thus, it is true that the *total* was known from the first census. However, more detailed demographic data was required, thus necessitating the second census. □

Deaths

Henry G. Devitt	FSA 1948
Harrison Givens, Jr.	FSA 1957
Miguel A. Ramirez	ASA 1967
Thomas B. Sorensen	FSA 1968

InFact

The Actuary is pleased to tell its readers about a relatively new and too-little-known publication, *InFact*, an Abstract of Recently Published Insurance Articles. *InFact* is compiled by Herbert C. Pettersen.

InFact is a large collection of small abstracts of recent articles appearing in insurance publications, organized by date of appearance under subject matter. Among the 25 or so sources from which content is abstracted are most of the publications of the Society, Academy, and Conference. Other sources are ACLI, CLU, HOLU, and LOMA, as well as the insurance magazines. Mr. Pettersen hopes to keep *InFact* up-to-date. The most recent issue was published in February, and carries the abstracting through calendar 1984.

As an indication of the format, we reproduce here the *InFact* abstract of John Boermeester's article which appeared in this newsletter.

Topic: ACTUARY Reflections on "Actuarial
 Author: Boermeester Mathematics, Vol 1";
 Reference: The Actuary comments about new life
 Date: 84/09 Page:2 contingencies text with illustrations of possible applications suggested by formulas developed in the text. □

Actuarial Books Available

I am helping a distinguished actuary, now disabled, to dispose of his many books. These include TASA back to 1929, TSA and Report Numbers to their beginnings, JIA to 1906, TFA to 1924, HOLUA 1930-81, and some ICA volumes, 1957 and later. Readers wishing to acquire any of these for the cost of shipping may notify me at my Yearbook location. Specify the books.

E. J. Moorhead

I have a complete set of cloth bound copies of TSA, Volumes I through XXXV, available to any reader willing to pay shipping.

John S. McCoy

Waterloo Actuarial Seminars

Seminars covering all aspects of Parts 4, 5, 7, and 9 except EA2 will be held in Waterloo during the period October 20 to November 2. For details contact: F. G. Reynolds, University of Waterloo, Waterloo, Ontario N2L 3G1, (519) 888-4495.

Philadelphia

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"The Actuary shall receive all applications for insurance and annuities, and make all necessary inquiries respecting the same, under the instruction of the Board of Directors; calculate the respective premiums and prices of annuities, and report the same to the Board; and, if approved, prepare the policies and bonds which shall be signed by the President and at least one Director, and countersigned by the said Actuary ..."

My own conclusion from all this is that actuaries of today and tomorrow ought to esteem Robert Patterson for his work and his teaching in our field, and should recognize Jacob Shoemaker as the first to cope with the full range of an actuary's responsibilities for maintaining the stability of a life insurance company. But upon whichever of these two gentlemen you bestow the laurels, it remains true that Philadelphia is, as far as I've managed to ascertain, ahead of any rival claims by, say, Boston, New York or Hartford as the veritable cradle of our profession in North America.

There's a deplorable tendency for modern writers to suppose that being an actuary in those times was quite easy. Even the generally excellent *From Actuarial to Actuary*, upon which newcomers to our profession rely for the essence of our history, says on page 17, "... the actuarial problems were fairly simple until after about 1860". They weren't at all simple in the absence of underwriting standards, of mortality studies, of established nonforfeiture values, and particularly of clear guidelines to assess solvency. We must not judge our pioneers as if today's facts and tested procedures were in place in their times. □

ACTUARIAL RESEARCH CLEARING HOUSE

The Committee on Research has recently distributed the 1984.2 issue of ARCH. This issue adds eight papers to the 13 presented in the 1984.1 issue (see the May issue of *The Actuary*). The eight newer papers are:

Title	Author
Motor Premium Rating	Stewart Coutts
On King's Pivotal-Point Formulas	Hung-ping Tsao
Projection Valuation vs Aggregate Funding — A Simulation	Thomas O'Brien
A Risk Premium Calculation Principle Based on The Aggregate Deviations Of The Risk Reserve Process	Colin M. Ramsay
More On A Classic Inequality	Barnet N. Berin and James C. Hickman
Piecewise Regression As A Measure of Smoothness In Whittaker Graduations	Lee Giesecke
Computing The Present Value of Lifetime Income	Joe Lavelly
The \bar{M} -Linear Hypothesis and Varying Insurance	John A. Mereu

The 1984.2 issue also announces the 20th (1985) Actuarial Research Conference, to be held November 21 and 22 on the University of Texas campus. The subject will be: *Financial Operations of Insurance Companies and Employee Benefit Plans*.

Anyone interested in presenting a paper, or in finding out about the conference, should contact Samuel H. Cox, Jr. at his *Yearbook* address. □

LETTERS

Exam Issues

Sir:

I strongly object to any attempt to waive SOA examinations with college credit. Before I began an actuarial career, I taught math courses at three different universities; now I do the same on a part-time basis while working full-time as an actuary.

There is such a disparity among students with passing grades from different universities that equity will surely become a serious problem if we institute examination waiver for college courses.

Chiu C. Chang

Sir:

I note with concern the decision to examine Part 9 and 10 candidates on recent developments. Consider the candidate's position.

The defined syllabus runs to approximately 1,500 pages, and requires intense concentration. Most candidates hold full-time jobs in the actuarial field.

These impose their own requirements, while the candidate is breaking his head over the known syllabus.

Now the candidate is expected to be well versed in current developments. In which? you ask. In those which occur, of course. Where is the candidate to turn for information? To the trade publications. How is he to get exposure to the wide variety of these publications? No answer is possible, for we know not which publications will be needed. How is the student to find the time? Ah, well. Perhaps that's the student's problem.

It is a lousy decision that could have been reached only by someone with no conception of the candidate's work load. Does anybody agree?

Don Blue

Sir:

As someone who studied for the actuarial exams month in and month out, year in and year out, evenings and

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weekends, in grocery lines and on vacations, I was shocked to read Robert Mukisian's conclusion (June) that "the only thing such examinations prove is that an individual made a concentrated effort for the moment."

I realize that there are accredited schools in which students can pay tuition, cram for exams, and get A's and B's. But the same is *not* true of the actuarial exams, and it concerns me that an academic claims that it is.

Does someone who "would also offer Associateship to graduates of an accredited program" have any conception of how much one needs to learn, and how thoroughly one needs to learn it, in order to become an ASA the current way?

Harvard Law School is more than accredited, but its graduates still have to pass the Bar exam in order to become lawyers. I think we should continue to do the same.

Ellen Torrance

OASDI

Sir:

Thanks for the June editorial about Social Security and the budget. There are few subjects that people know less about than that.

Most people know that postponing the S.S. Cola for one year will reduce S.S. benefits by almost \$8 billion. Not many know that that would not reduce the national debt by a cent.

I could hardly believe this myself. After all, everyone said (or admitted) that it would reduce the budget deficit by about \$8 billion!! So I wrote some letters. I have replies from a technician for The Federal Reserve Board and an actuary for the Social Security Board. They both confirm the weird way that the so-called "unified" budget works. If the Government were to BORROW \$8 billion from the S.S. Trusts it would REDUCE the deficit by \$8 billion at the same time that it INCREASED the national debt by \$8 billion!!

Of course, the \$8 billion increase in the national debt is essentially an accounting wash because it obviates the borrowing of \$8 billion somewhere else.

OASDI

Sir:

In terms of the billions of dollars net changes in the funds, I found myself intrigued by Mr. Myers' (May) choice of descriptive phrases for the changes in income and disbursement. In an effort to get a more precise indication of the meaning of the terms "slightly larger," "slightly lower" and "about the same," I set up the following table (assuming "exceeded" = "larger").

Benefit	Levels		
	Income	Disbursement	Fund
OASI	Slightly larger	About the same	+ 2 billion
DI	Slightly larger	Slightly larger	About the same 1984 - .5 billion 1983
HI	Slightly larger	- 2.5 billion	+ 3 billion
SMI	About the same	Slightly lower	+ 1 billion

Beginning analysis with the DI benefit we can assume that the value of the term "about the same" is something less than one-half billion. And, if we happened to know the difference between the 1983 and 1984 fund value, we could more precisely determine the value of the term. Applying this value to OASI, we see that "slightly larger" means two billion plus or minus five billion and this value seems to be confirmed by the HI benefit. Somewhat surprisingly, however, "slightly lower" has a value of only one billion plus or minus .5 billion implying that the modifier "slightly" has only half the value when applied to reductions rather than increases.

Another conclusion can also be drawn from the table, for it would seem that fund estimates made in 1983 and 1984 were within five billion for all except DI even though Income and Disbursement estimates were quite different.

A remaining mystery of government financing is how the two billion fund excess for OASI was used to repay loans totaling 4.3 billion. This creative use of money could be valuable information for us debt-burdened taxpayers. One can only conclude that these unusual results are just another example of the strange behavior of functions when infinity is involved. Perhaps we are on the verge of a breakthrough in the national debt and it will simply disappear when it gets large enough.

John H. Beales, Jr.

From an accounting point of view that is no justification for reducing the budget deficit. Borrowing money should not reduce the budget deficit unless the Government does not intend to pay it back.

The very helpful actuary at S.S. relieved my mind somewhat. He volunteered that the 1983 Amendments eliminated the using of borrowed money to reduce the budget deficit, but there is good news and bad news. The change was made effective in 1993! Since then I have been told that the same change is grinding through Congress with an immediate effective date.

Could this discussion be academic? Another article in *The Actuary* implies (with the help of the ubiquitous 75-year cost estimate) that S.S. is rapidly dying.

My own 75-year estimate indicates that by then the Real GNP will be so

large that S.S. benefits will be increased so that no old people are kept below the poverty line. Where will the money come from? From a small estimated increase in money velocity.

More exciting, by then the system will have been pressured into paying women for the presently unpaid (unimportant?) job of raising children.

Sure, laugh. But did you believe women could force actuaries into Unisex tables? 75 years is a long time.

Charles M. Larson

Sir:

A. Haeworth Robertson has written a provocative note, "Social Security: 50 Years Old and Dying?" (June). The title is really a rhetorical question of the

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same nature as "When have you stopped beating your spouse?"

I am convinced that the Social Security program in its present form will continue indefinitely into the future, and that there is no possibility of its demise (other than if a cataclysmic end of the world occurs).

In signing the Social Security Amendments of 1983, President Reagan stated: "This bill demonstrates for all time our nation's ironclad commitment to Social Security." He then went on to say that the bill was "a clear and dramatic demonstration that our system can still work when men and women of good will join together to make it work." Finally, he said that "these amendments reaffirm the commitment of our government to the performance and stability of Social Security." Certainly, those on the other side of the political fence from President Reagan do not take a less optimistic view.

Mr. Robertson states his belief that "there is probably an interesting correlation between one's life expectancy and one's estimate of Social Security's life expectancy." My case will not corroborate his theory, because my life expectancy is about 10 years, where I believe that Social Security's life expectancy is infinity.

Finally, I am constrained to state my belief that Mr. Robertson does not analyze Social Security's financial problems in an adequate manner when he lumps together the cash-benefits program of OASDI and the service-benefits program of HI. These programs should be examined separately. It seems reasonably likely that the long-range problems of OASDI have been solved by the 1985 Amendments. Although certain assumptions in the current cost estimates can be criticized as being too optimistic (e.g., fertility and productivity), others may be too conservative (e.g., immigration, retirement rates, and disability rates). The HI program certainly has serious long-range problems, but these do not now seem quite as serious as they seemed several years ago; besides, they are the same problems that confront the entire population as to medical-care costs.

Furthermore, if future experience turns out to be as unfavorable as the Alternative III cost estimates — and I think that this is very unlikely — and then higher costs occur than according to the intermediate estimate, it is not an impossible solution to have somewhat higher tax rates, phased in over the years. Considering that there will be increased productivity of some sort, even if not as much as 2.1% per year, the real income of the working population will have an increasing trend even though Social Security contribution rates rise above those now scheduled.

Robert J. Myers

Inside Build-up

Sir:

There are quite a number of strong arguments against the proposal to tax the inside interest build-up of individual life insurance policies. However, it is possible that Congress will ignore them and vote the proposal into the Internal Revenue Code.

Will this destroy the insurance industry? I doubt it. In fact, it may well be a blessing in disguise.

Let's see what can happen:

(1) If such a law is passed, constitutionally it cannot be made retroactive. Hence, the policies issued up to the passage of the law will continue to be tax-free. No holder of one of these policies would want to replace it with a new one. Obviously, the persistency of these policies is likely to be spectacular. This is the first blessing.

(2) Immediately after the passage of the law, there will be enormous pressure on the N.A.I.C. and the State Houses to amend the nonforfeiture laws to permit the issue of policies where the only nonforfeiture benefits are reduced paid up and extended term insurance. Policies of this type are not uncommon in other countries. These policies are also protected against replacement and their persistency should be excellent. Another blessing.

Again, I am not in favor of taxing the inside interest build-up of life insurance policies. But if Congress, in their own wisdom, believe that it must be so, they will simply blast cannibalism out of the industry.

Frank P. Di Paolo

A Simple Approximation

Sir:

I would like to call attention to an extremely simple approximation for the normal distribution. It was apparently published by Arvind K. Shah in the February issue of *The American Statistician*. Unfortunately I lack ready access to this journal. I am therefore following a reference provided in a publication of the Mathematical Association of America.

The area under the standard normal curve from 0 to Z is approximated by $F = Z \times (4.4 - Z)/10$ for $0 \leq Z \leq 2.2$, with a maximum absolute error of .0052.

The inverse then follows: $Z = 2.2 - \sqrt{2.2^2 - 10F}$. The author includes some recommendations for the situation where $Z > 2.2$.

Even the most primitive calculator handles such simple formulas, and the accuracy is commensurate with the reliability of most everyday data. For instance, Example 9.1 in the new *Actuarial Mathematics* text requires $F(.1)$ as part of the calculation. The text result and the result of this approximation are only 0.7% apart.

Dwight L. Keister

Pension Funding

Sir:

I am grateful to Jan Harrington for replying to my April letter on pension funding, even though she and I seem to be on opposite sides of the matter.

Within the past few days, United Air Lines has discovered a \$962 million surplus in its employee pension plans, which it will extract and divert to other corporate purposes. Presumably these plans have had actuarial certification in previous years, and presumably the present surplus is similarly certified. The financial press carries ads offering to help employers "fine tune" their pension funding so as to release moneys for non-pension purposes. Now the FASB has proposed to permit immediate recognition of moneys so released, rather than requiring as previously a ten-year spreadout. These

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surplus discoveries will undoubtedly become larger and more numerous.

If these sudden transformations from adequate to overfunded are indeed valid, then as a profession we must learn how to explain such mysteries more convincingly to skeptical employees, shareholders, creditors, unions, and regulators. Otherwise the credibility we have gained laboriously over many generations will be dissipated and we will be looked upon as mere arithmetical technicians. If, on the other hand, these massive swings are not valid from a pension security standpoint, then we should not certify them.

George L. Hogeman

Actuaries and Divorces

Sir:

It was very interesting to read Michael Frank's June article on "Actuaries and Divorces." While I have never been involved in a divorce case, I am occasionally involved in actuarial questions for which there are currently no set procedures or guidelines. In a situation like this, as Mr. Frank points out, there is always room for a difference of opinion between actuaries. The real challenge to the actuary is to become enough of an expert in the questions on hand to give a truly professional opinion, while at the same time maintaining a level of work such that the fee charged is not out of proportion.

For example, it seems to me that in valuing a final pay pension benefit, one would have to use a salary scale, unless one uses a very conservative interest rate (i.e., 2 or 3%) which is intended to reflect only the true rate of return without regard for inflation. And in developing a salary scale, it probably is somewhat necessary for the actuary to be an expert on economics, the spouse's industry, and even the spouse's company. If I were working on a case of this type, I would certainly want a full copy of the plan rather than a Summary Plan Description booklet. Getting hold of this (and interpreting it once you did get hold of it) would probably also be a challenge.

Since actuarial opinions differ, it would seem reasonable for both sides in the dispute to retain an actuary. I would not feel at all uncomfortable if an actuary were brought in to challenge my opinions. In fact, I feel much more comfortable having my opinions challenged by another actuary, who will understand the background from which I arrived at them, than I am with challenges from the outside.

In areas where actuarial practice is still ill-defined, I'm also more comfortable with the current system (where the assumptions and methods used are a product of the actuary's judgment and subject to review by his client and the court) than I would be with some arbitrary guidelines. If both sides in a court case present expert witnesses with different opinions, then it is up to the court to decide which opinion is better reasoned. Neither expert should feel that the challenge is to his profession, but only to his reasoning and his presentation. His obligation to the profession is to make these the best of which he is capable.

Albert E. Easton

Problems from NAIC Models

Sir:

Actuaries who enjoy problem solving may be interested in challenge from an unexpected source — the Model Laws and Regulations (adopted or proposed) of the NAIC.

As always, there are a few ground rules. The solution must be from the actual wording (not from hearsay as to how the Model should work). The solution should not incorporate assumptions discretionary with the solver (the solution should be objective). Solutions must be capable of being translated into actual numbers.

As a starter, consider whether the Universal Life Model Regulation for flexible premium plans sets up minimum non-forfeiture values. If so, what are they? Then (to add excitement) should negative loadings be excluded? If so, where does the Model say so?

Any responses, for publication or otherwise, will be gratefully received.

John T. Gilchrist

WHOSE PROFESSIONAL ADVICE?

Joseph P. McAllister brings to our attention an article in the May issue of the *CPA Client Bulletin* under the title: "Should You Renegotiate That Costly Mortgage?" The *CPA Client Bulletin* is prepared by the staff of the American Institute of Certified Public Accountants for the clients of its members. But it claims no official authority, and it warns that information contained therein should not be acted upon without professional advice.

Assuming that mortgage interest rates have fallen, and that renegotiation of an old mortgage may be possible, the article suggests a worksheet to help answer the question proposed. The worksheet starts with the difference in monthly payments, multiplies by the number of such payments, then subtracts "negotiating costs" (made up of pre-payment penalty, closing costs, and "points"). Finally it subtracts an estimate of added income tax and describes the result as the "net savings over the life of the mortgage".

The final paragraph is quoted verbatim: "If your new mortgage has a different term from the old one, to make the two comparable it may be necessary to reduce both to the actuarial 'present value'. Your CPA can help make this determination."

The Actuary invites comment and offers to send your views to the AICPA. □

Actuarial CEOs

Sir:

I was interested in your May editorial, indicating the low chance of an actuary in the U.S. becoming a CEO. In Canada, and I suspect the U.K., the odds are higher, for both large companies and small. Even in Trinidad, where we have more companies than actuaries, we had until recently a well-known actuary/CEO.

It is hard to argue against your last two paragraphs. For basic education we should stay with what we do best. We can leave other specialties to other specialists.

Paul F. Clayson
