



The Actuary

The Newsletter of the Society of Actuaries

VOLUME 15, No. 9

NOVEMBER, 1981

OUR NEW MODEL VALUATION AND NONFORFEITURE LAWS

by John O. Montgomery

(First of Two Articles)

Ed. Note: Throughout the development of these model laws Mr. Montgomery was Chairman of the NAIC Technical Task Force on Valuation and Nonforfeiture Value Regulation.

The thoroughly revised model laws governing minimum reserves and nonforfeiture values that the NAIC adopted in December 1980 are likely to have at least as great impact upon company operations as did the Guertin legislation forty years ago. This first article undertakes to place this subject in perspective by describing the objectives of the revision, the immense cooperative effort entailed, the actuary's role in doing business under the new law, and some immediate effects foreseen.

The second article will explore the derivations of the mortality and interest assumptions that are prescribed and permitted, and look at some transitional and operating questions that arise.

Objectives

The first purpose was to bring the basic actuarial assumptions up to date in the light of the major interest and mortality changes since the predecessor model was adopted nearly a quarter-century ago. But a companion objective of equal import was to introduce flexibility, i.e., ready adaptability to future changes in underlying conditions, without the troublesome and lengthy process of state-by-state legislative revisions. The keys to this flexibility for interest rate changes are rates tied to prevailing long-term market interest levels—and for mortality, authority given to commissioners to permit use of new tables that may be adopted by the NAIC.

(Continued on page 8)

ELECTIONS 1981

The results announced in Atlanta are:

President-Elect Barbara J. Lautzenheiser

Vice Presidents Harold G. Ingraham, Jr.
Richard S. Robertson

Secretary Kenneth T. Clark

Treasurer Robert J. Johansen

Director of Publications Edward J. Porto

Board of Governors Nicholas Bauer
M. David R. Brown
Gary Corbett
Ardian C. Gill
Walter N. Miller
Peter W. Plumley

The number of votes cast, from among 4485 eligible voters, was 2334 (52.0%). Last year's percentage was 56.3%.

GAINING ENTRY TO YOUTHFUL MINDS

Ed. Note: This is excerpted from a letter written to Director of Education Linden N. Cole.

Dear Linden,

Recently I spoke at a junior high Career Day. I had ordered the Society's Speakers' Kit which I found informative and most helpful in my decisions on what to say and how to organize it. Yet, my youthful audience's attention seemed to fade as I just talked about insurance in general, the work and the exams. But these kids of almost driving age were with me again as I sought their help in calculating the annual premium for a 16-year-old's automobile insurance.

I started with this hypothetical case:

Number of 16-year-olds insured	1,000
Number of accidents expected	200
Average cost of repair for one accident	\$ 1,500

(Continued on page 8)

LOYOLA PROGRAM ENDS

by Ralph E. Edwards

An employed-student Actuarial Science Program that Loyola College started eleven semesters ago is ending this fall. Ostensibly our predicament was marginal tuition income arising from too few enrollments; but more fundamental reasons for stopping were that evening classes take inordinate travel time for a student body coming from Baltimore and Washington, that students prefer programs operating mostly in employer hours, and that instructors (who are full-time actuaries) are unavailable or have to sacrifice their own vacations for classes. Even so, these handicaps might have been survived had we conquered other problems more successfully than we did.

Coping with syllabus changes was among these other problems. This summer we needed to produce a new program brochure and to start recruiting instructors so they could obtain texts and prepare for classes to start next January. What we encountered was a major syllabus change, with many details unsettled yet scheduled for the May 1982 examinations. Back in the spring of 1979 our enrollments shot up as students sought to pass Part 5 ahead of a syllabus change; a postponed effective date this time might have kept us from shutting down, particularly since enrollments could be expected to rise because Northeastern University's program is closing.

Only a day or two before deciding to close, we protested to the Society about the hasty syllabus change. The timing criterion shouldn't, of course, be whether or not students are encouraged to beat the deadline. Three dates are involved: first, when the decision is announced; second, when all details are settled and all study material made available; third,

(Continued on page 8)

The Actuary

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Published monthly (except July and August) by the SOCIETY OF ACTUARIES, 208 S. LaSalle St., Chicago, Illinois, 60604, Robert H. Hoskins, President, Kenneth T. Clark, Secretary, Robert J. Johansen, Treasurer, Edward J. Porto, Director of Publications. Non-member subscriptions: students, \$4.50; others, \$5.50.

The Society is not responsible for statements made or opinions expressed herein. All contributions are subject to editing.

EDITORIAL

HY-PHEN-ING

RECENT instructions to Committee Chairmen from the Society's outgoing Director of Publications (the deservedly respected Robert E. Hunstad) contained the following admonition:

Hyphenation should be properly used. The Editor of the *Record* tells me that this is the most common error made in the transcribing done by our Recorders—improper hyphenation. Please use the dictionary.

Meditation brought us to the conclusion that our good D.O.P. was not railing against gross over-hyphenation or under-hyphenation of compound words; his reproof was directed at those who, in worthy efforts to produce an unragged page, violate the accepted rules on splitting a word that threatens to jut obscenely into the right-hand margin.

We hastened, as instructed, to our American Heritage Dictionary, and found that, yes, "ignoramus" can be split at any of just three places, and "stochastic" at but two. We are resolved to start with the New Year to give this unit of our journalistic duty the attention it deserves.

But immediately the question arises: When, other than at a line's end, may the encroachment or exile of a hyphen change a meaning? Is a well-funded pension plan better funded than a well funded one? Much more important, does it matter whether the Society has Vice Presidents or Vice-Presidents?

It turns out that we have both. Our Constitution (Article V) bestows on us four Vice-Presidents. But Article VI of our By-Laws insists there are four Vice Presidents. To choose a case at random, Daphne D. Bartlett is a Vice-President on pages 1 and 2 of our Year Book, but a Vice President on page A-7.

For the dubious benefit of the Task Force or Ad Hoc Committee that surely must be formed to resolve this, let us state our own clear preference.

Vice-Presidents, as a breed, we like. Vice Presidents leave us with an uneasy feeling that the Society may have been infiltrated by the underworld. But the only officials quite beyond our personal pale are the Vicepresidents.

E.J.M.

LETTERS

A Career Change

Sir:

I have decided to resign from being Chief Actuary of the Social Security Administration so that I may return to the life insurance industry.

To have been intimately involved with the Social Security program during these past three years has been a most rewarding experience. I shall continue to be keenly interested in future developments and hope to be a constructive outside critic while the program is being fundamentally reexamined.

May I emphasize that my reason for making this change (to a company in New York) is entirely personal. As I have observed the extraordinary pace of change in life insurance, it has become clear that delay in returning might do permanent damage to my ability to perform in it effectively.

Dwight K. Bartlett, III

Ed. Note: Actuaries familiar with Mr. Bartlett's contribution will undoubtedly join in high appreciation of his service to the public and to our profession.

* * * *

History Of Universal Life

Sir:

An article in your September issue on Universal Life gives total credit for bringing this product into the insurance world to James C. H. Anderson for a paper presented in 1975.

But a paper by Ken E. Polk in the 1974 *Transactions* (TSA XXVI, 449) addressed specifically a policy with total flexibility in pattern and amount of premium payments, showing that it could be designed to comply with the Standard Valuation and Nonforfeiture Laws. Mr. Polk's paper gives the mathematics underlying most current U.S. products.

Wilbur M. Bolton

* * * *

Ethics and Loopholes

Sir:

Allen B. Keith (April issue) correctly berated Robert J. Myer's use of "unethical" to describe what the Social Security expansionists don't like (the now defunct FICA-II). But Mr. Keith uses the word "loophole" to describe aspects

(Continued on page 4)

FOUR LIMRA PUBLICATIONS

These booklets, of special value and interest to actuaries, may be obtained from Life Insurance Marketing & Research Assn., Box 208, Hartford, CT 06141.

Proposed Lapse Disclosure System—Feasibility Test and Procedures. Report to the NAIC by the Advisory Committee on Policy Lapsation. June 1981, 43 pp. and appendixes, \$20.

It was in 1974, we recollect, that an NAIC Lapsation Task Force, expressing its frustration with excessive lapses experienced by some companies and some agents, said that there was nothing effective that state commissioners could do about this. But in 1977 the regulators took the first necessary step toward doing something by seeking recommendations from this advisory group, capably chaired by LIMRA's Helen T. Noniewicz. At least 14 Society members contributed to its work.

Apart from the significance of its findings (which have encountered industry opposition) this report has great value in giving more data on policy lapse and surrender experience than ever before published. Its questionnaire went to 1,100 life companies; usable statistics came from companies that have 72 percent of the total ordinary life insurance in force in the United States.

Having developed sets of comparison standards (i.e., averages determined as if all the contributors were one giant company), the committee suggested that if the regulators decide to use the system they might regard companies whose termination rates exceed double the applicable standard, in any of their several policy categories, as having a lapse problem justifying insurance department enquiry. This reviewer considers this criterion too weak, but otherwise unreservedly applauds the report and the committee's wisdom and notable fortitude in producing it.

The Disclosure Book: An Agent's Guide to Policy Cost Comparisons. 33 pp. and appendixes, \$5.

There are grounds for doubting that nearly enough life insurance trainers have yet put their hearts into training their agents to understand the interest-adjusted system, and into encouraging agents to explain it fairly to interested buyers. This agent training book furnishes means for doing this. Its chapter titles are:

Introduction	An Imposed Opportunity
Chapter 1	How and Why Disclosure Regulations Developed
Chapter 2	Basic Concepts
Chapter 3	Cost Disclosures in Action
Conclusion	The Value of Your Service
Appendix A	How the Indexes Are Calculated
Appendix B	Cost Disclosure in Canada
Appendix C	Where To Go For More Information

Career Agent Termination Patterns. Research Report 1981-4. 19 pp. and appendixes. *Agent Service Tables Handbook.* Actuarial Calculations for Marketing. 12 pp. and appendixes.

You are advised to ask Joseph R. Brzezinski for these two helpful reports, both dealing with the agent termination tables that he described in this newsletter's January 1981 issue. The *Research Report* gives the termination rates and related data by both contract year and calendar year, describes their derivation and uses, and gives comparisons with the McConney-Guest tables in TASA XLIII (1942). The *Handbook* poses six questions that arise about agent survival and shows how they are answered from a company's own statistics in conjunction with the tables furnished.

E.J.M.

ACADEMY'S SOCIAL INSURANCE COMMITTEE TESTIMONY

For our readers' convenience at a time when remedying Social Security financing problems is in the headlines, we list here five key excerpts from testimony in June and July 1981 by James R. Swenson, Chairman of the Academy's Committee on Social Insurance. His first statement was to the Senate Special Committee on Aging; the other to the Senate Subcommittee on Social Security. *The paragraph titles are ours, not Mr. Swenson's.*

Act Now On Long-Term Problems

"It is apparent that legislation needs to be enacted to resolve the predicted short term financing problems (of OASTI). The Academy believes that it is equally important that long term financing issues be addressed at the same time to help assure financial viability and to restore public confidence."

Trim Benefits To Affordable Levels

"[B]enefit promises must be kept at levels that are reasonable and affordable. This requires that significant long term changes be enacted so that future generations will not be faced with a burden they will be unable or unwilling to support. . . . [P]roposals to gradually increase the retirement age from 65 to 68 would generally eliminate approximately two-thirds of the 75 year OASDI financing deficit. . . . A 'safety valve' provision providing that benefit increases be based on the lesser of wage or price increases would help. . . ."

Pay Attention To Pessimistic Forecasts

"[M]ore emphasis should be placed on actuarial projections based upon pessimistic assumptions."

Let Actuaries Make Their Own Forecasts

"The current financing problems illustrate the continuing need for independent, professional, actuarial analysis. The Office of the Actuary (of SSA) and the actuaries employed in the Health Care Financing Administration are uniquely qualified to provide such analysis. They must be given latitude to select a range of appropriate assumptions independent of 'official' economic forecasts."

(Continued on page 5)

Letters*(Continued from page 2)*

of tax law that could legally be used to reduce taxes. Since high taxes are intrinsically unethical, means of reducing them deserve a less derogatory label.

I would describe these so-called loopholes as "areas of retention of the fruits of labor not yet raped by an expansionist tax philosophy."

Stuart J. Kingston

* * * *

The Actuary In Court

Sir:

Like Murray Projector (September issue) I have been a Forensic Actuary, averaging a case a month for the past several years. 95% of these deal with divorce; I, usually working for the wife, testify as to the present value of the husband's retirement pension pro-rated over the length of the marriage. Usually the husband doesn't have expert testimony in his behalf, but occasionally he produces an economist (whose testimony in my view is usually meaningless).

The other 5% of my cases are disputes between an ex-agent and his company on the value of future commissions, the item most often disputed being the interest rate to be used. A difficult question, especially when a jury is present, is when "my" attorney asks me to explain what an actuary is!

I enjoy this challenging work. Among many questions, attorneys and judges always ask for explanations in lay terms of the actuarial principles and even of the calculations. I often feel I've been asked an essay question on one of the later actuarial exams; the consulting actuary "takes" several exams in the normal course of his weekly work.

G. Eugene Hawkins

* * * *

Low Loss Ratios

Sir:

The real question that James H. Hunt and E. Paul Barnhart were debating (January and April issues) applies to several forms that generate low loss ratios—not just cancer insurance but also accident policies and industrial insurance. One school of thought holds that the low loss ratios are justified because the insurance fills a need; the other that the agency force is the pri-

mary beneficiary so actuaries and regulators ought to keep such products off the market.

I wonder if adequate disclosure may afford a middle ground, allowing the public to decide whether low loss ratios are acceptable. Several states require filing of loss ratios now; we should work to improve how these are reported when we find them failing to reflect the ultimate expected ratio suitably adjusted for interest.

Godfrey Perrott

* * * *

Another Cue to A New q

Sir:

An actuary frequently must choose between expressing concepts on a continuous or a discrete basis. It occurred to me to supplement Paul W. Nowlin's letter (March issue) by fully continuous approach.

His first statement becomes: Let T denote the time until death of (x) . If the probability density function of T ,

viz. $tP_x \mu_{x+t}$ is constant,

$0 \leq t < 1$, then its constant

value is μ_x (as can be seen by setting $t=0$), and

$$q_x = \int_0^1 tP_x \mu_{x+t} dt = \mu_x.$$

His second statement becomes: If

$$\mu_{x+t} dt = \mu_x dt, \text{ hence}$$

$$\mu_{x+t} = \mu_x, \quad 0 \leq t < 1,$$

then q_x (denoted \bar{q}_x for this case) =

$$1 - e^{-\mu_x}.$$

Readers can interpret the first statement in terms of a uniform distribution of deaths in the year of age, and the second in terms of a constant force of mortality, with the initial value as determining factor.

Cecil J. Nesbitt

(Continued on page 7)

A REQUEST FROM THE E. & E. COMMITTEE ASSOCIATESHIP TASK FORCES

As part of a long-range study of the mathematical content of the associateship exams, task forces have been established to study (1) Demography, (2) Numerical Analysis and Graduation, and (3) Operations Research and Applied Statistics. The task forces are charged with; documenting the actuary's need for these subjects, recommending specific topics and a course of reading, and preparing an implementation schedule.

The goal is to see that actuaries have the mathematical tools to handle the modern problems they are likely to encounter in their career, such as:

(1) Developing long-range financial security programs in the face of an increasingly uncertain economic future.

(2) Justifying risk classifications with demonstrations.

(3) Entry by statisticians into traditional actuarial areas, possibly with superior techniques.

(4) Establishing minimum capital and surplus requirements for life companies.

(5) Analyzing and explaining deviations from expected experience, and determining corrective actions.

(6) Certifying and validating loss reserves in casualty and health insurance.

We seek your help. Please tell the appropriate task force chairman (listed below) what problems you face as a practicing actuary and what mathematical tools you feel would help in solving them. Comments on other topics in the associateship syllabus would also be welcome. Use our Year Book addresses, except Mr. Tilley who is now at Equitable Society in New York.

Subject Task Force Chmn.

Demography Judy Faucett

Numerical Analysis & Graduation Walter B. Lawrie

Operations Research & Applied Statistics James A. Tilley

□

DEATHS

Gerald B. Anger, F.S.A. 1964
Will D. MacKinnon, F.S.A. 1927
James R. McDonnell, F.S.A. 1947
Alex C. Wellman, A.S.A. 1926

HOW MANY MEMBERS?

This article's aim isn't so much to provide figures that today's readers specially want, as it is to keep future historians from being thwarted by unavailability of membership figures that would have appeared in the 1979 *Year Book*. That *Year Book*, it will be remembered, died aborning.

We take this opportunity also to rectify a temporary miscount, perpetrated during that same hiatus period. Our 1980 *Year Book* reported, at p. 60, that we had 3,955 Fellows and 3,042 Associates on November 1, 1979; the correct numbers were 3,934 Fellows and 3,035 Associates.

There is a third matter. Desire for earlier *Year Book* emergence has prompted a set-back in our closing date for these membership figures. Formerly that closing date was December 1st; starting with 1979 it is November 1st. The significant effect of this change is that, in any attempted comparisons with prior and subsequent years, the figures for 1979 don't reflect the new Fellows (of whom there were 90) nor the new Associates (360) who qualified in the November 1979 examinations.

Executive Director John O'Connor reports that we can be assured that we really did have 7,697 members on November 1st, 1980; our faithful Chicago staff proved this by making a page-by-page count.

This reporter is confident that now that the dust has settled, our 1982 *Year Book* will revert to the tabular format with opening and closing totals used in past days.

MEMBERSHIP STATISTICS

December 1, 1977 to November 1, 1980

	Fellows	Associates
Membership, December 1, 1977	3,469	2,694
<u>December 1977 to December 1978</u>		
Increase: By Examination	314	449
By Election		33
By Reinstatement	2	6
Total	<u>3,785</u>	<u>3,182</u>
Decrease: By Death	20	5
By Withdrawal	7	48
By Associates becoming Fellows		314
Membership, December 1, 1978	<u>3,758</u>	<u>2,815</u>
<u>December 1978 to November 1979</u>		
Increase: By Examination	189(1)	399(1)
By Election		20
Total	<u>3,947</u>	<u>3,234</u>
Decrease: By Death	13	6
By Withdrawal		4
By Associates becoming Fellows		189(2)
Membership, November 1, 1979	<u>3,934(3)</u>	<u>3,035(3)</u>
<u>November 1979 to November 1980</u>		
Increase: By Examination	276	756
By Election		22
By Reinstatement	1	8
Total	<u>4,211</u>	<u>3,821</u>
Decrease: By Death	14	8
By Withdrawal	8	29
By Associates becoming Fellows		276
Membership, November 1, 1980	<u>4,189</u>	<u>3,508</u>

(1) If November exam results had been reflected, there would have been 279 Fellows and 759 Associates. (2) This figure would have been 279. (3) These figures would have shown 4,024 Fellows and 3,305 Associates.

Social Insurance Committee Testimony

(Continued from page 3)

Amend Law To Require Actuarial Certification

"ERISA requires that valuations of private pension plans be certified by qualified actuaries. A similar actuarial certification is required by P.L. 95-595 for pension plans covering federal employees. . . . The American Academy of Actuaries recommends that the Social Security Act be amended to enable the public to enjoy the same benefit of professional actuarial certification for the Social Security program." (Readers may note that actuarial certification was adopted for the 1981 Trustees Reports—see our October issue—but its permanence has yet to be assured by legislation.)

E.J.M.

HOW TO BECOME AN ARCHACTUARY

by Courtland C. Smith

ARCH (Actuarial Research Clearing House) is an informal journal for prompt dissemination of current actuarial research. A typical issue contains short papers on particular research topics, longer papers (with abstracts to help readers judge their utility), exchanges of letters, a few problems and solutions, translations of foreign-language items, and perhaps useful computer programs or references thereto. We also print proceedings of our Actuarial Research Conferences.

Published two or three times yearly, the annual subscription is U.S. \$25. Join us by remitting to: Society of Actuaries, Box 98474, Chicago, IL 60693.

Manuscripts in original or dark photocopies will be welcomed by any of the following at his Year Book address: Arnold F. Shapiro, Co-Editor; Courtland C. Smith, Co-Editor; Charles S. Fuhrer, our new Assistant Editor.

Ed. Note: Another valued ARCH service is publishing scripts sent to The Actuary that are beyond this newsletter's capacity to handle. One example is the batch of welcome comments from readers of Hilary Seal's "An Attempt to Convert American Actuaries" (March 1981 issue.)

E.J.M.

CA AN

Prof. Ernest R. Vogt of Winnipeg is founder and editor of *Canadian Actuarial Academic News*, officially symbolized as above. That journal's aim is to provide a forum for actuaries teaching at Canadian universities and other academics teaching or doing research in actuarial science—about 30 of these in all. The magazine started nine quarterly issues ago, but there's a cloud on its horizon; its sire to threatening to cast his infant loose by May 1982.

Thus we may be barely in time as we extend this cordial welcome to a sprightly publication that has already displayed some useful and stimulating news and reflections. We do wish it well.

For those who wonder why that magazine's initials are split into two pairs, and what that cedilla is doing up there, we pass along Editor Vogt's explanation. By that device the initials were made to do double duty. Split and cedilla'd they may be accepted as denoting "This Year" in French.

E.J.M.

THE E. & E. CORNER

Ques.: Has consideration been given to changing spring exam dates—at least for Parts 1-4—to avoid dates of university finals?

Ans.: No. University exam dates differ too widely, we think, to make such a change worthwhile.

Ques.: What attempts are made to see that the exam tests knowledge of all parts of the syllabus?

Ans.: Syllabus coverage is an important factor we use in our final check on each exam. The Part Committee, the consultants, and several E. & E. officers all ask ourselves whether we have arrived at a well rounded exam that reasonably covers the entire syllabus. Complete coverage, though, isn't practical every year; sometimes it conflicts with setting high quality, non-trivial questions that are sufficiently searching. We must be content with adequate testing over a span of years.

We and our students have to remember that the system's purpose is to educate future actuaries in all syllabus sub-

jects. The exams themselves should assure that F.S.A.s have shown a reasonable degree of knowledge of the material, but this doesn't mean that every study note or every part of a subject needs to be tested each time. □

MORE ON UNIVERSAL LIFE

Apart from Wilbur M. Bolton's historical observation in this issue's Letters, our September supplement on Universal Life has yielded three responses.

Robert D. Shapiro sent a copy of his firm's research report, "Whither Universal Life?". After expressing concern that "some companies may be evolving Universal Life packages without adequate consideration of long-term strategic implications", the report lists questions that deserve attention. Among these are: Whether the trends that have created interest in the product are merely temporary; How the product fits the company's own characteristics and objectives; What alternatives or variants ought to be thought about.

Universal Life, says this report, may be right for some companies and wrong for others.

Dale R. Gustafson asks why the really hard questions about the product aren't reflected in the articles we printed. His nominees for the hard questions are:

Are short-term new money investments appropriate for a product designed to meet life-long insurance needs?

Is it appropriate for buyers, or potential replacers, to compare "new money" with "portfolio" sales illustrations without explaining the profound differences between them?

How will the great continuing planning and service needs of Universal Life policyowners be provided for? Who will satisfy these needs and how will they be compensated? Does anyone believe that a policyowner can figure it out all by himself, or that an 800 number in the home office will suffice?

Richard F. Fisher sums up his viewpoint thus:

Universal Life is marketed as a tax-free money market fund, or other short-term investment vehicle, with term insurance available to be purchased from the fund. Current high short-term yields

are illustrated for very long periods of years.

Continuance of the term piece has all the problems of continuance of term insurance purchased in any other way.

The fund's attractiveness is directly related to its yield, which will fluctuate over wide ranges in short periods. Churning will be high as comparisons of recent performance and illustrations will "prove" the necessity for a switching. As with most investment plans, persistence of new deposits will be lower than persistency on level premium life insurance. Only lower commissions will be economically justifiable.

The result of low commissions is low service. Life insurance professionals cannot afford to work for peanuts.

The product will result in term coverages that lapse at high ages, disappointed beneficiaries, tax questions (Why should this investment be treated better than other investments?), high turnover as brokers shift their clients to whatever the current favorite is, fewer professionals working to insure human life values, and higher life company expenditures on advertising and policyowner service.

Will the consumer get more for his money? No. Is Universal Life a technological breakthrough that will result in real productivity and real savings for the consumer? No.

It is a symptom of an economy in convulsion. There is danger that it will result in breaking down the practice of insuring human life values with level premium life insurance that is affordable and pays benefits whenever death may occur.

E.J.M.

This Month's Query For Actuaries

This question is directed to readers who are skeptical about the oft-heard remark, "When inflation rages, everybody loses!"

Query: Apart from the obvious case of those who have larger debts than savings and whose incomes are amply indexed, which groups in the country have profited most conspicuously from the U.S. or Canadian inflation of the past decade?

Please send answers to this newsletter's masthead address, for compilation with credit to each contributor.

ECONOMIC CYCLES AND THE HEALTH INSURANCE BUSINESS

by Robert H. Dobson

Ed. Note: This is one of a series written at the invitation of the Society's Committee on Continuing Education.

Actuaries engaged in pricing and financial forecasting for the health insurance business have begun to pay attention to the effects of economic cycles. Until recently, most such arithmetic took refuge in one of three assumptions:

- (1) Things will not change;
- (2) Things will change in the same way they changed last year; or
- (3) Things will change by more (less) than last year to the same extent that last year's change was more (less) than the year before.

Of course, actuaries knew that none of these assumptions was correct, and that all that can definitely be said about a forecast is that it will be wrong.

Meanwhile, economists studying the behaviors of macro-economic indicators such as changes, in real gross national product, in the CPI, in the GNP price deflator, and in the unemployment rate, have clearly shown the significance and dimensions of economic cycles.

A project in which I recently participated as a consultant explored the relationship of health insurance experience to such economic indicators, revealing the relationships shown at end of this article.

Our justifications for assuming these relationships varied. Enrollments within group plans clearly will decrease as unemployment rises, while the number of plans in force may depend more upon the sizes of rate increases compared to the general rate of inflation. That is, if a company chooses to increase its margins, its rate increases will tend to exceed those of its competitors, and cases will leave. Exposures under individual policies tend to increase from conversions when unemployment rises, but to decrease from direct sales as people become less able to pay their premiums.

Many companies can demonstrate that use of health care services, specially hospitalization, increases during recessions, but I am not aware of any published documentation. The relationship between the cost of such services, particu-

larly the medical care component, to the CPI is more easily identified.

The relationships involving cash flow are intuitive. If the economy, measured by change in real GNP, is weak, premiums may be expected to be paid more

slowly, and claims filed more promptly. Increases in the real cost of money (excess of the prime rate over the inflation rate) will have similar effects.

We actuaries should embark upon more research into these relationships.

Experience Factor	Economic Indicator
Exposure (enrollment)	Unemployment Rate Relationship of Rate Increases to Change in CPI
Utilization (frequency)	Unemployment Rate
Cost per Claim	Change in CPI
Cash Flow	Change in Real GNP Relationship of Prime Rate to Change in CPI

Letters

(Continued from page 4)

Pricing and Surplus

Sir:

In a paper published in *TSA XXXI* (1979), Robin B. Leckie developed a theory of surplus management which recognized growth as a parameter in determining the annual charges to policyholders for surplus maintenance.

For a company with liabilities (L_t) growing at rate g , the paper defines this annual charge, e_t , as a percentage of liabilities. Using the notation in the gross premium Study Note, which uses the symbol ${}_sB_x$ to represent Anderson's book profits per \$1,000 in force at the beginning of year S , it can be shown that if Leckie's surplus charge in year S from time t ,

$$e_t L_t (1+g)^{S-1},$$

is equal to Anderson's book profits at the end of year S ,

$$\sum_x {}_sB_x \ell_{[x]+S-1} (1+i),$$

then Leckie's formula for surplus at time n becomes

$$(1+i)^n \sum_{S=1}^n \sum_x {}_sB_x \ell_{[x]+S-1} (1+i)^{1-S} \quad (1)$$

which is the accumulation of Anderson's book profits to time n with the net earnings rate i on surplus equal to the interest rate j at which book profits are discounted.

This suggests at least a desired pattern for emergence of book profits in new product development. Unfortunately, profits before dividends do not, in general, follow a pattern which allows direct application of these principles. As an alternative it may be helpful to examine the following formulation which represents the accumulations of surplus from a number of years of issue at an assumed rate of growth g in new business

$$\sum_{n=1}^N (1+g)^{N-n} \times (1). \quad (2)$$

Formula (2) can then be compared to

$$\sum_{n=1}^N (1+g)^{N-n} \sum_x {}_nV_x \ell_{[x]+n}$$

to see if an acceptable relationship between surplus and reserves is produced. If at time N both (1) and (2) are equal to the desired surplus objective then the charges suggested in Leckie's paper can be used thereafter to maintain surplus at the desired level.

C. Lee Fischbeck

Valuation and Nonforfeiture Laws

(Continued from page 1)

A third aim has been to accommodate the laws to plans of insurance that have recently come into being (and perhaps even to those that may be designed in years ahead), ensuring consistency in nonforfeiture values by policy form. And, finally, the search was for a model that would merit uniform enactment in all U.S. jurisdictions.

The Work Of Many Actuaries

Development of these laws marks culmination of labors of many actuaries—at least a hundred on all the advisory groups and task forces involved. The initial push for revision came from the January 1976 report by the Society's Special Committee on Valuation and Nonforfeiture Laws chaired by Henry C. Unruh; comparison of the final result with those recommendations will show that most of them were accepted, either in full or in part. Charles F. B. Richardson, then Chief Actuary of the Tennessee Department, was a great asset to the NAIC Task Force, both in general and for his work on expense formulas. The findings of the Society's Special Committee to Develop a New Mortality Table chaired by Charles A. Ormsby contributed greatly in its sphere. Ted Becker, my Task Force colleague and successor-chairman, gave strong leadership throughout.

An ACLI subcommittee chaired by Yuan Chang did yeoman work in developing basic features of the dynamic interest rate approach. And the final resolution of diverse views into a widely accepted legislative solution was built upon the work of a group chaired by Charles Greeley; in a few months they achieved spectacular success in a truly professional manner. I wish space permitted naming many other contributors to what has been a remarkable achievement.

The Practicing Actuary's Role

If ever a company actuary or consulting actuary could unconcernedly adopt minimum statutory policy reserves, that day has long since gone. Not only is there now a Certificate of Actuarial Opinion on the over-all adequacy of reserves to be faced, there is also the requirement in the Society and Academy Guides to Professional Conduct that a member exercise best judgment to ensure that assumptions are adequate and

appropriate. Furthermore, with respect specifically to the mortality assumption, the Ormsby Committee Report has wisely stressed that no recommended minimum must be allowed to replace the judgment of the actuary responsible for adequacy of reserves and general financial soundness.

Happily for the insuring public and for our profession's reputation, there is widespread evidence that most actuaries are taking these responsibilities with the seriousness they so clearly warrant.

Effects Of This New Legislation

On policies issued after the new law's operational date, all CRVM net premiums will be materially lowered—but the same is not necessarily true for terminal reserves. In general, minimum reserves using 1982 interest rates will decline on permanent plans by between 5% and 30% depending on plan, duration and issue age. But reserves on levelterm plans may often be found to have increased, a striking example being on such policies sold to women.

The new law will permit greatly reduced cash values on new issues, but competition can be counted upon to bring gross premiums down to the point at which interest-adjusted surrender costs will show considerable reduction. This is bound to place many existing non-participating policies in a non-competitive position, making them severely vulnerable to replacement unless companies take measures to remedy that condition. Some insurers have already embarked upon enrichment programs for their present policyholders; those who neglect to do so will probably lose most of their policies held by people who are insurable at preferred or standard rates. □

(To Be Continued)

Loyola Program

(Continued from page 1)

the examination itself. We suggest that there be at least ten months separating the second and third of these dates; thus, texts can be ordered and early study facilitated, particularly for students not attending classes. Does the E. & E. Committee give interested actuaries enough opportunity to comment on proposed changes?

Another problem with syllabus changes is that new topics are not evolved gradually, but are given full treat-

ment and then later cut back to make way for the next new topic. Yet another has been uncertainty, exemplified by minor changes back and forth in the assigned sections of the Numerical Analysis text. The latest proposals seem to return that subject to a modernized version of where it was around 1940, with a new chapter on Iteration. Actuaries of different generations can, it seems, communicate on fundamentals, but less readily at the periphery of a field. □

Youthful Minds

(Continued from page 1)

Everyone saw that \$300 would have to be collected from each insured to pay these claims. Then I asked, "But what if more information was available?"

	<u>Number Insured</u>	<u>Number of Accidents</u>
Boys	500	150
Girls	500	50
Total	1,000	200

Question: "Should \$300 still be the premium for all 16-year-olds?" After long discussion the audience finally agreed (the males somewhat grudgingly) that the boys should pay more. So we calculated the two sets of rates.

Then more calculations as yet more data became available—driver education and what it does to accident rates; living in City A where repair work costs twice as much as in City B—

When I asked what other information might be useful in rate-making, I was inundated with responses, most of them theoretically sound though not practical. This brought us to discussing data collecting: its cost, how much accuracy needed, how to avoid subjectivity.

Later on, we discussed the insurance company's expenses and the idea of a gross premium. But whenever I got too far away from numbers, interest dropped off quickly. Next time, if there is one, I'll make the example my focal point and arrange the other information around it.

At the next revision of the Speakers' Kit, perhaps the role of the numerical example might be expanded.

Nora E. Moushey

Ed. Note: We hope there'll be many a next time for Nora and that others will send us accounts of their experiences at the podium. □