



The Newsletter of the
Society of Actuaries

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THE Actuary

Continuing Education in Other Professions

by Gary D. Simms, Esq.

(Ed. Note: The following article is reprinted with permission from The Pension Forum, September 1987.)

Recent years have witnessed an ever-increasing demand for continuing education opportunities for the professional. This demand in part has been the result of an upsurge in consumer advocacy: The users of professional services are beginning to insist that the professional maintains a high quality of service through ongoing education. One response to this demand has been the promulgation of legally mandated continuing education as one method, among others, of insuring competence within specific professions. As a result, professional associations have felt pressure to provide the continuing education opportunities that are being sought by both the professional who wants to improve his knowledge and ability voluntarily and the professional who must attend courses because he is required by law to do so.

The purpose of this article is to provide members of the actuarial profession with background information regarding the question of continuing education from the perspective of other professions: what they do, how they have done it, and the extent to which the actuarial profession can learn from other professional groups. Perhaps the actuarial profession may decide that continuing education recognition is not a matter worth pursuing; nevertheless, that

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Commit to Quality

Patrick L. Townsend is the author of the book *Commit to Quality*, which describes his successful installation of a quality process at The Paul Revere Insurance Companies. Townsend's "Quality Has Value" process is mentioned in Tom Peters's latest book, *Thriving on Chaos*, as a model for creating employee involvement and improving quality in a service industry.

Townsend earned a bachelor of science degree in mathematics at Marquette University. He spent 20 years in the Marine Corps doing jobs ranging from teaching ROTC at Holy Cross University to running a Vietnamese refugee camp.

Features Editor Deborah Poppel interviewed Townsend at McCormack and Dodge, a software engineering firm based in Natick, Massachusetts, where as the Director of Quality Resource Services he has been charged with again installing a company-wide quality process.

Poppel: Why should companies focus on quality?

Townsend: There's only one reason to do it — it makes money. Companies that establish themselves as consistent providers of quality service will

come under "Townsend's Ultimate Law of Quality" — the first ones to focus properly on quality will keep all the money. People will pay for quality, and that makes a competitive difference. There are other positive but intangible, hard to measure, benefits for a company focusing on quality, such as the development of a happier work force.

Poppel: Why all the talk about quality now?

Townsend: Those of us working in the service sector are facing a survival crisis. The fact that America is a 75% service economy now isn't because we chose that, but because our manufacturing segment got its head kicked in by foreign competition. We were chased into the service sector. But we do a terrible job in the service sector. We really haven't been challenged. If the Japanese or anyone else decide to challenge the American service economy on a large scale, we're in real trouble.

Poppel: Doesn't quality cost money?

Townsend: Yes, but it's a great investment. The people who measure this estimate a return on investment in

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Commit to Quality cont'd.

the neighborhood of 30 to 1. If a well-organized quality process only gives you a 10 to 1 return, then you've done something wrong.

Poppel: When you talk about a "quality process," what do you mean?

Townsend: A quality process involves every person in the company, from the president to the person hired yesterday. This doesn't mean that every day every employee will think wonderful quality thoughts, but it does mean that the avenue is available to everyone any time, and they know it.

This deliberately differs from the traditional quality circle approach, where participation is voluntary. For example, if only a subset of employees are used to improve quality, you're sending out several damaging messages. You're saying that the people working on it are the only ones who aren't doing things well, that they're the only people who are important, or that they're the only ones smart enough to fix things. All of these are bad messages to send, particularly when you consider that in most organizations, nonmanagement people are the ones involved. So either you're saying that management is doing everything right, which nobody believes, or you're saying that management is so rock-hard stupid that, even given a chance, it couldn't improve. Even if that's true, you don't want to say it.

Poppel: What are the other components of a quality process?

Townsend: Everyone must know what you're talking about. You need a common definition of quality and a common agreement of the penalties for failing and the benefits for succeeding.

You must trust people and treat them like adults. If you only have a handful of quality circles, you can micromanage them. You can go to every meeting if you want. But once everyone is involved, you have to say things like, "That's your area of responsibility, fix it." The key thing is to grant authority commensurate with responsibility. That means you don't tell people to fix all the problems, just their own.

Added to that is an element of gratitude — you work at saying thank you. Let people know that you appreciate what they're doing and that it has real value. The trick of building a program of recognition, gratitude,

and celebration (it needs all three) is to remember that different people hear thank you in different ways. What turns one person on is going to put the next person to sleep. And because there's no way to keep an accurate track of what each person's hot button is, you have to build a system that says thank you several different ways.

There are two reasons why gratitude is so important. First, if people do something to help the company, they deserve to be thanked. And, second, you want them to do it again.

Poppel: Why is quality so hard to achieve?

Townsend: Because it's partially a matter of changing habits. And there's also an ego problem involved. If you want to change everything, the assumption is that things have been wrong until now. This isn't necessarily true. Instead the attitude should be that where we are is workable, but we are now trying to move from where we are to where we could be.

Poppel: What were the results of the quality process at Paul Revere?

Townsend: We went from being the number two producer of disability insurance (DI) to number one. In the first three years of the quality process, our bottom line from DI increased 96%, while our staffing increased 4%. We discovered an amazing capacity for work, simply by discarding the jobs we should not have been doing in the first place, and then making our own procedures less cumbersome and more efficient. By the way, as far as I know, Paul Revere is the only insurance company with a quality process that involves every member of the company.

Another example of a successful quality process is at the 3M Company. It began the process during the same period that Paul Revere did — using different mechanics, but the same principles. Its gross sales during that three-year period increased from \$5 billion to \$8.6 billion, while its staffing remained constant. Companies that "do" quality well make a lot of money.

Poppel: Your book differentiates "quality in fact" from "quality in perception." What do you mean by these concepts?

Townsend: Quality in fact means doing what you intend to do; that is, meeting your own specifications. Quality in perception means that

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Commit to Quality cont'd.

someone else thinks you'll meet his expectations; in other words, what you're doing is what he wants. To succeed, you need to do both.

An example of quality in fact without quality in perception in insurance would be developing a great product that worked exactly as it was designed, but no one wanted to buy it. We become so involved in developing a perfect product that we forget the objective, which is to sell it.

An example of quality in perception without quality in fact would exist when a company has built a strong reputation through its past actions, and people would buy its products just because they have been satisfied before. Then they buy a new product and discover that it doesn't do what it's supposed to. At that point they not only cancel that coverage, but they probably cancel all the other policies they have with the company. And then they tell their friends about it!

It's important to note, I think, that Americans are slowly learning to complain. (This, by the way, is another factor accelerating the focus on quality.) But, we still don't complain much relative to other countries. Let me give you an example. I recently visited a paper mill that makes newsprint, and here was how it operated. When a roll of newsprint passed the final quality check at the last inspection station, it was marked for sale in Japan. If it failed the inspection, it was marked for sale in America. Our newspapers will accept what the Japanese newspapers will not. However, I think that because Americans now have greater access to quality goods (often foreign-made), the level of what they'll accept is changing.

Poppel: *How do you get your whole organization to accept the focus on quality?*

Townsend: The top management of the company has to agree at the beginning of the process that this will involve everyone personally, including themselves. It becomes part of the company. Top management must show it is serious about the process by appointing one individual, who reports to the president or at most one level down, with the sole responsibility of making the process work.

Poppel: *You said everyone in the company must be involved in the quality process. How do you involve the field force?*

Townsend: In the case of the Paul Revere companies, the field force accepted the concept last. We had to prove to them that there really was a change in the attitude of the home office, a change in the accuracy of the information provided, and a change in the treatment of claims. Once they believed that the home office was really trying to change things, there was tremendous acceptance. This also helped break down some of the walls between the home office and the field, which was one of our stated aims at the outset. We wanted to make it one company.

Poppel: *How would you rate the quality of customer service provided by large insurance companies?*

Townsend: Insurance companies generally don't provide solid customer services. From personal experience, I'd say it's erratic, depending on who you're dealing with, but it may be getting a little better. For the most part, banks don't do a good job with customer services, either. However, there are a few that don't fall into that category.

Poppel: *How can actuaries help their companies provide quality customer service?*

Townsend: It is important to remember who your customers are. They aren't just the policy buyers, but rather anyone to whom you're providing products, service, or information. Talk to your customers and find out what they want. If you can't meet their expectations, tell them, so there are no surprises.

Poppel: *In your experience, how are large insurance companies different from the Marines?*

Townsend: That's a fun question. One snappy answer is that the uniform code at a large insurance company tends to be tighter and less comfortable.

It's harder to tell who's in charge at an insurance company unless you follow people back to their offices. In the Marine Corps, people wore their rank on their sleeves and collars. There is a comfort in the military with walking into a room knowing exactly who everyone is. In the Marine Corps, there is an element of continual change and movement, however. It's a far less stable organization.

A huge difference is that in the Marine Corps the effort to teach leadership is real and continuous. In an insurance company, the emphasis is on management. A manager cares

that the job gets done. A leader not only cares that the job gets done, but also cares about the people doing the job and the world in which they do it.

If a manager in an insurance company decides to be totally nonparticipative, to run things in a dictatorial way because he or she knows all the right answers, the worst thing that can happen to that manager is to be fired. If Marine Corps leaders act that way, the worst thing that can happen is that they can all die. The motivation to be participative is far greater in the military than it is in the civilian world, counter to the stereotype.

Volunteers Needed for SOA Committees

The Committee on Professional Development is again surveying interest in SOA committees. Please take a few moments to fill out our questionnaire included in this mailing of *The Actuary*.

All committees need willing and able actuaries to carry out their charges. If you have the time to serve on a committee, compare your interests with the committees' charges described in the *Yearbook*. To find out more or to get on a committee as soon as possible, contact the committee chairperson directly.

If you prefer to wait to be contacted by a committee in need of your talents, complete the questionnaire enclosed with this edition of *The Actuary*. Your responses to the questionnaire will be tabulated by August 1, 1988. Then each committee chairperson will be sent a listing of those individuals who have indicated an interest in serving on his respective committee. The chairperson may recruit committee members from that listing.

The Committee on Professional Development will also prepare a followup article for *The Actuary* describing the results of the questionnaire.

Committee membership can be a rewarding and valuable experience. Isn't each of us a debtor to our profession? This is your opportunity to repay that debt as a volunteer. Give it a try.

Continuing Education cont'd.

decision should be made only after careful consideration of the benefits of a formalized program of continuing education for actuaries.

Preliminary Information

The question of whether the actuarial profession should adopt a system of continuing education recognition for its members is now in its beginning phase. The Conference of Actuaries in Public Practice has adopted a program for its members, and the American Academy of Actuaries is considering such a program. For Enrolled Actuaries, the question appears to be "when" and not "whether" a program of required continuing education will be imposed by the Joint Board for the Enrollment of Actuaries.

And yet, the fact is, the actuarial profession already has in place an extensive system of continuing education. What is lacking at the present time is a systemized overview of the entire range of continuing education, together with a system for certification of attendance at already-existing educational opportunities for members of the actuarial profession.

Consideration of a more systematic and formalized structure is motivated by two major factors, one internally generated and the other externally generated. The first set of motivating factors includes a desire to enhance the image of actuarial professionalism and to supplement the effort now underway with respect to standards of practice. The external factors include the potential for imposition of continuing education requirements by regulatory bodies, such as the Joint Board.

The most significant initial hurdle to be overcome in the consideration of the matter is the fact that the phrase "continuing education requirements" is not uniformly defined or interpreted. In short, it means many different things to many different professions, and certainly within the actuarial profession is likely to be misunderstood by many practitioners. One can conceive a spectrum, running from the most rigorous (classroom instruction requirements with examinations, together with mandatory certification of membership in the organization) to the least rigorous (voluntary systems without an examination or certification procedures). At any point along the spectrum, the actuarial profession could logically formalize an appropriate program of continuing education.

You will note the emphasis placed upon the word "formalize." As indicated, the actuarial profession already has a program of continuing education, with each of the major actuarial organizations acting as a source for continuing education opportunities. For example, the Society of Actuaries and the Casualty Actuarial Society offer many such opportunities through their seminars and published papers, as does the Academy through jointly-sponsored functions such as the Enrolled Actuaries Meeting and the Casualty Loss Reserve Seminar [CLRS].

Therefore, from the outset, the actuarial profession needs to address the question of whether there is a need to formalize its continuing education program. This essentially is a matter of determining the extent to which specific requirements for such education will be established, monitored, and certified.

Presently, the Academy's qualification standards imply the need for at least a modicum of continuing education, by mandating that the actuary keep current in professional developments. Exactly how this is to be accomplished is not presently clarified. Nevertheless, one could argue that continuing education is almost by definition a necessary and important part of maintaining the integrity of the actuary and the actuarial profession. The debate must therefore necessarily center upon the possible parameters of a formal program, how it could be designed, implemented, and operated.

Definitions

It is appropriate to define some of the jargon associated with continuing education requirements before proceeding to a more detailed discussion. These definitions are as follows:

- (1) Continuing Education — learning experiences, formal or informal, designed to enhance and/or update the knowledge, skills, or attitudes of the learner.
- (2) Mandatory Continuing Education Requirements — statutes (generally enacted by the various states) requiring continuing education for the relicensing of certain professionals. Mandatory continuing education is established and enforced by law. State licensing or regulatory agencies are responsible for administering mandatory continuing education requirements.
- (3) Voluntary Continuing Education Requirements — continuing education

requirements adopted and promoted by voluntary professional associations.

(4) Continuing Education Units (CEUs) — provide a permanent record of the educational accomplishments of individuals participating in significant non-credit education experiences. They may be expressed as multiples of "contact hours" of actual instruction or other learning experiences.

(5) Certification — process by which a nongovernmental agency or association grants recognition to an individual who has met certain predetermined qualifications specified by that agency or association.

(6) Hours of Study — a quantitative measure such as hours, points, or continuing education units (CEUs) applied to course offerings and so on in a continuing education program.

The Basics of Continuing Education Requirements

(1) Legally Mandated Programs: The majority of legally mandated requirements are found in the medical and allied health fields. Other professions having such state requirements include certified public accountants, social workers, architects, and lawyers.

[The American Institute of] Certified Public Accountants (AICPA) continuing professional education division [sponsors courses]. Every year, over 90,000 CPAs enroll in these courses in more than 3,800 group-study presentations, usually conducted by state CPA societies. These courses address every area of the profession. The AICPA also produces and distributes "Video Journal" and "Videoflex," two programs designed for self-study and in-office use by practitioners unable to attend group sessions.

The Society of Chartered Property and Casualty Underwriters does not have a continuing education requirement for its members; however, many states require continuing education for underwriters. The society sponsors continuing education workshops and seminars throughout the year to help members meet the state requirements and to enhance professional development.

(2) Non-Legally Mandated Programs: There are, of course, professional organizations which have continuing education requirements (either voluntary or mandatory) regardless of whether legally mandated requirements exist. Among the professional societies that require

Continuing Education cont'd.

periodic continuing education to qualify for membership are sixteen state medical societies and eight state dental societies. On the national level, the American Academy of Family Physicians (AAFP) has had a continuing education requirement for a number of years. Each member must complete 150 hours of approved continuing medical education over three years to be eligible for reelection to membership.

Two other organizations surveyed have continuing education programs even though practitioners are not required by law to fill continuing education requirements. One, the Institute of Chartered Financial Analysts, has a council on continuing education which is responsible for developing continuing education for members. Ongoing efforts to keep members professionally competent and up-to-date are accomplished through seminars, various publications sent to members, and a periodical, *The C.F.A. Digest*. Continuing education is not mandatory, nor are seminars taken by members certified. Members were recently surveyed on this issue and voted against mandatory requirements. However, the association anticipates that within the next ten years there will be mandatory continuing education requirements.

Until recently the American Society of Appraisers (ASA) had a mandatory recertification program that required senior members to recertify on a regular five-year basis. In order to recertify, members were required to accumulate a certain number of points during a five-year period. Points were accumulated through various continuing education activities. In an effort to better coordinate its continuing education program with other appraisal associations (the ASA is an umbrella organization, the other associations specialized), the continuing education program was recently reorganized. The point system was revised so that all the appraisal organizations would award the same number of points for various continuing education activities and the mandatory recertification requirement was dropped. Voluntary recertification is now achieved by earning 100 points during a five-year period or by successfully passing an examination. Members obtain points in various ways, such as attending association meetings, giving lectures on appraisal, and serving as officers in the organiza-

tion. Though recertification is no longer mandatory, the ASA constitution provides that members who obtain the number of points required for recertification are so designated in the yearbook. This provides incentives to recertify.

A Proposal for Consideration

It is apparent from recent developments that the actuarial profession, acting through the princip[al] actuarial organizations, is giving serious thought to the formalization of continuing education within the actuarial profession.

It is suggested that the profession should address the major questions that any such program includes, and that it should develop a clear plan of action for consideration of a complete proposal by the various actuarial organizations. Of course it may be that the status quo is entirely appropriate.

There is often an interplay between membership in the professional association and satisfaction of legally-mandated continuing education requirements. Generally, professional associations whose members must meet legally mandated requirements for continuing education in certain states do not require continuing education for membership in the organizations. Nevertheless, professional associations play a major role in any mandatory continuing education requirement. Such associations are generally a major producer of continuing education activities, as well as a channel of information about other programs.

Mandatory requirements generally must be satisfied before an individual practitioner can be relicensed by the appropriate state authority. Much of the information contained in this article would be useful to any association considering a continuing education program, whether mandatory or voluntary.

Most of the associations surveyed as background for this report have set up continuing education programs in response to state requirements. For example, in 1971, when it appeared that about one-third of the states were considering making continuing education a mandatory requirement for renewal of an architect's license, the American Institute of Architects decided to upgrade what had been, until then, a sporadic continuing education program.

The American Pharmaceutical Association (APA) does not require continuing education for professional

status; however, thirty-four states do require continuing education credits for a state license. Generally, states require fifteen hours of continuing education units (CEUs) each year for these professionals. The association sponsors continuing education programs and currently has programs which provide 150 approved CEU credits. In developing a program, the APA formed a task force to study the need for continuing education. In 1974 the task force issued a statement of basic principles and policies to "assist the profession in developing a basic guide for planning and implementing programs to assure that registered and/or-licensed pharmacists maintain competence in practice." Following completion of the statement, the APA contracted with the Education[al] Testing Service to conduct a national study of the practice of pharmacy and the education needs of pharmacists. The study provided a data base for the development of standards of practice and an identification of continuing education needs.

Realtors in most states are required by state law to fulfill continuing education requirements. Each year the National Association of Realtors makes a survey to determine the requirements of each state. Continuing education courses offered by the association are tailored to the requirements of the various states. All courses must have the approval of the state real estate commission. The courses are offered at national conventions held three times a year. The courses are three hours long, and there are no examinations (except for California realtors who are required by law to take an exam). Participants pre-register for the courses and attendance is taken to verify participation.

Continuing education is not a requirement for membership in the American Bar Association; however, at least sixteen states have continuing education requirements for lawyers and the number is growing. Continuing education is sponsored by the ABA sections (committees), sometimes in cooperation with the state bar associations. The programs offered are not specifically designed to meet state requirements, but members often take them for that reason. Several states use continuing education as a means of establishing specialization within the legal profession. For example, California and Texas permit lawyers to designate and maintain

Continuing Education cont'd.

certain areas of specialization after completing required amounts of continuing education. Florida has a similar law in which a lawyer publicly designates up to three areas of specialization based on experience; to maintain the area(s) of specialization, the lawyer must participate in prescribed amounts of continuing education.

Certified public accountants are required to take an average of forty hours of annual continuing professional education in forty-five states. Much of the course material developed to meet this requirement is produced by [AICPA]. Assuming, on the other hand, that the profession desires to challenge the status quo by recommending the formalization of continuing education for the profession, a series of questions must be addressed. These include, but are not necessarily limited to, the following:

- (1) Should a program of continuing education for actuaries be voluntary or mandatory?
- (2) What would be satisfactory components of continuing education? Would we adopt a classroom instruction hour requirement, or a more flexible approach which gives credit for activity within the profession (such as membership on committees, giving lectures, writing articles in bulletins or professional journals, authorship of monographs or books, and so on)? In either case, how many hours (or how many units) would be required?
- (3) What kind of activities currently undertaken by the actuarial organizations would qualify for continuing education credit? The Enrolled Actuaries Meeting, the CLRS, or other seminars sponsored by other organizations would have to be considered.
- (4) Should certification of satisfactory completion of the requisite hours of instruction/study/activity be on a self-certification basis, or should the various actuarial organizations undertake this function?
- (5) In any continuing education program, whether mandatory or voluntary, some type of review process must exist to ensure the quality of the program. This review process should address both the quality and appropriateness of the course offerings, as well as the length or duration, in order that some form of a quantitative measure might be applied such as hours, points, or continuing education units (CEUs).

(6) Should the profession adopt a program of recertification of its members, based upon successful completion of x hours of continuing education in y number of years? Should the *Yearbooks* denote members who have successfully completed their continuing educational requirements?

(7) How does the issue of qualification standards interrelate with a continuing education program, and what implications does this relationship have with respect to the profession's educational programming?

(8) A major communications program directed to members of the actuarial profession would be critical. Clearly, some communications are needed to establish the necessary membership support that such a program would require. Even if the program is without any onerous certification or testing requirements, the members must be advised as to the nature of the program to be adopted.

Conclusion

This article has provided an analysis of what continuing education means within the context of professional organizations. There is little need to reinvent the wheel regarding this issue, given the experience of others. The actuarial profession, if it does determine to move down a road towards formalization of continuing education requirements, needs to consider the lessons learned by others if it is to produce a program which meets the needs of its members and the public interest.

Gary D. Simms, Esq., not a member of the Society, is General Counsel for the American Academy of Actuaries.

TSA Papers Accepted

The following papers have been accepted for publication in *TSA* Volume 40:

- "Probabilistic Concepts in Measurement of Asset Adequacy," and "Unification of Pricing, Valuation and Management Basis Financials for Participating and Non-Guaranteed Element Contracts," by Donald D. Cody.
- "Some Applications of Credibility Theory to Group Insurance," by Charles S. Fuhrer.
- "Interest Rate Scenarios," by Merlin F. Jetton.

Product Profitability: Variable Versus Interest-Sensitive

(Part Two of Two Parts)

by John M. Fenton and Dennis L. Carr

This is the second part of a two-part article examining some of the pricing-related issues insurers face in deciding whether to introduce a variable life insurance product. Part one appeared in *The Actuary* for March 1988.

Recap of Results from Part One

In part one, it was shown that (under the given set of assumptions) a hypothetical company can generate comparable profitability on a typical Variable Universal Life (VUL) product, as compared to its current Universal Life (UL) product. Initial testing was performed using a single cell approach under a level interest rate scenario. The resulting VUL product is somewhat more heavily loaded than the UL product to compensate for the higher expenses generally found on variable products. Profitability was compared after provision for taxes and target surplus. Because of the reduced exposure to interest rate risks, a lower level of target surplus was assumed for the VUL product, aiding its profitability.

Here, in part two, two more topics will be addressed:

- Global pricing issues
- Impact of multiple interest rate scenario testing on profitability

Global Pricing Issues

Our initial analysis focused only on a single cell approach to pricing. This approach necessarily converts fixed amount start-up expenses into per policy expense assumptions, utilizing expected production figures. However, a new pricing technique gaining more acceptance in the industry conducts profit tests under various production levels. Each production level generates a separate per policy expense assumption. Although it may be difficult to estimate both the level of future production and the allocation of expenses between fixed and variable, this global approach offers advantages. This concept is especially important on variable products because of their

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Product Profitability cont'd.

generally higher start-up expenses. These higher expenses can be composed of several factors, including:

- Higher costs to purchase, develop, or lease systems which are capable of administering variable products;
- The need to incorporate SEC related product development costs, such as the legal fees involved in preparing a variable product prospectus or those for registering separate accounts, if necessary;
- Costs to train and license an agent sales force;
- Initial excess fund operating expenses that the insurer may have agreed to absorb directly.

Although beyond the scope of this article, it would be desirable to study the impact of varying production levels on per policy expense assumptions.

Multiple Interest Rate Scenarios

Until fairly recently, profit testing on most life insurance products was conducted on a book value basis, utilizing a level interest rate assumption. However, with the continued popularity of interest-sensitive products, the industry is realizing the need to examine these products' exposure to interest rates changes. In particular, pricing is no longer solely viewed in the context of projecting liabilities. Rather, pricing actuaries also need to consider the impact of interest rate changes on assets purchased to back these products.

In this regard, profit testing of the two products was expanded to study the impact of varying interest rates on profitability. Profit tests were conducted under 40 randomly generated interest rate scenarios. For this round of testing, the following assumptions were made:

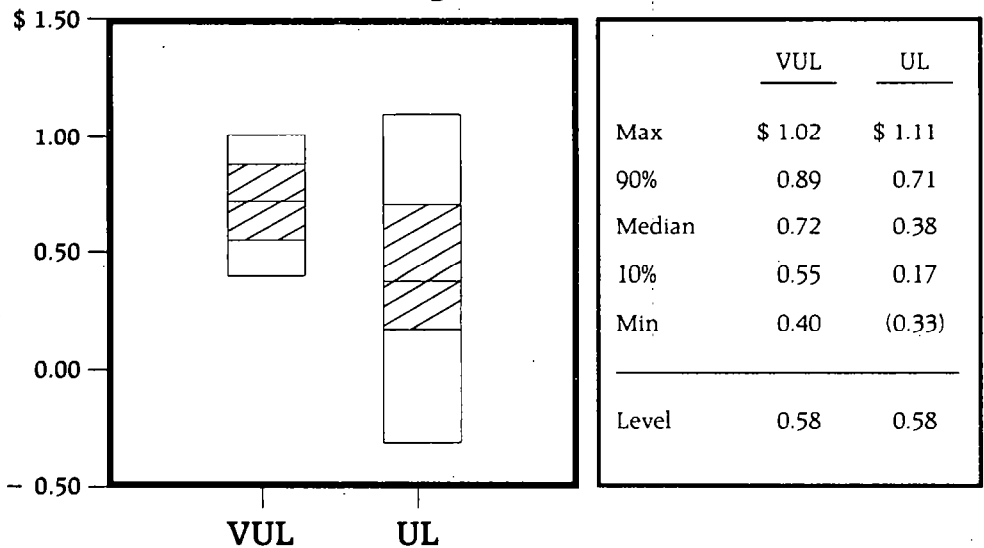
- Assets backing the UL product were invested in ten year high grade corporate bonds.
- The credited rate on the UL product was set equal to the earned investment rate less 150 basis points. In no event, however, did the credited rate exceed the competitors' credited rate by more than 25 basis points.
- The competitors' credited rate is an index representing the expected credited rates for similar UL products. It was expressed as a function of five-year Treasury bonds to reproduce actual recent UL credited rate experience.

- When the UL product's credited rate fell below the competitors' credited rate, additional lapses were assumed to occur. The amount of additional lapses varied depending on the magnitude of the difference in credited rates and the level of surrender charges.
- Monies placed in the VUL product were assumed to be invested in the money market fund. Although this simplified assumption was made to eliminate the need for market value adjustments on liabilities, results should not be unreasonable compared to other investment vehicles.
- Interest rate changes did not generate excess lapses on the variable product. It was assumed that instead of lapsing, monies would be moved to other available funds if a particular fund's investment performance was poor.

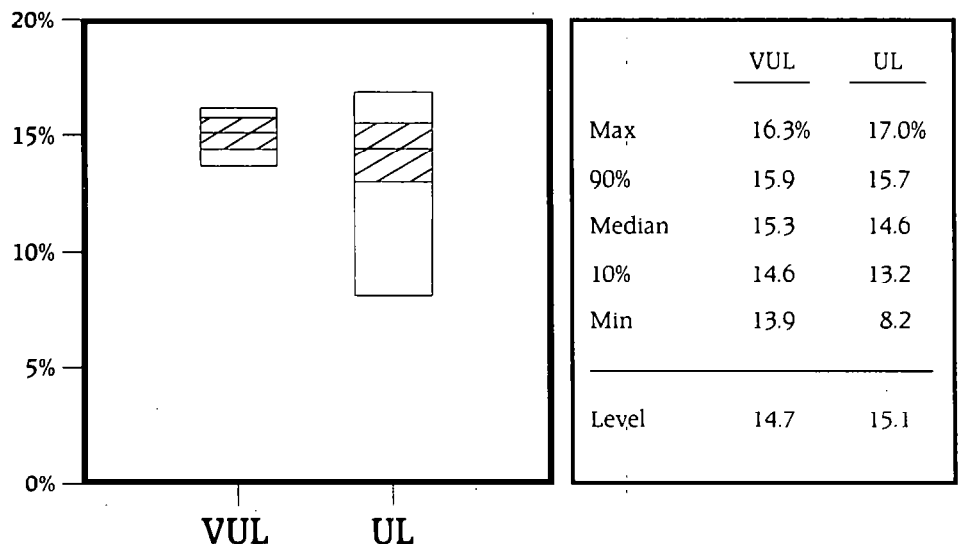
Based on these assumptions, profit results on the two products were measured after provision for taxes and target surplus. Profits were discounted at a level 12% interest rate. Results are shown here in graphic format. The shaded area in the bar graph represents results between the 10th and the 90th percentiles. The maximum value (Max) represents the

Continued on page 8 column 1

**Comparison of Profit Results
Present Value per Unit — 12% Discount**



**Comparison of Profit Results
Return on Investment**



Product Profitability cont'd.

most favorable profit test result, while the minimum result (Min) represents the least favorable result. Profits under the level interest rate scenario also are provided here for comparison.

The multiple scenario results reveal that profits on the VUL product are much less volatile than the UL product. One should note that on the VUL product the median result under multiple scenarios is more favorable than the level interest rate result. However, the opposite is true on the UL product. The UL product's profitability is more volatile primarily because of additional lapses, which result when the UL product's credited rate falls below the competitors' credited rate. In fact, these additional lapses create a significant difference between the two products in the amount of business that is in-force in later years. While the VUL product has about 28% of its business in-force after 20 years, the comparable median result for the UL product is only 8%.

Conclusion

It appears that a company considering a variable product can develop a typical VUL product with adequate profitability, as compared to the company's current UL product. In fact, profit results under multiple interest rate scenarios suggest that earnings on the UL product are subject to larger swings due to interest rate changes. In the end, however, profitability will depend on many factors, including the amount of additional expenses incurred on the variable product, actual production levels, ability of the company's distribution force to sell the VUL product, and the impact of interest rate changes on lapse rates.

John M. Fenton is a Consulting Actuary at Tillinghast/Towers Perrin. He specializes in the areas of variable insurance products, interest-sensitive product development, and matters related to New York Insurance Law.

Dennis L. Carr is a Consulting Actuary at Tillinghast/Towers Perrin. He was a faculty member for the SOA Seminar on a Multiple Scenario Approach to Interest-Sensitive Product Development in the fall of 1987.

In Memoriam

Robert D. Drisko F.S.A. 1958

Joseph B. Glenn F.S.A. 1931

Henry S. Huntington III F.S.A. 1951

Bennet B. Murdock A.S.A. 1942

Editorial

Opportunities in Restructuring

by Richard K. Kischuk

Restructuring has been a way of life for most industries in the 1980s, including life insurance. This is creating tremendous opportunities for the actuarial profession, if we choose to capitalize on them.

For most of the twentieth century, whole life insurance has been the bread-and-butter product for the industry. This began to change in the 1940s as insurers diversified into employee benefits. More recently, sales have shifted toward term insurance, variable products and interest-sensitive products. Insurers have begun to offer managed health care services, and many have diversified into banking, property-casualty insurance, securities brokerage, mutual funds and other financial services.

As Exhibit 1 shows, these trends have intensified during the 1980s. From 1981 through 1986, life insurance products provided \$16 billion of surplus. Most of this surplus was reinvested to support the growth of annuities, which consumed more than \$14 billion of capital. Overall, the industry has experienced a tremendous shift of capital from whole life insurance to term insurance and interest-sensitive products. Life insurers have also made huge investments in managed health care, variable products and other types of financial services.

Traditionally, profits from ordinary life insurance, the backbone of the industry, have not only provided most of the dividends to policyholders and shareholders but have also financed the industry's diversification into other areas. However, as Exhibit 2 illustrates, capital generated by ordinary life insurance appears to have peaked in 1983. This has been caused by a fundamental decline in profit margins from ordinary life insurance (see Exhibit 3). Profitability has fallen off sharply as lapse rates have risen and sales have shifted from whole life to term insurance and interest-sensitive products. AIDS claims will erode the capital still further.

This trend has probably not been obvious to many companies because it was more than offset by health insurance profits in 1984 and 1985, along with capital gains in 1985 and 1986. Of course, these are both cyclical sources of profit, and they do not provide a permanent offset to the erosion of ordinary life profitability.

Increasingly, chief executive officers are realizing that they have little time to create a new underpinning of profits to replace the earnings from traditional whole life products. Unfortunately, returns from most of the newer activities — variable products, interest-sensitive products, managed health care and financial services — have not met expectations.

Continued on page 9 column 1

EXHIBIT 1
Vitality Surplus Generated

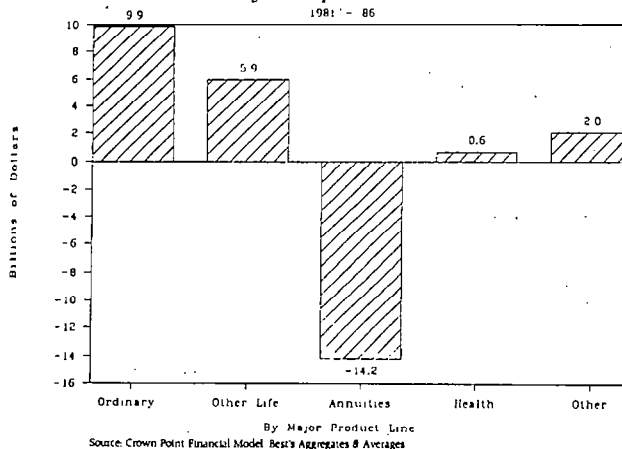


EXHIBIT 2
Ordinary Life Insurance
1981 - 86

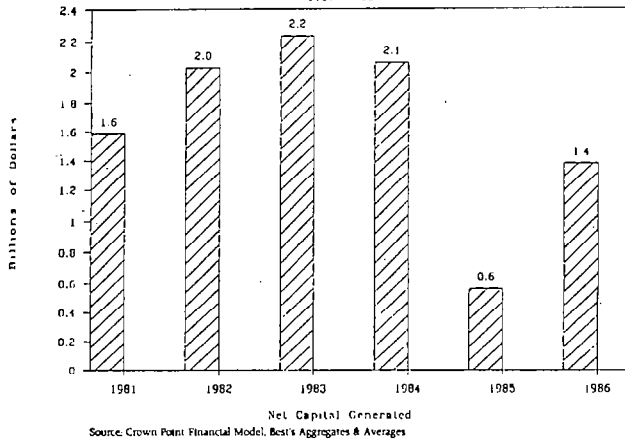
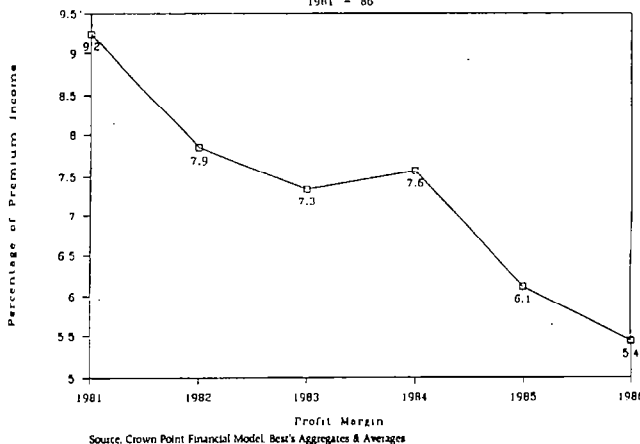


EXHIBIT 3
Ordinary Life Insurance
1981 - 86



Retention Analysis

by Jerald Helm

(Ed. Note: The following article is reprinted with permission from the Reinsurance Section Newsletter from March 1987.)

The setting of proper limits of retention of risk for individual lives is an important piece of a company's total plan of operation. An under-retained company may find that it may be able to afford to increase its retention and decrease per unit expenses through economies of scale. On the other hand, an over-retained company may be risking excessive liability.

An important reason then, for retaining only a portion of the business issued, is to stabilize expenses resulting from claims from large policies. If the amount of claims could be predicted under various retention scenarios, a company could choose the retention level which would best fit its financial situation. Predicting these claims may be accomplished by using techniques of probability and statistics to derive expected claims and the associated standard deviations. An example may help with understanding the procedure.

There are several items of input needed to perform a retention analysis. The M.I. Low Life Insurance Company has the following distribution of policies, representing its total in force by face amount, before reinsurance:

Policy Distribution		
Size		Count
0 - 5,000		5,082
5,001 - 10,000		6,962
10,001 - 25,000		9,679
25,001 - 50,000		5,131
50,001 - 75,000		3,953
75,001 - 100,000		1,322
100,001 - 125,000		722
125,001 - 150,000		479
150,001 - 175,000		251
175,001 - 200,000		185
200,001 +		264

In addition, an evaluation of the company's claims experience can be made to estimate an overall rate of mortality. M.I. Low Life has experienced a mortality rate of 1.85 per

Continued on page 10 column 1

To realize the potential of these new ventures, companies must move quickly to make fundamental changes in their marketing strategies, cost structures, asset-liability management, underwriting methods, and capital structures. To effect the transition, companies are beginning to employ the same financial management methods industrial companies have successfully used, such as discounted cash flow, financial ratio analysis, capital asset pricing modeling, and break-even analysis.

At the same time, companies must be careful to avoid techniques which have outlived their usefulness. For example, while return on equity is still a useful framework for financial decision-making, it is deficient as an overall corporate goal. "Return on management" is beginning to replace "return on equity" as the relevant benchmark for measuring company performance.

This creates a challenging environment for actuaries. To help

companies make the transition into the 1990s, actuaries must be aware of financial management techniques developed by MBAs, CPAs, economists and others. Many traditional approaches used by actuaries are now irrelevant and must be replaced with modern methods.

Restructuring the insurance industry is also creating pressure for a transition in actuarial practice. To be part of the solution, we must update actuarial science and expand into new areas. Among other things, this will require a revitalized research effort by the Society of Actuaries. Even more so, both basic and continuing education must extend into nontraditional topics. And each of us must look for innovative ways to help our companies and clients to be successful in creating a new base of profitability for the 1990s. Our challenge is to keep up with the pace of change that is taking place in the life insurance industry. If we are successful, the actuarial profession and the insurance industry will prosper together.

Retention Analysis cont'd.

thousand. The final piece of information needed is the estimate of the ratio of the net amount at risk to the face amount. (One source could be the data for reserves released on actual deaths.) In this case, the ratio is .97.

Armed with all this data, the expected claims and the associated standard deviations referred to earlier can now be determined. The result of using these statistical values, referred to as the Output Data table, provides, for each level of retention shown, an amount of Projected Maximum Net Retained Claims for each of three probability levels. Each cell of this table can be interpreted as being the projected maximum amount of claims retained, of those incurred in one year's time, net of reinsurance, for the given retention and probability level. Reinsurance is assumed to occur on each and every dollar of insurance over the given retention level. Each probability level, 84.13%, 97.73%, and 99.87%, corresponds to projected claims being less than or equal to expected claims, plus one, two, and three standard deviations, respectively, assuming the Policy Distribution data [have] a Normal statistical distribution.

The first step in evaluating the Output Data table is to decide the degree of certainty desired by choosing a probability level. The level chosen is dependent upon company philosophy: a conservative philosophy would choose a high probability level; an aggressive philosophy would be satisfied with a low probability level. Each probability level may be interpreted as corresponding to a degree of comfort: the one which feels most comfortable, and in harmony with company philosophy, is the one which should be used. Once the probability (comfort) level is decided upon, retained claims may be compared at different levels of retention.

Suppose M.I. Low Life has a middle-of-the-road philosophy. At a probability level of 97.73%, and retention of \$100,000, the maximum amount of claims retained, of those incurred in one year's time, is projected to be \$2,167,828. This means the probability of *not* exceeding \$2,167,828 in retained claims (\$587,010 over expected) in one year's time is 97.73%. This same method of evaluation may be used for any combination of retention and probability levels.

The graphic representation of data from the Output Data table allows for additional insight into the relative magnitude of claims at various retention and probability levels. [Generally,] as retention levels increase, the marginal difference in Projected Maximum Net Retained Claims decreases. This is true at each probability level.

It can also be seen, as expected, that even though the probability of *not* exceeding a given amount is greater, the amount of Projected Maximum Net Retained Claims increases significantly as the probability level increases.

Since this analysis is based on Policy Distribution data collected at a specific point in time, it is only scientifically accurate while there is not a significant change in the underlying distribution of policies.

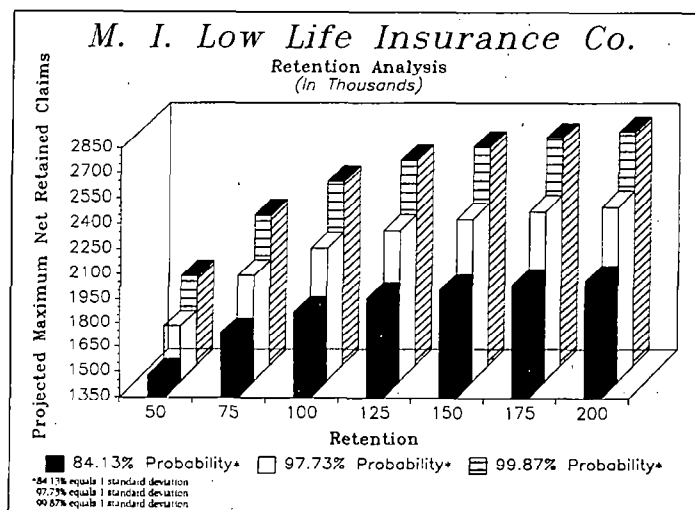
The Output Data table and graphic representation only consider the theoretical or solvency aspect of retention. There are also several practical aspects to consider before a retention level can be set:

1. *Volume reinsured.* The size of a reinsurance account correlates to a reinsurer's willingness to provide capacity as well as to perform needed services.
2. *Cost of reinsurance.* The costlier the reinsurance, the greater the incentive to retain.
3. *Administrative cost.* Administrative cost is particularly important for individual cession reporting. Retention plus a corridor allows for elimination of smaller, costly cessions. Retention should be set to minimize the number of small reinsurance cessions.
4. *Recapture.* Recapture, subject to reinsurance treaty provisions, should be timed to help meet corporate earning objectives.
5. *Surplus impact.* To the extent the reinsurance program cushions surplus strain, an increase in retention will cause a statutory strain.
6. *Earning stability.* The theoretical or solvency aspects considered in the Output Data table and graphic representation were based on an assumption of no variation in cost of reinsurance at different retention levels. In fact, the cost of reinsurance was not considered at all, and is a very real cost that should not be ignored.

Table 1: Output Data Table

**Projected Maximum Net Retained Claims
at Probability of**

Retention	M.I. Low			
	Expected Claims	84.13%	97.73%	99.87%
50,000	1,267,696	1,478,796	1,689,896	1,900,996
75,000	1,477,469	1,740,078	2,002,687	2,265,296
100,000	1,580,818	1,874,323	2,167,828	2,461,333
125,000	1,643,036	1,958,480	2,273,924	2,589,368
150,000	1,680,981	2,011,870	2,342,759	2,673,648
175,000	1,704,210	2,045,849	2,387,488	2,729,127
200,000	1,718,598	2,067,745	2,416,892	2,766,039



Continued on page 11 column 1

Retention Analysis cont'd.

7. *Psychological impact.* The shock created by signing checks for claim amounts significantly greater than to what one is accustomed could cause knee-jerk decisions which could affect an underwriter's willingness to take necessary risks.

Clearly, any decision to change retention *must be the decision of the company.* With that in mind, M.I. Low Life should consider the issues raised in this report, plus any other plans likely to financially affect it. If the current retention of M.I. Low is \$50,000, it might be difficult to justify the extra claim expenses predicted by increasing retention to \$75,000 or \$100,000. However, if M.I. Low Life is currently at \$100,000, the marginal increase in claim expense is relatively minimal if retention is increased to \$125,000 or \$150,000. If retention is currently at \$100,000, an argument could also be made to decrease retention to \$50,000. Perhaps the expected decrease in claims would be more than enough to offset any profits given up by such a decision. [One factor which cannot be ignored in making decisions such as these is the cost of reinsurance.]

As is true with any statistical model, an analysis of retention is subject to some claims fluctuations due to statistical error, invalid assumptions, invalid data, or any other invalid input into the analysis.

Consider a company wanting to increase retention and at the same time insure against adverse mortality. Such a company could purchase Stop Loss insurance to cover losses beyond the claims predicted by the retention analysis. A typical Stop Loss program covers, up to a company selected maximum benefit, 90% of net retained claims beyond a loss limit point. The minimal premium for Stop Loss coverage will generally be much less than the profits realized from an increase in retention. Furthermore, large losses caused by accumulated unexpected claims, if they occur, will be controlled. Stop Loss coverage then, could be the answer for a company on the verge of increasing retention, but wanting added insurance from experiencing increased claims resulting from such a decision.

Jerald Helm, not a member of the Society, is an Actuarial Assistant at Security Benefit Life. He works primarily with issuing quotes on coinsurance and stop-loss insurance.

Spotlight on the Sections

The Investment Section

by Robert D. Hogue

The SOA Board recently approved forming another special interest section, the Investment Section. During the new section's organizational period, 10% of the Society's Fellows applied for membership. A look at the employment status of this 10% indicates that a small number are involved in investment-related work. It seems that, if their present duties have not caused them to join, then their perceived future duties have.

In truth, I am surprised that so few chose to enroll. For over a decade our industry has been changing in ways that are severely affecting both its fundamental operations and our roles and responsibilities within it. Actuaries used to be first concerned with rates of mortality, morbidity and persistency and second with those of interest and expense. Today the reverse is true, and it is this single observation which explains most of the changes occurring within the industry and the profession.

The attention we are paying to our future, indicated by our research and meeting discussions, underpins the claim that ours is a spread business dominated by the need to attain satisfactory interest margins while controlling expenses to avoid declining margins. Our environment is crowded with surprises. Two major multiline companies are abandoning the individual life business; a few life insurance companies have announced the discontinuance of universal life insurance sales; and an increasing number of prospective acquirors of life insurance companies require that those companies have no interest sensitive product lines. Other companies bemoan the passing of surplus relief treaties as a ready source of capital for acquiring new interest sensitive business. Some of these companies see direct debt financing as an attractive alternative. Still others are turning away from investing in new life insurance issues and are searching instead for ways to get into the funds management business. All this activity indicates a theme of reactions to risk in a volatile economy.

There are many changes occurring within our industry and our

profession to which we must react. I suggest that actuaries wishing to expand their investment-related expertise concentrate on the following:

1. The Life Insurance Business is a Funds Management Business.

It seems obvious that the Cannibal Life scenario is on its projected course. Even those avoiding it through product line limitations and market withdrawal are subject to its effects. A switch to registered products represents its ultimate acceptance.

2. Life Insurance Companies Will Continue to Diversify and Consolidate.

The prospect of further deregulation of the financial services industry has spurred a new wave of interest in diversification within the life insurance industry. In addition to mergers and acquisitions, consolidations are now taking the form of line of business divestitures and joint ventures. There is more interest in mutual company mergers, which will eventually lead to a wave of transactions. The number and total value of life insurance company mergers and acquisitions increased rapidly over the last three years, and activity levels in all industries since the beginning of the year indicate that the pattern will return.

3. Life Companies Will Increase Their Attention to Capital Management.

Access to growth capital is an increasing concern for most companies. They are avoiding growth opportunities such as the introduction of registered products because of their capital constraints. In the last few years the mushrooming concept of the financing subsidiary has been accepted by all but the smallest of companies. Capital allocation by company and product line is a central concern of most corporate officers.

4. Industry Focus on Volatile Financial Markets Will Increase.

Most actuarial research over the past few years has centered around the analysis of risks labeled C-1, C-2, C-3, and C-4. Much attention has been given to C-3, with C-4 picking up market share since October 1987. The researchers and regulators are gradually injecting volatility analysis into our craft. Fluctuating interest rate

Continued on page 12 column 1

Investment Section cont'd.

levels of the early 1980s and the recent market adjustment also impel our managements to expect our increased attention to it.

The actuarial role has continuously broadened, diversified and splintered into a number of specialties for as long as we can remember. Only the more aware of us can keep track of its many organizations, and none of us can maintain working knowledge of all its many specialties. Unfortunately, forces beyond our control have compelled us to create one more section and one more specialty. As is always the case, the cycle requires extending what we know and do by including new disciplines. In this case they are those required by the four realities listed above.

The Investment Section, as is true with all new organizations, will evolve to meet the expressed needs of its members. At present, the four realities listed previously appear to be the most logical focus for our professional development. Extending our expertise to include enhanced knowledge of investment topics will generate these initial targets:

1. Modeling

Corporate models used for model office projections and scenario testing incorporate sophisticated asset submodels in only the most highly developed examples. However, the methodologies underlying them are rapidly becoming familiar to actuaries whose roles require that familiarity. Section programs should be developed to expand these applications to include generic instrument types. For example, a typical banker's model includes submodels for bond pricing, collateralized mortgage obligations, securitized receivables and option pricing. Under the current state of the art, these four cover the universe.

2. Corporate Finance

Today's actuary must deal with diversifying and divesting product lines and subsidiaries. He already has the skills to determine value and expected return. He should add to this a working knowledge of corporate finance in order to evaluate alternative deal structures in terms of their impacts on the resultant organization. As is true with insurance schemes, the primary ingredients are cash flow, accounting treatment, and tax impact.

3. Capital Management

A number of actuarial papers have covered the approaches available

for measuring return under insurance schemes. Even more has been written on the allocation and use of company surplus. These sources, along with standard techniques used by finance professionals, should be organized and presented as a body of knowledge on capital management for insurance companies. This base should be developed further as industry focus on capital management intensifies.

4. Investment Instruments

Actuaries need basic education in the investment instruments available to their companies. They are increasingly pressured to work in partnership with their investment staff counterparts to meet their joint requirements of unified balance sheet management. To fully function each must learn the products of his partner. Fortunately the actuary has less to learn than his investment staff counterpart because investment instruments offer far fewer options and involve fewer and simpler variables than do the products developed by the actuary. Thus, a trend may develop toward more actuaries working in their companies' investment departments.

Actuaries who survive the rigorous examination ordeal emerge as super technicians and problem solvers. Although their careers frequently take them beyond actuarial responsibilities, they tend to rely on their backgrounds when becoming involved in other areas such as marketing, finance, data processing, underwriting, and so on. Many eventually move even further to management or professional technical positions in other disciplines, still relying on their actuarial knowledge throughout their careers, even though some deny it.

The creation of the Investment Section entails the creation of the "investment" actuary.

This actuary will measure the impact of alternate applications of company funds based upon his four principal perceived current requirements. His scope will cover specific products, product lines, lines of business and separate companies. To fill his role, he must have a solid working knowledge of actuarial science. Added to this will be an advanced knowledge of insurance products, corporate finance, capital management and investment instruments.

Robert D. Hogue is Vice President — Insurance, Corporate Financial Group of Prudential-Bache Securities. He is a member of the Investment Section Council.

The Job of the Papers Committee

by Kenneth A. McFarquhar

In a recent issue of *The Actuary*, Dave Jeggle, Director of Publications, encouraged members to write for some of the Society's publications, including the *Transactions*. The *Transactions* is somewhat different from other journals in that papers which are submitted must be reviewed and approved by the Papers Committee in order to be published.

The reviewing or refereeing process which has been in place for some time now is undergoing some significant changes. An Ad Hoc Committee of the Papers Committee has been studying the entire process which a paper undergoes before its publication in the *Transactions*, and some revised procedures have been proposed. In my capacity as chairperson of that Ad Hoc Committee and as former chairperson of the Papers Committee, I would like to report on these changes.

After researching reviewing processes used in other organizations and trying to combine the best procedures to meet the Society's and authors' needs, a new reviewing process was proposed. The process first begins when an author submits a paper to the Society office. Papers are sent here to preserve the author's anonymity, and so all correspondence with the author is handled through this office. Next, the submitted manuscript goes to the Papers Committee chairperson, who in turn consults with a senior reviewer. It is their responsibility to recruit four other reviewers who are experts in the paper's subject matter. To ensure that the most capable specialists review the paper, the senior reviewer may call on Section members or other sources outside the Society to assist in this process. All completed reviews are sent back to the senior reviewer.

When the paper begins the reviewing process, the author will receive a letter advising him of the likely review time. Papers are usually reviewed within 4-5 weeks, but occasionally a reviewer may need to extend that deadline. If such a delay does occur, the author will be notified to that effect. If a reviewer is unable

Continued on page 13 column 1

Papers Committee cont'd.

to meet the review deadline, another reviewer will be found to complete the work.

Once the reviews have been returned to the senior reviewer, he will complete a comprehensive report of the paper. Both the senior reviewer and the Papers Committee chairperson will make certain that this final review is complete and consistent. Accomplishing this may sometimes require discussion among the reviewers, particularly if there is some disagreement between reviewers. In addition, the Papers Committee may sometimes request supplemental material on aspects of the paper which have been inadequately covered. In either case, when this has been done, the review process is complete. The next step is to communicate the decision to the author. This is done through the Society office.

Approval of the paper sets the publishing process in motion. If a paper has been refused, however, the reviewers may encourage the author to make some changes and resubmit the paper. If an author disagrees with the Papers Committee's decision, he/she may:

- 1) discuss it with the chairperson and ultimately ask for a reversal of the decision;
- 2) write a letter to the chairperson expressing the same sentiments; or
- 3) appeal to the President of the Society.

In summary, what are the primary changes from the past? First, in the previous structure, we did not have senior reviewers, and so the chairperson was responsible for coordinating all reviews. This meant that in most cases the chairperson was not an expert in the subject matter of papers, and so there was a greater chance of inadequate reviews. In fact, some criticism of the system also suggested that "leading edge" papers were sometimes not recognized because of a lack of subject expertise on the Papers Committee. This situation should be improved with the recruitment of experts as senior reviewers for each speciality.

Second, in the past, it was usual for the reviewers to communicate with each other. In the new structure this will be encouraged, particularly when trying to resolve differences in reviews. Third, when an author disagreed with the decision

rendered by the Papers Committee, the only recourse available was an appeal to the President. Now an author can appeal to the Papers Committee Chairperson and the senior reviewer. The latter will be knowledgeable on the subject and thus able to discuss the paper thoroughly.

We believe that the proposed system just described incorporates procedures which will assure both expert review and constructive communication with the author. I hope our members will have a much better idea of the review process we are striving to implement for the TSA, and that it will encourage them to put pen to paper and submit something in the near future.

Kenneth A. McFarquhar is an Actuary at Manufacturers Life Ins. Co. He is past chairperson of the Papers Committee, and current chairperson of the Ad Hoc Committee to restructure the Papers Committee.

Conference Announcement and Call for Papers

The 23rd Actuarial Research Conference to be held August 25-27, 1988, at the University of Connecticut is intended to bring together practicing actuaries and academics to discuss the latest developments in the theory of insurance catastrophes. A particular emphasis of this conference is on the AIDS epidemic. A number of actuaries who have been active in this area will join statisticians and medical researchers to explore the current state of knowledge. There also will be sessions for contributed papers on other topics of interest in insurance catastrophes and various actuarial research work underway.

Individuals interested in presenting papers are invited to submit abstracts by July 1, 1988. Contributed talks will be 30 minutes each. The registration fee is \$75. The Conference is sponsored by the Casualty Actuarial Society, Society of Actuaries, Hartford Actuaries Club and the University of Connecticut's Department of Mathematics and Actuarial Science Program.

For more information and registration forms contact the Conference Coordinator, Dr. Charles Vinsonhaler, at the University of Connecticut in Storrs, Connecticut, phone (203) 486-3944 or 3923, or Mark G. Doherty, Director of Research for the Society of Actuaries, phone (312) 773-3010.

Actuarial Sciences and Uncertainties

by Francisco R. Bayo

In many scientific disciplines, the processes of experimental observation and logical deduction have been applied successfully to reduce the realm of the unknown and the uncertain. Many diverse physical phenomena have been condensed into a few mathematical formulations, some deterministic and others stochastic. It is natural then for actuaries to seek to apply similar formulations more broadly in their discipline, hoping to reduce some of the uncertainties with which they must contend.

Many actuaries feel that merely to adopt a reasonable assumption in the midst of uncertainty is not sufficient. They must arrive at it in a rigorous way by creating a mathematical model — one that they feel brings us closer to certainty or at least helps us understand more fully the nature of the uncertainties. We must understand and accept, however, that true certainty will always elude us.

In recent years actuaries have applied stochastic models to mortality and other processes in order to get a measure of the inherent uncertainty. This is useful when we have a reasonable knowledge of the underlying parameters and their probabilities. But the temptation is to extend stochastic modeling into areas of unpredictable parameters and probabilities. What do some actuaries mean by stochastic projections of financial operations? Do they truly believe that the demographic and economic behavior of the population involved will proceed stochastically according to predetermined parameters and probabilities? Don't they realize that they are not referring to physical processes nor to animals in a carefully controlled laboratory? Their models refer to people with freedom to act under largely uncontrolled conditions.

Science is an ever-improving field. Today's discovery makes yesterday's "knowledge" imperfect. I am concerned that, in our zealous rush toward more rigorous modeling, we will bargain away our professional actuarial judgment in exchange for a false sense of security. Why don't we just openly proclaim with a sense of

Continued on page 14 column 1

Uncertainties cont'd.

dignity and respect that, in spite of all our accumulated knowledge and all our intensive efforts, the principal ingredient in our recommendations is our judgment?

Some may fear a misunderstanding by the users of our services and, therefore, conceal uncertainty with a screen of precision. Others may be afraid of using their best judgment and, therefore, try to hid behind that screen. These are futile attempts; uncertainty is here to stay.

Francisco R. Bayo is Deputy Chief Actuary in charge of long-range projections and economic and demographic research for actuarial purposes at the Social Security Administration. He has been with Social Security for 28 years. Mr. Bayo is also a former Pension Section Council member, author of several TSA papers, and winner of the Triennial Prize.

AERF Selects Monograph Author

The AERF is pleased to announce that Charles L. Trowbridge has been selected to write a monograph on the intellectual foundations of the actuarial profession. Mr. Trowbridge is the retired Senior Vice President and Chief Actuary of The Principal Financial Group.

Mr. Trowbridge's other activities during his distinguished career include service as Chief Actuary of the Social Security Administration, as Professor of Actuarial Science at the University of Michigan, as Editor of *The Actuary* and as SOA President.

The need to define fundamental actuarial concepts moved the Interim Actuarial Standards Board to promote

such a monograph under AERF sponsorship. The monograph will be a broad-brush portrait of the profession, not a textbook. One goal is to stress that actuarial science derives from certain ideas or concepts used by *all* actuaries. The monograph is intended to help unify and coordinate the profession, and be a foundation for building actuarial standards. Our profession suffers from being little known to the public. A clear statement of fundamental actuarial concepts can do much to better define the actuarial profession for others.

As the monograph is being written, a distinguished panel of reviewers will be employed to ensure that all areas of practice are appropriately covered. AERF intends to publish the monograph in time for the centenary celebration scheduled for Washington, D.C., in June 1989.

Dear Editor:

Medicine in the Year 2000

I found Harry M. Oliver, Jr.'s, article in the January 1988 *Actuary*, "What Medicine Will Look Like in the Year 2000," both interesting and thought provoking. I would like to add a few comments.

In most fields, research and improved technology lead to certain efficiencies and cost reductions. Medicine, however, is unique. Research and improved technology seem to result in additional services and improved quality of care. Just think how many routine procedures done today were virtually unheard of only a few years ago. Who knows what will be (or could be) routine medical care in the year 2000?

Obviously, one of the well recognized causes, is the third party reimbursement mechanism. Other contributing causes are the nature of doctors' training (cure the patient regardless of cost), and the fact that the traditional economic supply and demand theories do not appear to apply to health care even in the absence of the third party payor system.

With the expectation that health care will continue to grow at a faster rate than the overall economy and the continued aging of the U.S. population, it would seem that the nation will eventually need to seriously address the possibility of health care rationing in some form.

Raymond J. Marra

Travel Time

As a 1987 FSA who plans to remain close to the plight of actuarial students, I would like to challenge some of the points made by M. David R. Brown in "Travel Time Under the New Examination System" from the November 1987 issue of *The Actuary*. He states that students taking the new parts of old Part 5 in May 1987 were affected favorably overall by the introduction of FES. I contend that they were unfavorably affected.

Mr. Brown states that of the 608 students (767 - 159) who sat for all four parts in May 1987, 191 (88 + 103) would have become ASAs under the old system. This translates to a pass rate of 31.4%, which is significantly below the pass rates of the May 1986 (42.9%) and November 1986 (40.0%) Part 5 exams. It is possible the number of candidates who failed one or more of the sub-parts but would have passed the old Part 5 was underestimated. Mr. Brown does not indicate how this was calculated — were the results of all 608 candidates combined and a pass score determined on a basis consistent with prior years? It is also possible that it is indeed more difficult to pass all parts of the exam, and therefore travel time for candidates will increase considerably in the aggregate.

I would argue the latter, for the following reasons:

1. Of the 159 candidates who did not write all the exams for which they were registered, presumably most, if not all, would have written Part 5 if it were still an all-or-nothing exam. Very likely, some of them would have passed. One cannot assume that since they did not sit for 1 or more exam(s) that they would not have at least attained a minimum standard on the part(s) in question and passed the exam as a whole.

2. It is more difficult for a candidate to be as well prepared for each of the four exams as candidates who are only taking (or taking seriously) one, two or three of them. I am concerned that candidates good enough to have passed Part 5 the first time under the old system will now require at least two exam sessions to get through the four parts, thus adding time as well as frustration to their actuarial student journey.

On the whole, I am in favor of FES. However, the concerns expressed here bother me. Perhaps the set of candidates writing all four exams should be considered separately in determining their pass mark.

Mark S. Selit

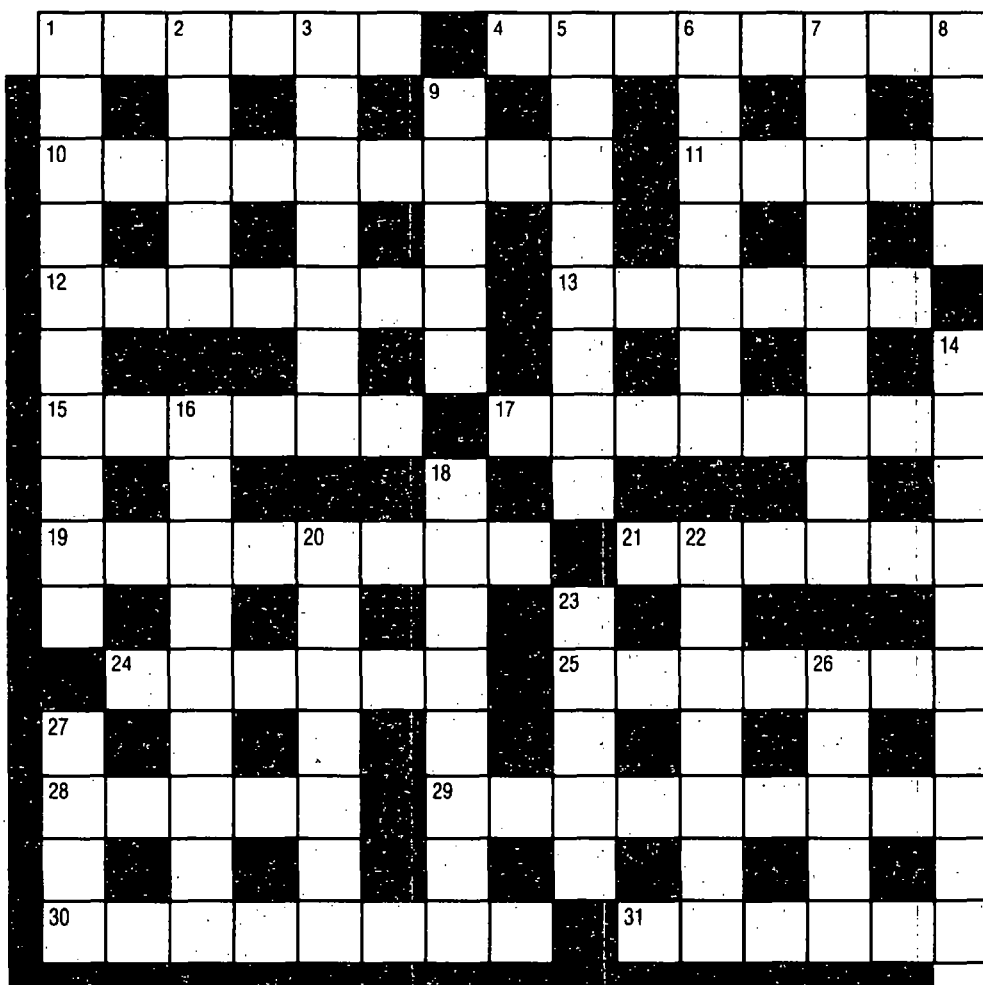
ACTUCROSSWORD

Across

1. Ursa is translated as "The Bear" (6)
4. It follows Illinois in army formation (8)
10. With this sort of lens one could see to the Pole (9)
11. From such entertainers one found Groucho irreplaceable (5)
12. Many set free by royal generosity (7)
13. One medically qualified was in front easily (6)
15. Indoctrinator with no tract in a sheltered place (6)
17. A rep used improperly to obtain agreement (8)
19. Varieties of meat for fellow player (8)
21. This could be prised into arachnid form (6)
24. Agreement in onus distribution (6)
25. Issuing shot so trying to sink (7)
28. One with such poor roles usually pays (5)
29. Chairman, briefly in ancestral surrounding reveals document (9)
30. Think about arranging date and time (8)
31. Prepared for 25 on salads? (6)

Down

1. Unchanging except for a tilt with 1 across (10)
2. Wise man if left and soon about it (5)
3. Aim pots for canvas application (7)
5. Admirer but self-confessed procrastinator (8)
6. Burden remaining a small animal in America (7)
7. Ideas for a word already used (9)
8. Not one different—a tale spun (4)
9. Capital abroad—Kentucky in, too (5)
14. Isolates broken easter eggs, keeping them 23 (10)
16. Having been so identified, a song died away (9)
18. Make no move for national treat (5,3)
20. Ram tusk? No, a different sort of animal (4,3)
22. Vessel for attacking 31 or bats (7)
23. If broken, desired by thespians (5)
26. Peace-loving girl wished a musical goodnight (5)
27. Fruit sounding sound (4)



April's Solution

LATEST EL DORADO
 A O E F H B O I R
 MAKING AFASTBUCK
 A A A I S A M I N
 SHYSTER AMIABLE
 E I O W N R Y
 RULER AUGUSTAN
 Y I Y A T A
 EMPHASIS GREED
 A E E M R J
 LULLABY ARIZONA
 U T R O S M Z C
 MIGHTY KEAROSE
 N R E K S C N I N
 ASTONISH SELECT

100% SOLVERS — **February:** S Cuba, L Fiacco D Baldwin & J Michael, R Frasca, A P Johnson, J Keller, B Packer, R Picard & R Maguire, and J Schwartz.
March: W Allison, F Alpert, D Baillie, J Beaton, M & D Brown, G Cherlin, C Conradi, S Cuba, Mrs C Edwards, M Ellenby, C Galloway, A Garwood, P Godfrey, D Ross & K Hansen, J Hentschel, F Hogan fam-

ily, R Hohertz, HTI Hogs, A P Johnson, H Johnston, O Karsten, S Keys, R & J Koch, D Leapman, W Lumsden, S Magnusson, P Marks, R C Martin, W & J May, S McCuaig, G D McDonald, H Messinger, R A Miller, B Mowrey, J Ochrymowych, E Portnoy, S Powell, R Reed & J Mair, J Robinson, G Sherritt, S Swanson, G Teig, D Weill, R Weitzenkamp, D S Williams, and H Zaret.

Send solutions to: Competition Editor, 8620 N. Port Washington Rd (312), Milwaukee, WI 53217



ACTUCROSTIC

A. Last agony; dying breath. (2 wds)

16 120 75 211 106
26 337 89 142 58 41

B. Young smart aleck.

5 63 87 164 108 52 181
19 238 37 121 178 147 223

C. An S-shaped molding.

85 21 207 180

D. Accuracy; mathematical precision.

187 212 134 10 81 33 175 103 53

E. Erect; exalt; glorify.

29 216 165 78 132 104 192

F. Enough said; the matter is closed. (2wds)

7 191 115 51 97 129 36 220 69

G. Impudent; saucy.

48 232 71 141 113

H. Playful; cuddly.

13 137 100 38 177 200 56 221 82

I. What skippers need in September's America's Cup races.

116 189 166 174 138 152 124 209
4 59 236 25

J. Soft drinks, cocktails and hors d'oeuvres.

229 74 169 206 119 12 40
188 151 214 159 239

K. Wisconsin Gas Company, eg.

90 225 20 110 198 45 162

L. Crucial moment; last minute. (3 wds)

91 107 197 167 135 18 217 44 231 64

M. Sweet-and-sour, cream, and mustard, eg.

54 199 158 105 83 128

N. What happens to a turkey in a heated oven? (2 wds)

1 195 80 109 23 163 55 184

O. Escape clause; legal way out.

57 17 99 179 143 123 73 224

P. Know-it-all; adult smart aleck.

230 34 93 173 14 201 156

Q. Leyte Gulf, Coral Sea and Midway, eg. (2 wds)

98 50 86 210 161
122 68 190 39 133 227 153

R. When is it if you are listed on the exam results? (3 wds)

2 126 193 46 148 185
170 219 101 157 182 235 79

S. What is proper; seemly. (with The & 2 wds)

136 3 65 203 183 125 150 32 94 233

T. Tense; under a strain.

222 176 62 95 112 8 145

U. By no means; never. (4 wds)

15 77 127 171 43 205 27 102 155
146 6 160 88

V. Spurt; make a burst of speed. (2 wds)

47 208 84 139 194 226 204 60 118

W. Moral principles.

67 202 130 92 28 117

X. Surmise; deduce.

215 30 114 186 172 70

Y. Papers; discussions.

76 196 168 31 131 218 49 144

Z. A game of chance.

24 213 72 149 111

AA. Metallic element resembling the rare earths.

228 35 96 66 11 42 140

1	N	2	R		3	S	4	I		5	B	6	U	7	F	8	T		9	Y	10	D	11	AA	12	J		13	H	14	P	15	U	16	A		17	O	18	L					
19	B	20	K	21	C	22	Y	23	N	24	Z		25	I	26	A	27	U	28	W	29	E	30	X	31	Y	32	S	33	D	34	P		35	AA	36	F	37	B	38	H		39	Q	
40	J	41	A		42	AA	43	U	44	L	45	K	46	R	47	V		48	G	49	Y	50	Q	51	F	52	B	53	D		54	M	55	N	56	H	57	O	58	A		59	I		
60	V	61	Y		62	T	63	B	64	L		65	S	66	AA	67	W	68	Q	69	F	70	X	71	G	72	Z		73	O	74	J	75	A	76	Y		77	U	78	E	79	R		
80	N		81	D	82	H	83	M		84	V	85	C	86	Q	87	B	88	U	89	A		90	K	91	L	92	W	93	P	94	S		95	T	96	AA	97	F		98	O			
99	O	100	H		101	R	102	U	103	D	104	E		105	M	106	A	107	L	108	B	109	N	110	K	111	Z	112	T	113	G		114	X	115	F	116	I	117	W		118	V		
119	J	120	A	121	B		122	Q	123	O	124	I	125	S		126	R	127	U	128	M		129	F	130	W	131	Y		132	E	133	Q	134	D	135	L	136	S	137	H	138	I		
139	V	140	AA	141	G		142	A	143	O	144	Y	145	T		146	U	147	B	148	R		149	Z	150	S	151	J	152	I		153	Q	154	Y	155	U	156	P		157	R			
158	M	159	J		160	U	161	Q	162	K		163	N	164	B	165	E	166	I	167	L	168	Y		169	J	170	R	171	U	172	X		173	P	174	I	175	D		176	T			
177	H	178	B	179	O	180	C	181	B		182	R	183	S	184	N		185	R	186	X	187	D		188	J	189	I	190	Q	191	F	192	E	193	R	194	V	195	N	196	Y	197	L	
198	K	199	M	200	H	201	P		202	W	203	S	204	V	205	U	206	J	207	C		208	V		209	I	210	Q	211	A	212	D	213	Z	214	J	215	X	216	E		217	L		
218	Y	219	R	220	F	221	H	222	T	223	B	224	O		225	K	226	V	227	O	228	AA	229	J	230	P		231	L	232	G	233	S	234	Y	235	R	236	I	237	A	238	B	239	J

LAST MONTH'S SOLUTION: D(ietrick E) Thomsen, (Experimenting with) Forty Trillion (Electron-) Volts, "Most of the unknown radioactive particles they seek will be too short-lived to make much direct impression on the detectors, so the presence of any of them will be revealed by the identity and behavior of their decay products. The name of the game is by their fruits shall ye know them." SCIENCE NEWS, November 14, 1987.

