THE PENSION SECTION

By Charles Farr

Early 1983 saw the start of the formation of the Society's Pension Section. A 25-member organizing committee polled the membership of the Society to determine their level of interest. An overwhelming response of over 1,000 members spurred the Board of Governors to authorize the Section. Invitations to enroll were mailed in June 1983 and about 900 actuaries became eligible to vote in the first election of a Council joining the Section and paying their dues.

The first scheduled meeting of the newly elected Pension Section Council was on Nov. 14, 1983. It was largely organizational in nature, but the outlines of the directions of future efforts began to emerge.

Work started on examining the feasibility of publishing a pension journal. The education of the pension actuary was felt to be a priority area of effort, aimed at reviewing the present syllabus and making whatever changes judged to be necessary in the light of the needs of today and the future. Continuing education of the pension actuary was also felt to be an ongoing concern.

There was some feeling that there were enough professional meetings already devoted to pension topics, and that it would be inadvisable to duplicate what was already being done. On the other hand, interest had already arisen in connection with the need for coordination and liaison with the Program Committee of the Society. Initially, this interest was expressed in terms of the Section providing assistance to the Program Committee of the Society in the selection of program participants or topics, and even conducting specific sessions.

MAIL ALERT

The First Ballots for the Society's 1986 Elections were mailed to all Fellows on April 3, and hence should have been received prior to the arrival of this issue of *The Actuary.* To be valid, ballots must be returned to the Society office by May 5.

EXERCISE YOUR FRANCHISE!

The Committee on Elections has noted with some dismay the declining percentage of Fellows of the Society who have participated in Society elections in recent years. These figures for recent elections were as follows:

1985	48.9%
1984	50.5%
1983	50.9%

Undoubtedly there are reasons for the declining percentage of eligible voters exercising their franchise right. Apathy is undoubtedly one reason. Inability to distinguish between the qualifications for office of the various candidates is undoubtedly another reason. The complexity of the ballots is also a contributing factor. The Committee on Elections has tried very hard to find a happy medium between providing adequate information to eligible voters and the need to keep the ballot and the accompanying instructions reasonable.

The profession's ability to discharge its responsibilities to its publics is largely determined by the quality of the services provided to the membership in education, continuing education, and research. The Society's performance in providing services to its membership will in turn only be as good as its leadership. With your vote the quality of that leadership can be guaranteed. Without your vote it cannot be guaranteed. □

NON-TRADITIONAL PERSPECTIVES

By James Ramenda

It is fashionable these days to characterize actuarial jobs as either "traditional" or "non-traditional". In this context, most would place company valuation in the traditional category. Yet, this function is performed most frequently by millions of investors who are continually offering, bidding for, and exchanging shares of publicly traded insurance companies in a setting most would consider non-traditional for actuaries — the stock market. My experience as an actuary working for a member firm of the New York Stock Exchange leads me to conclude that the traditional skills associated with actuarial training are quite appropriate for the activities of a stock brokerage.

To be sure, my firm is highly specialized. Our primary focus is to provide investment research opinions on insurance companies to institutional investors. Transactions are conducted through our own trading desk and we "make a market" in a number of over-the-counter issues. The chief advantage an actuary has in this area is conceptual familiarity with the technical aspects of a company's operations that are critical in formulating an investment option. Having reached an opinion, the greatest challenge for an actuary is communicating the technical basis for the opinion in a meaningful way to investors of widely varying degrees of insurance knowledge. The "story" must hold together, but cannot rely on analysis expressed in a manner beyond the reasonable grasp of portfolio managers, who themselves may be considering dozens of other companies in any number of industries.

The five actuaries in my firm also participate in another somewhat related

EDITORIAL

LATER RETIREMENT

The logical case for encouraging Americans to stay longer in the work force — to retire later — has been presented elsewhere, and is far too complex to be treated here. Suffice to say that it is built upon a combination of demographic, economic, and psychological considerations, and involves far more than the financial health of any retirement system.

Yet the first indication that workers may eventually stay in the work force longer comes from the 1983 amendments to the Social Security Act. The framers of this legislation may have had only SS solvency in mind, but they nonetheless took an important first step toward a later retirement age.

Under the law now in effect the Normal Retirement Age (NRA) stays at 65 for another 15 years, then moves over the next 25 years (slowly, and with one long halt) to age 67; but there is no change in the early (earliest) retirement age — it remains at age 62. The NRA determines the *amount* of benefit, but has no *direct* effect on when it begins. Note also that the Medicare eligibility age remains at 65.

It seems quite possible that the 1983 amendments will have very little effect on retirement age patterns, and hence on the crucial worker-to-retired ratio. The substantial cost savings projected for OASDI can be realized under either of two conflicting scenarios, only one of which is the movement of *actual* retirement ages upward. The other assumes no effect on the ages at which benefits are claimed, but smaller benefits due to the more stringent early retirement reduction factors that flow from the later NRA. (The age 62 factor has long been 80%, but it becomes 70% 40 years hence when the NRA reaches 67).

Social Security actuaries, as they project the long-range OASDI picture, must choose one of these scenarios, or some blend between. The more likely depends in large part upon what other plans may do. Surely if private plans amend their NRAs to stay in step with SS, actual ages of retirement would seem to be eventually affected. If not, the private plan may encourage the maintenance of present retirement patterns, and in the long run have the effect that the employer "restores" the SS cut.

It would seem, then, that the public policy question is still open — the future trend of actual retirement still obscure. Advocates of upward movement in the average retirement age would like to see the SS early retirement age move with the NRA (eventually reaching age 64). some movement in the private plan area (and in plans for government employees), and (for consistency if nothing else) a Medicare eligibility age that moves slowly to 67.

For retirement age reformers time may not be an immediate factor. The adjustments need to be accomplished by the end of the century, but not necessarily tomorrow. Pension actuaries should realize that they have a role to play; and that, for getting movement started, today is not too soon.

C.L.T.

ANOTHER NEW FEATURE?

This same column of the March issue carried what might be considered a trial balloon, a suggestion (rather than an announcement) as to a future feature. In this issue we employ the same technique to try out another idea for a new *The Actuary* feature.

We base this idea on the mathematical background common to all actuaries. Although most are pretty far removed from mathematics, we must have been interested once, and we may be still.

Surely *The Actuary* could carry several times each year a column presenting mathematical facts, oddities, problems, puzzles, and the like; or items of math history. *The Actuary* has always had some math component (see for example "Exam Memories" in this issue); but it has tended to emphasize other things. Would readers like a little movement in the math direction? Yes or no, let us hear from you.

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As one small example of the type of item that such a column might contain we here present a seeming paradox:

We are told that the Arabs brought the modern decimal system of writing numbers to Europe in about the 9th century, though the idea of "place" or "position" upon which the system is built goes back to some much earlier Hindu.

Like several of the ancient languages, Arabic is written from right to left, and hence appears to westerners as "backwards" or "in mirror image".

Even so, the current year appears in Arabic newspapers as 1986, not as 6891. In fact, all numerical representations appear "correct" to westerners. Words and sentences seem to be in mirror-image, but not figures.

Perhaps the Arabs express the smaller numbers first (i.e. the units place, followed by the tens, the hundreds, etc.) If so, the *two* order reversals would cancel each other out, making a 1986 representation logical under both systems. At least, when we asked, this is what we were told.

But the foregoing explanation raises other questions. If a telephone number were listed in an Arab directory as 198, would the six be dialed first? Would Arabs *say* the current year as the Arab equivalent of 6891? In what order does

The Pension Section

Beginning with the February 1984 meeting of the Council, discussions touched on many topics in search of the directions that the Section's efforts should be channelled. By-laws were developed, election procedures for the 1984 elections were decided on, representation on the Council of pension actuaries by employer, specialty and geography was discussed, work continued on the Section's journal, co-sponsoring seminars as a part of continuing eduation of the pension actuary seemed natural, the nature and frequency of communication with Section members was explored, coordination with the Society's Program Committee for future Society meetings was examined, and the level of member dues was decided.

By the end of its first year, the Pension Section Council felt that the Section had only begun on its journey, that the outlines of its mission were becoming clearer, and that progress would be possible during the ensuing year. Specifically, there was agreement with the main thrust of the report of the Society's Planning Committee: That Society services to pension actuaries can and should be improved, that the Pension Section should take the initiative and provide the leadership, and that the efforts should be directed at the education and research needs of pension actuaries who are Society members.

Some of the hoped-for progress was realized during 1985. The first issue of *The Pension Journal* was published in March, including a report of the Pension Section Council to Section members and five actuarial articles. Co-sponsorship of six seminars, providing opportunities for continuing education for pension actuaries, was arranged.

Another New Feature?

an Arab stenographer type the numbers? We suspect it isn't as simple as our informant implied.

No doubt our readers from the Islamic world, and there are some, can set us straight.   □

Deaths

John H. Bell	FSA 1949
Robert C. Crisp	FSA 1978
Peter A. Goodsell	FSA 1976
Joseph W. Hahn	FSA 1959
Thomas Irvine	FSA 1945
Maurice H. LeVita	ASA 1932
Francis M. Smith	FSA 1921

Work began on an intensive program to review, revise and update the pension portions of the syllabus, drawing into the effort dozens of pension actuaries representing a broad spectrum of the profession. A Section Program Committee, chaired by a member of the Council, selected the topics, obtained the program participants and organized 14 pension-related sessions for the 1985 annual Society meeting in New Orleans. Liaison was established with other pension-related committees of the Society, with a committee of the Academy, and of the CIA. The second issue of the Section's publication, under a new name *(The Pension Forum)* was published in December, with plans for a quarterly frequency.

The Pension Section has a membership as of February 1986 of over 2,300 actuaries, making it the largest Society section. About 81% of the members are in the United States, 15% in Canada and the rest in other countries. About 72% are consulting actuaries, 21% are employed by insurance companies and the rest are in government, academia or other employment.

The future beckons with opportunity for the expansion of services to the pension actuary. Coordinating the Section's activities with those of other committees already in the pension area can be greatly expanded to the benefit of all. Systematically cataloguing and helping to arrange pension-related research will respond to a need often voiced by pension actuaries. The surface is barely scratched in the area of continuing education of the pension actuary, and developments in the direction of standards for such continuing education will place great emphasis on the need for progress here. Involvement of a larger and larger number of members of the Section in these activities, and the other activities mentioned earlier, must also continue to be a goal.   □

SOCIAL SECURITY

3rd edition, 1,076 pages
Robert J. Myers

Reviewed by Benjamin I. Gottlieb

If you want to learn about Old-Age, Survivors, and Disability Insurance or Hospital or Supplementary Medical Insurance, then you are going to need this edition of Robert J. Myers' *Social Security.* This book can make an expert of every actuary who wants to become one. The expertise will not come painlessly, though, because the book is long and detailed, including a great deal of historical background. And it is thorough, covering Public Assistance, Railroad Retirement, Unemployment Insurance, Workers' Compensation and social security systems in other countries.

Myers advises readers who are interested in broad concepts to skip the footnotes and appendices, where a lot of the details appear. The reader will be able to find answers to specific questions without difficulty, however, because the book has an 11-page table of contents at the beginning and two indices at the back. The book concentrates heavily on facts, but there is some relief from the detail because Myers has a gift for explaining why certain provisions work the way they do.

Myers also has no hesitancy about stating his opinion of provisions or proposals for legislative change. While expressing his opinions is incidental to his main purpose, it is hard to tell whether his opinions are middle-of-the-road or whether his preeminence among actuaries on the subject of Social Security makes his viewpoints seem middle-of-the-road. Most actuaries trace their knowledge of Social Security back to articles, speeches, and books by Robert J. Myers, including the two earlier editions of this one.

Social Security will continue to be an important topic of political debate. This debate is centering on the startling realization spreading around the country that our resources are limited. Actuaries should begin to play a key role where cost considerations are paramount. We may be the only debate participants who have the facts and figures. Reading this book will certainly give us a framework for them.

The book is published by Richard D. Irwin, Inc., Homewood, Ill. 60430.   □

Non-traditional Perspectives

non-traditional field. Our in-house portfolio managers currently perform investment services for over 40 insurance companies. Here, our actuaries may be asked to help develop the investment strategy for a company, particularly with regard to asset-liability management. While non-traditional by definition, this type of activity is quickly becoming a "normal" actuarial function in many insurance companies.

A third area in which actuaries play non-traditional roles in our firm is in our management consulting/industry research activities. Our subject matter here is generally in the realm of broad strategic considerations. Many of the projects relate to the financing, purchase, or sale of a company and it is not uncommon for us to enter the picture after an actuarial valuation already has been performed. We often find that general management consultants, investment bankers, and senior management, itself, may need help in identifying/optimizing the strategic implications of such information.

In terms of generic skills, each of the various functions I've discussed basically consists of converting technical knowledge into a useful business decision and communicating the result to a non-actuarial audience. The key word, of course, is communication. Since Preston Bassett's editorial (November 1984) on communication skills, *The Actuary* has seen a marked increase in the number of articles dealing with this subject in one respect or another. Most, I would submit, are of the tone that actuaries generally lack communications skills commensurate with their analytical abilities. Without passing judgment on this issue, I think it is safe to assert that this is the traditional view held by non-actuaries who have dealt with actuaries in traditional settings.

Fortunately, in the non-traditional environment I have described, one is freed from this perception to a large extent. Institutional investors don't know that actuaries are not supposed to be able to communicate since the actuaries with whom they deal are usually CFO's or CEO's — typically people with demonstrated communications skills. In fact, most of our clients, as well as a good number of my colleagues at work,

do not know who in the firm is an actuary. Those who can identify the actuaries would be extremely hard-pressed to explain what an actuary is.

This lack of familiarity has other benefits, as well. For example, actuaries in non-traditional areas can feel free to express viewpoints on subjects ranging from marketing to organizational design (and importantly, financial matters) without the audience bracing themselves for an "overly-conservative" or "uncreative" perspective.

Of course, a degree of cross-training is necessary to achieve this type of environment. All of the actuaries in my firm are either M.B.A.'s or registered "reps". We also have a number of C.P.A.'s and C.F.A.'s, all of whom are also M.B.A.'s and/or registered reps.

I'd like to use this idea of cross-training as a framework to put forth a few ideas from a non-traditional perspective on the current state of actuarial practice in North America. First, I see no reason why actuaries are not more involved in investment activities, such as they are in the United Kingdom. While this point is probably not controversial, my second contention that life and property-casualty actuarial training be unified may inspire some comment. Detractors may argue that this would pack much more material into the exams, about half of which, on average, would be totally foreign to the work experience of the student. Certainly, the number of people who cross industry lines in their careers is limited.

My response (and I am a member of an exam part committee) would be that elimination of irrelevant and/or redundant material currently on the exams could provide ample margin for fresh material. As to the limited number of life-PC careers, it may well be a matter of distinguishing cause and effect. I personally think that an actuary, as a professional, should be reasonably well-versed on all major insurance businesses.

In closing, I'll try to smooth any feathers ruffled by my foregoing comments on the exams and explain why I believe the process is particularly important for those considering non-traditional areas. Yes, students may rightly feel that much of the study material is redundant, irrelevant or even unintelligible. It is also true that exam questions may sometimes seem am-

biguous and ill-defined; or they may seem ridiculously detailed. However, students who feel that the exams are therefore poor preparation for their careers, whether traditional or non-traditional, should realize that it is these characteristics which are most like "real life". This is not to say we should strive for an imperfect exam process, but rather that such imperfections are a natural consequence of passing a large and changing body of information through the imperfect screen of human communications — remembering that communications is not just conveying what one means, *but understanding what others are trying to convey.*

This is a particularly important realization for students considering non-traditional careers, where communications generally can be expected to play a major role. Finally, of course, *such students should recognize that it is* the technical content of the exams, however steeped in minutiae, which provides the actuary with a niche in the non-traditional environment. □

FROM USURY TO INTEREST

By Murray Projector

USURY: Definitions
(1) The lending out of money with an interest charge for its use: the taking or practice of taking interest.
(2) An unconscionable or exorbitant rate or amount of interest, specifically interest in excess of a legal rate charged to a borrower for the use of money.

Between definitions (1) and (2) are 2,000 years of Western history, beginning with Biblical strictures against charging *any* interest and reaching today's sophisticated credit economy, in which interest, per se, is accepted and only excessive interest is illegal.

The narrow concern in mathematics is usually with the mathematics of interest, how it is measured, and how it functions mathematically. It is difficult to understand why such an essential factor in business and commerce was ever outlawed, and why usurers (i.e., takers of *any* interest) were despised as heinous criminals. A broader concern is desirable.

The 2,000 year struggle which changed the status of interest from a malevolent to a benevolent factor was not monotonic; there were advances

From Usury to Interest

and setbacks from century to century, from country to country, from church to church.

Interest charged for production loans was the troublemaker. The condemnation of interest charged by one neighbor for his neighbor's consumption loan in an agricultural society, which was the concern of the Biblical authorities, was generally accepted. But the same condemnation, applied to an investor lending money to a merchant for business purposes, caused controversy.

Attempts were made to distinguish loans by purpose, and to defend interest for business purposes while condemning it for personal consumption loans. Some held fast against interest in any case on moral and/or economic issues.

Controversy reached its peak in the 16th century. The practice of lending money at interest was by then widespread even though generally prohibited by church and secular law. Jews, Catholics, and Protestants were immersed in the struggle; kings, scholars, merchants, artisans, lawyers, theologians, and ministers all took sides, one side, both sides, or all sides. It was a period when religion was a seven-day a week concern not limited to the Sabbath Day. The language for controversy was not dull; the arguments hold our in-

LIFTED

The Actuarial Review, the quarterly newsletter of the Casualty Actuarial Society, has occasionally carried a feature entitled "Lifted from *The Actuary*". The first of the 1986 issues of *The Actuarial Review* includes a full page of material lifted (with permission) from our September and October issues.

Those relatively few actuaries who are members of both Societies may wonder why they are twice exposed to parts of three stories. We only ask these readers to remember where they saw it first. □

terest on their own merit, not just for being quaint.

Yet controversy continues under new names. The determination of a just price is still subjective. Business necessity is still in conflict with personal morality; virtue is never as respectable as money. Conflicts always accompany the quest for uncommon wealth.

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Editor's Note: Like another article with the same authorship appearing in an earlier issue, this one was written some time ago, but was recently submitted because of its relationship to other articles in *The Actuary.* Here the reference is to the editorial in the April 1985 issue, and to the follow-up on Islamic Life Insurance in October. □

LOMA'S WORK WITH ACTUARIES

LOMA's Financial Planning and Control Division involves the work of nine committees of life insurance executives dealing with auditing systems and internal controls, corporate planning, cost accounting, cost analysis and profitability studies, data processing financial issues, expense budgeting, financial controls and reports, investments, and treasury operations.

In addition to the work of the committees, the Division sponsors the LOMA/Ernst & Whinney Life Insurance Accounting Program, Life Insurance Internal Audit Course, and Intercompany Cost Analysis Program. The Division also has a Financial Officers' Forum every three years, and conducts five to six other conferences, roundtables, and seminars annually dealing with current financial issues. The Division also publishes a number of research reports and conference proceedings each year.

In part because such topics as business segmentation, asset/liability management, profitability assessment, and C-3 risk analysis are of concern to both actuaries and financial officers, an increasing number of actuaries are holding financial and accounting positions in the industry and thus working more closely with LOMA. LOMA looks forward to the increased participation of actuaries in its work and more involvement with the Society of Actuaries and other organizations resulting from this evolution in life insurance financial management.

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Editor's Note: We are pleased to publish the preceding three paragraphs, which were written by Stephen W. Forbes, a Senior Vice-President of LOMA, and which came to us via Linden Cole, the Society's Director of Education. □

MEMBERSHIP GROWTH

Comparing the membership statistics for Nov. 1, 1985 shown in the 1986 *Yearbook* with the similar statistics for a year earlier, one finds that the annual growth rate of Society membership was 5.6%, up significantly from the 3.7% of a year ago.

This growth, however, was not uniform. By membership class, ASAs grew faster than FSAs; by type of employment, consultants grew faster than employees of insurance companies. The table following presents an abbreviated summary:

By membership class	Number	% of total	Annual growth rate
FSA	5409	55.3%	3.8%
ASA	4370	44.7	7.8
By type of employment			
Insurance company	5007	51.2	4.6
Consultant	3391	34.6	7.4
Other (including retired)	1381	14.2	4.9
Total	9779	100.0	5.6

Those who like round number approximations can think of total membership as 10,000 (and growing), FSAs as 55% of the total (declining), insurance company employees as 1/2 + (declining), and consultants as 1/3 + (increasing). □

Coming in May Issue

Another "Actuarian"

A COMMON FINANCIAL LANGUAGE — A KEY TO OPENING THE DOOR OF CHANGE

By Robert D. Shapiro

The North American business environment, particularly as it relates to the financial services business, has changed. Most of us expect continued substantial change over the next five years.

Current customers, other consumers (future customers?) and competitors will be different than in the past. Hence product design, pricing and financial management will need to evolve into a fundamentally different form.

Although the development of appropriate new marketing and organizational strategies are essential in virtually every insurance organization, they are unlikely to create the needed level of success without simultaneously developing a consistent, integrated financial management system. Generally this "common financial language" will be characterized by features such as:

1. Characterization of the company as a collection of businesses, not as a collection of functional technicians. The language is one of markets, distribution systems and product lines, not one of investment managers, actuaries and marketing managers.

2. Linkage of the design and pricing of products to specific markets and market needs, not the development and sale of generic products across all markets. There will be a distinct determination of the relationship of incremental cost (and incremental price) to the value-added in meeting and servicing specific customer needs.

3. Motivation towards managing for desired results, not "build in assumptions and wait". There will be specific, strategy-related, plans and financial standards established for each line of business and major "performance module". "Performance modules" would include, for each major line of business, underwriting and risk management, administration, investment and marketing.

4. Development of a compatibility of interest between the company and its distributors, not a concept where there is a perceived "captive agency" (or more appropriately in many career agency organizations, a "captive home office"!) There will be clear definition of the various risks involved in the company/distributor joint venture, with definition of the appropriate sharing of risk and related sharing of potential rewards for managing each of these risks properly.

The changes suggested above have a number of significant implications for the insurance company. Many of these reflect a substantial change in perspective. For example, companies will develop plans, establish systems and set performance standards that focus on *managing customers* instead of on managing policies. In such an environment, where the customer (not the policy) is important, the existing inforce and the potential future inforce are very closely related. In this kind of environment, traditional allocations of expenses, taxes and investment income between existing and new policies have to be re-examined.

As the focus changes from products and distribution systems to customers and markets, the "hype" of the last five years about unbundling products will change to rebundling risk, investment and administrative services in special ways (a) fit to the needs of targeted new markets and (b) leveraging the company's competitive strengths.

With markets driving company strategy (instead of statutory or GAAP financial statements), pricing assumptions, corporate objectives, and unit financial goals will be defined in different forms and in different amounts. Line and performance module manager compensation will be derived directly from performance relative to the established financial goals.

"Important" performance standards in the future will include items such as (a) the increase in value-added during the year, (b) measures of innovations or new developments, (c) measures of customer satisfaction, and (d) measures of quality (within the appropriate definition of quality for the company).

DOES ARIA READ TSA?

A recent paper in the *Journal of Risk and Insurance* entitled "What Are the Major Journals that Members of ARIA Read?" is the work of two professors at Laval University. This paper explores the ranking of journals, based on their relative quality and impact, as perceived by members of the American Risk and Insurance Association. ARIA is made up of professors of insurance in universities or colleges. The *JRI* has the same relationship to ARIA as the *Transactions to the Society*.

Society members may be interested to know that *TSA* appears among these rankings, indicating that our journal has *some* readership and *some* reputation among insurance professors. However, it is far from being the ARIA favorite among the 80 or so journals analyzed. The paper displays three rankings for each journal, based on "familiarity", "quality", and "impact". Familiarity and quality mean about what the names suggest, while impact is a melding of the other two.

Excerpts from the rankings shown in the paper appear below. Readers may make of this what they will.

Journal	Rankings based on		
	Familiarity	Quality	Impact
Journal of Risk and Insurance	1	11	1
Journal of Finance	4	1	2
Econometrics	15	3	5
Harvard Business Review	5	26	6
CPCU Journal	2.5	50	7
CLU Journal	2.5	64	9
Transactions of the Society of Actuaries	11	21	11
ASTIN Bulletin	32	33	25
Social Security Bulletin	16	66	31
Journal of Institute of Actuaries	n.a.	17	35

21ST ACTUARIAL RESEARCH CONFERENCE

Oct. 29, 30 & 31, 1986. Ohio State University, Columbus, Ohio. Risk, Valuation and Surplus.

The theoretical foundations for the work of the valuation actuary: the individual C-risks; their interdependence; determination of surplus needs.

Further information:
Robert B. Brown
Department of Mathematics
Ohio State University
231 W. 18th Ave.
Columbus, OH 43210
(614) 422-5584

A Common Financial Language

Asset shares and unit profit studies will continue to give way to projection based pricing, wherein the starting point is a quantification of the company's future plans and not assumptions derived from a no-longer-relevant historic base.

Winning companies will be those that pay attention to where they want to go, and not to where they've been. They will stick to common sense fundamentals in managing businesses and people. Many traditional sacred cows (like "life insurance is sold and not bought") will be slaughtered, at least in many sectors of the marketplace. Today's commonly discussed strategies like "alternative or complementary distribution" and "funnelling more products through our existing agents" will give way to strategies like "now that we have the customer, how do we keep him/her and develop him/her" and "what complimentary needs can we effectively meet to tighten our control of the customer".

Nothing is more dangerous than yesterday's successes...or apparent successes. Management needs to anchor its thinking and develop its plans on the realities of the future, not the relics of the past. Actuaries can and should play a critical role in this process through clearly defining, measuring and managing the evolving new integrated standards for future performance...the development of a common financial language. □

LETTERS

Exam Memories
Sir:

I believe Henry C. Unruh (February) must have been misinformed when he was told that C. A. Spoerl took 40 hours to solve the following problem: "A bag contains m black balls and n white balls. The balls are taken out one at a time and placed in a straight line. Find the most probable number of contacts black with white." This is a fairly straightforward problem involving partitions and I can't imagine that it would have taken that long to solve.

There will be an odd number of contacts if the first and last balls are of different color. There will be $2k-1$ contacts if there are exactly k partitions of black balls interlaced with exactly k partitions of white balls. Proposition XXV in "Choice and Chance" by Whitworth reads: "The number of ways in which n indifferent things can be distributed into r different parcels (blank lots being inadmissible) is the number of combinations of $n-1$ things taken $r-1$ at a time.

Let $C(n,r)$ represent the number of combinations of n things taken r at a time. Let $P(k)$ represent the numerator of the probability of k contacts. The denominator will be $C(m+n,n)$. Let * denote multiplication and / denote division.

$$P(2k-1) = 2*C(m-1,k-1)*C(n-1,k-1)$$
$$P(2k+1) = P(2k-1)*(m-k)/k*(n-k)/k$$
$$P(2k+1) = P(2k-1)*L(k)$$

Assume that $m > n$ and consider only an odd number of contacts for the time being. The largest number of contacts possible is $(2n-1)$ and this occurs when each of the n white balls (except for the one at an endpoint) is in contact with a black ball on each side. Also, $P(2k+1)$ is greater than $P(2k-1)$ so long as $L(k) > 1$. $L(k)$ drops below 1 somewhere between $k=n/2$ and $k=m/2$. Therefore, the most probable number of contacts is $(2k+1)$ for the largest value of k for which $L(k) > 1$, subject to a maximum value of $(2n-1)$.

Look now at an even number of contacts. This will occur only when both the first ball and the last ball are of the same color. There will be 2k contacts when $(k+1)$ partitions of one color are interlaced with k partitions of the other color.

$$P(2k) = C(m-1,k)*C(n-1,k-1) + C(m-1,k-1)*C(n-1,k)$$
$$P(2k) = P(2k-1)*(m+n-2k)/2k$$
$$P(2k) = P(2k-1)*M(k)$$

M(k), just like L(k), drops below 1 somewhere between $k=n/2$ and $k=m/2$. Therefore, the most probable number of contacts is 2k for the largest value of k for which $M(k) > 1$, subject to a maximum value of $(2n-1)$.

The final answer should be the larger of the values obtained by looking at the odd and the even contacts. There may not be a unique answer since two adjacent values could have the same probability.

Ernest A. Arvanitis

****

Sir:

My solution to Henry Unruh's problem of m black balls, n white balls, and the most probable number of black-white contacts is as follows:

Let m and n be equal or greater than 2. Picture all combinations of $(m+n)$ balls laid out vertically before you. Now concentrate on the first two rows.

1. The number of combinations for which the first two balls are white is $C(m+n-2,n-2)$.
2. The number for which the first two balls are black is $C(m+n-2,m-2)$.
3. The remaining combinations have one white and one black, representing a "contact". The number of these is $C(m+n, n) - C(m+n-2, n-2) - C(m+n-2, m-2)$.

Letters

4. There are $(m + n - 1)$ pairs of two consecutive rows. Realize that each such pair of rows has the same total number of contacts, when you consider all combinations.

5. The expected number of contacts is

$$E_c = \frac{(m+n-1)}{C(m+n, n)} \{C(m+n, n) - C(m+n-2, n-2) - C(m+n-2, m-2)\}$$

6. This reduces to $E_c = \dfrac{2mn}{m+n}$

7. Note that *m, n,* or both may now be 0 or 1, and the formula will still apply.

Tony Bertronski

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Sir:

If the most probable number of contacts means the expected number, I think I may suggest an answer to Henry Unruh's problem.

By calculating the mean number of black-white contacts for 1, 2, or 3 balls of each color, we can relatively easily obtain the following formula: $\dfrac{2 \times m \times n}{m + n}$.

I can't understand why it should take 40 hours to solve this problem. Fifteen minutes, the time that the E&E Committee allows, should be enough.

Ghislain Nadeau

Editor's Note: Using $m = 4$, $n = 3$ as an example, the probabilities of 1, 2, 3, 4, 5, or 6 contacts, by the Arvanitis analysis, are 2/35, 5/35, 12/35, 9/35, 6/35, and 1/35 respectively. The mean of this distribution is 24/7, as both Mr. Bertronski and M. Nadeau have correctly determined; but the most probable number, the mode of the distribution, is 3.

Would a 1940 exam committee have given partial credit for the $2mn/m + n$ solution? Or would it have viewed this as a correct answer to the wrong question, and awarded a grade of zero?

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Actuarial Demographics I
Sir:

Dwight Bartlett (January) asks for a theory to explain why nearly two-thirds of 1960 FSAs fall in the alphabet range A-K.

I recall reading of the "tail-end trauma" associated with the schooling of individuals whose names fell at the end of the alphabet. It was suggested that these were less confident and hence less successful due to years of waiting as grade reports were read off by teachers. While the A's and B's were congratulating each other on their fine marks, the S's, T's, and W's were still agonizing over what was to come.

I have seen the same sort of bias within my company's officer structure. Our 1984 officer list reveals that 49 fall into A-K and 43 into L-Z. This seems like a modest departure from expectation, except that the 12 most senior officers are split 9 to 3, meaning that all others are split 40-40. These results could be traceable to a blip in the statistics, since the numbers are small.

I am also aware of the theory expressed by Niels Fischer (March) that graders get burned out before they reach the papers of those with high candidate numbers. In my time candidates were assigned numbers alphabetically, and Niels tells us that the same was true in 1960.

Robert E. Hunstad

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Actuarial Demographics II

Sir:

The letters about actuarial-productive high schools prompts me to offer the following.

In 1955 Ridgewood (N.J.) High School produced four FSAs from a graduating class of 365. While Ridgewood is a popular place of residence for employees of New York City's insurance companies and consulting firms, a production rate of close to 11 per 1,000 is impressive.

James C. Smith

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PIA Program
Sir:

The Office of the Actuary of the Social Security Administration has recently made available a BASIC program to compute Primary Insurance Amounts. An attempt is currently being made to modify this program to run on Apple II series personal computers.

As a planning aid, I would appreciate input from the actuarial community on the potential interest in such a program. I am particularly interested in estimating the number of potential users and the amount of memory the majority of users have available.

Interested readers can write me at the Office of the Actuary, 6401 Security Boulevard, Room 4-N-29 Link, Baltimore, MD 21235.

Roy Ferguson

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Legionnaires
Sir:

In my circular letter sent last November to 700 Society members on the retired list, and reported in your February issue, I invited estimates of how many would have contributed material or anecdotes of bygone days by Jan. 31, 1986. Honors for accuracy go to Andrew Vogt (63), and Thomas N. E. Greville (75), the correct answer being 54.

Every estimate was on the high side. I attribute this to a belief commonly held that what one does is the normal thing to do. If we could have learned what guesses a sample of non-responders had in mind, some low-side forecasts might have turned up.

Another cause of the return being less than 8% unquestionably is that, despite my urging not to remain silent on the grounds that anecdotes and material might be unacceptably trivial, many actuaries undervalue their remembrances and artifacts of times past. But the appeal has been a success, and I publicly thank the contributors, while urging others to write to me.

E.J. Moorhead

SOCIETY OF ACTUARIES STAFF ORGANIZATION

By John E. O'Connor, Jr.
Executive Director

The Society of Actuaries membership now totals close to 10,000! As you might suspect with the Society becoming increasingly larger, more specialized and active, it is often difficult for the membership to meet the office staff or even realize the full range of services that the Society office routinely provides for its members. Therefore, I would like to take this opportunity to introduce you to our staff and the services that we provide for you.

In addition to myself and two administrative assistants who compose the Executive Division, the office is organized into seven divisions. These are: Education, Education and Examination Support Services, Meetings, Finance, Research, Communications, and Information Services Center. Within this departmental structure, each division has its own set of responsibilities in conjunction with various committees. However, it is quite common for several divisions to work together and support each other on a particular project.

Let me briefly describe each division and its primary responsibilities.

Education:

This department is headed by Linden N. Cole, FSA. Education is one of the primary functions of the SOA, and the work of the Education and Examination Committees, supported by this department and its staff, is a key to the overall strength and growth of the actuarial profession. In his capacity as Director of Education, Linden works closely with the Society's various education committees, including Education

COMPARING THE ACTUARIAL EXAMS

By Rick A. Roeder

When you were spending countless hours studying for actuarial exams, did you ever wonder why you had been foolish enough to select this profession when other professions such as accounting and law appeared to offer easier paths to receiving professional credentials? I surely did. I gave myself the opportunity to test whether this thought was mere wishful thinking in a recent six-month period.

My practice has gotten involved in additional areas of tax-planning other than those normally encountered by an actuary. Being a believer in credentials, I thought that becoming a CPA would be consistent with this belief, and a useful marketing tool to boot. So, I decided to take the CPA exams, much to the incredulity of certain associates and friends. I want to share my observations on the many differences between the CPA and actuarial exams.

First of all, you should realize that I am not an ideal barometer by which to compare the two sets of exams:

1. When I took the actuarial exams I was usually one of the youngest in the room; not so for the CPA exams where I was one of the "senior citizens" and "exam seasoned" from my actuarial background.

2. My formal education was stronger in actuarial science than in accounting.

3. My attitude in studying for the two sets of exams was different. I studied hard for the actuarial exams, while my commitment to the CPA exams was limited to self-study on a basis that did not interfere with work or social commitments (and the 1984 World Series, as it worked out. My favorite baseball team, the Tigers, played the local

ANNUITIES USED IN SETTLEMENT OF PERSONAL INJURY LAWSUITS

By Robert C. Blattenburg

At the outset it should be said that this article is not intended to be a learned or technical treatise. Rather it is a brief description of one of the fastest growing segments of the life insurance industry — the so-called Settlement Annuity. It is presented out of the experience of the author, who has had a hand in the development of the methods used in rating and handling these annuities since the inception of current usage. The author was Actuary of one of the companies to first issue such annuities, he has been an advisor to others, and he has actually settled several hundred personal injury lawsuits through the use of Settlement Annuities.

The use of annuities as part of a financial package in the settlement of a claim of one person against another is not really new. The Roman Senate granted a life income to a claimant, and about 50 years ago annuities were used in settlement of a few of the Thalidomide cases. However, the use of the annuities issued by life insurance companies to settle personal injury lawsuits did not really begin until 1970. Since then the growth rate of the use of this approach has been tremendous. Only $150,000 of premium was generated in 1970, but over $2,000,000,000 in 1984. Almost a 100% annual growth rate sustained over 14 years is indeed awesome.

The reasons for this growth are not difficult to see, though we may wonder why it didn't happen earlier. For the injured person a life-time income makes much more sense than a lump-sum settlement. The liability insurer likes the

EDITORIAL

The public, if it thinks of actuaries as expert at anything, may attribute to the profession some expertise in the length of human life. There is surely *some* basis for this confidence. Actuaries have learned how to collect mortality data, to construct mortality tables, and to calculate life expectancies. But what do they know about mortality in a wider sense? Is the actuary truly a mortality expert?

Suppose the actuary were asked, "Upon what factors does human mortality depend? and why? and how much?" Were he to take this complicated question seriously, and give it his best try, the actuary might come up with a classification of mortality variables as a basis for at least a partial answer.

Age: Above about age 40 age can be viewed as one measure of loss in "vitality", whereby this vague term is meant resistance to disease, the ability to regenerate, or simply the capacity to stay alive. But chronological age is far from the perfect measure. Older but healthier persons have more of these vital forces than the younger sick. Viewing mortality as importantly a function of age, actuaries must expand their concept of age beyond the easily-arrived-at birthday age and into the confusing world of "developmental," "equivalent", or "rated" age.

Genetic Influences: After age, the next most important mortality factor may be the male-female distinction. Gender seems to be the genetic factor with the most impact, but there are others. Remarks like "he comes from long-lived stock" may be scientifically insufficient, but they have more than a grain of truth. Tendency toward several of the life threatening diseases has been proven to be genetic. Genetic influences may be hard to quantify, but they certainly exist.

Environmental Factors: From one part of the world to another, mortality rates vary markedly by what is loosely called public health — sanitation, nutrition, control of contagious disease. Within a geographical area variations arise from individual choice or personal habits — smoking, exercise, diet, use of drugs, even defensive driving. Some occupations have high mortality tendencies, related to accident, exposure to toxins, or unusual stress. Environmental influences too are difficult to quantify, or even to separate from the genetic.

Time: Rates of mortality are lower than formerly. We are likely to attribute the changes to environmental factors, though we cannot be sure. For whatever reason mortality rates are not static, and we treat them as such at our peril.

All in all, actuaries have *some* concept of what affects human mortality, and *some* idea of why and how much. Mortality turns out to be a rather intractable phenomenon for study purposes, because of the large sample sizes needed for creditable results, the length of the observation period, and the difficulty in controlling the factors not under study.

Are actuaries experts in human mortality? In the sense of "do they have it well analyzed?" the answer must be no. But in another sense actuaries may qualify. At least they know *why* they don't know, and why it *is* so difficult to find out.

C.L.T.

A NEW FEATURE?

The January editorial (asking for fresh ideas for this newsletter) has inspired a response suggesting that *The Actuary* start a column to which readers contribute short articles describing practical business problems in their everyday work. Problems may be of a technical or actuarial nature, or about management or communication. Solutions might be described, suggested, or solicited. Each article would be held to 300 words.

We think highly of this idea. An example appears below under the title PROBLEM. What might this new feature be called? How can readers improve upon the basic idea? How is readership response best handled?

PROBLEM

An actuary is helping a non-profit retirement home still in its initial planning stage. The general plan is to finance the cost of the physical plant by the *sale* of housing units to residents, charging for all other expenses and services through a monthly service charge. There is, however, concern whether enough buyers can be attracted to make this condominium-type financing successful. The initial sales price s is seen to be an obstacle.

The planners are considering two alternatives to the sale of units, neither of which would affect the monthly service charge, but both of which would modify the financing of the physical plant. Alternate (a) is the so-called life-lease arrangement, where the resident pays an entry fee e entitling the resident(s) to the use of the unit for as long as he, she or the survivor of a couple lives. Alternate (b) might be called the rental arrangement, wherein acquisition costs are charged as an addition a to the normal monthly service charge.

The planners ask the actuary to establish the relationships between the sales price s, the entry fee e, and the additonal monthly charge a.

The actuary suggests that $e = s[1-(1+i)^{-n}]$ and $a = s \cdot i$, where i is the monthly interest rate in real terms (after inflation) and n is the average length (in months) of the life lease.

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What do readers think of this analysis? How would they determine e and n?

OA Staff Organization

(Continued from page 1)

Policy, Education and Examination, and Continuing Education.

His department supports the massive volunteer effort already in place for developing study materials and study notes for the examinations; for maintaining the overall quality of the examination system; for developing ways to test the validity of examination questions; for developing seminars on important topics for actuaries; and for coordinating the education and examination activities between the Society of Actuaries and other actuarial bodies jointly sponsoring or administering the examinations.

In addition to these "routine" responsibilities, Linden and his staff are very involved with the various Education Committees and Task Forces in support of developing proposals for a "Flexible Education System." You will be hearing much more about this concept at upcoming Society meetings and in future issues of *The Actuary.*

Education and Examination Support Services:

Bernard A. Bartels supervises this department, which supports the E & E Committees in administering the examinations. Bern and his staff coordinate the printing of all exams and instructions to supervisors; process all the examination applications; arrange and ship all materials to some 215 exam test centers around the world, and distribute tickets of admission, grades and passing lists.

This fall 9,500 candidates registered for the November exams, setting an all-time record. The largest increase of candidates was in Part 1, with 2,700 students writing the exam.

Bern's department also is responsible for coordinating Section activities at the staff level, including arranging for the printing and mailing of Section newsletters.

Meetings:

Responsibility for administering three spring meetings and one annual meeting, including the budgeting for hotel and related meeting expenses, falls under the purview of Chelle Brody, the Society's Meeting Manager. Chelle and her staff also make logistical arrangements for all Board of Governors

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Deaths

Walter H. Huehl	ASA 1926
Edgar M. Jackson	FSA 1935
Hilary L. Seal	ASA 1950

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and Executive Committee meetings, Section meetings and assorted committee meetings. In addition, Chelle works closely with the Society's Program Committee to prepare the contents for program pieces for SOA meetings and coordinates the mailing of meeting materials to the SOA membership.

Last year's annual membership meeting in New Orleans was the largest in the history of the Society. Total attendance, not including spouses, was 1,534.

Finance:

This department is headed by Charles Stanley, the Society's Director of Finance. Chuck has responsibility for controlling the basic chart of accounts, for maintaining a system of budgetary and expense controls, for maintaining an investment program for the Society and for coordinating and budgeting for all membership mailings. He also works with the Treasurer, a variety of committee members and staff to develop an annual budget for consideration by the Administration and Finance Committee and, finally, by the Board of Governors.

Research:

The Research Department, headed by Mark Doherty, works with a variety of committees in overseeing the development of the reports of the Committees on Mortality and Morbidity Experience. Mark also works closely with several other research committees on specific studies, such as the 1980 CSO tables, the 1985 Individual Disability Tables, and the Credit Insurance Study.

In addition, Mark is responsible for maintaining the Society's library, which is primarily archival, and for answering questions of a research nature from the SOA membership, general public and other groups who may need actuarial data periodically. One such question recently led him to discovering actuarial tables in the SOA library which were over 100 years old.

Mark also provides research staff

liaison to various organizations, such as AERF, LOMA, LIMRA and MIB.

Communications Department:

Handling public relations, communications and publications for the Society, in support of the Public Relations Committee and the various Committees on Publications, is the Communications Department, headed by Linda Delgadillo. Departmental responsibilities include preparing and designing career information and promotional brochures; writing news releases for new Fellows and new Associates; and editing and overseeing the printing of various Society publications, including the *Yearbook, Transactions, Transactions Reports,* the *Record,* the new *Actuarial Mathematics* book and various seminar and symposium proceedings.

Information Services Center:

Carol Perry heads the Information Services Center, which maintains the membership data base for the Society of Actuaries, the American Academy of Actuaries, the Conference of Actuaries in Public Practice and the U.S. membership of the International Actuarial Association. Carol's department also produces the membership information for these organizations' yearbooks.

In addition, the Information Services Center lends support to the other divisions by processing dues billing, examination registration, meeting and seminar registration, study note services, subscriptions, and mailing labels. The Society's accounting system and inventory stock are also all computerized.

Carol and her staff will be very involved in support of the E & E Committees' efforts for an enhanced data base to support their expanding requirements.

Our profession is becoming more and more complex, and although the Society has grown tremendously in recent years, we do not want to lose sight of the fact that we are a personal membership organization. As such, we must be very aware of the needs of the individual member. We welcome any suggestions, complaints, or inquiries from any member who has a concern or an idea he or she would like to express. We have had many members visit our new offices in suburban Chicago and welcome the opportunities here and at SOA meetings to interact directly with our membership. ☐

MAJOR LEAGUE BASEBALL — AS A MARKOV CHAIN

By C.L. Trowbridge

The game of baseball has characteristics that suggest its analysis as a Markov chain. Such an analysis may be of interest to statistically minded baseball fans, and may prove to have some practical application.

The team on the offense (i.e., at bat) finds itself in one of 24 "states", depending on how many are out, and the number and position of baserunners. Each half-inning begins with none on and none out (state A) and ends, after three are out, in the 25th or "absorbing" state Z. Between A and Z the half-inning wanders through the alphabet, sometimes forward, sometimes back; sometimes scoring runs, sometimes not.

A code for "State"

Let the letters A thru H represent the 8 no-out states, in the following order: In A the bases are empty; B, C, and D represent *single* baserunners on 1st, 2nd, and 3rd respectively; E, F, and G represent states with *two* baserunners, on 1st and 2nd, 1st and 3rd, and 2nd and 3rd; in H the bases are full.

Let the letters I through P similarly represent the 8 one-out states, and Q through X the 8 states where two are out. As previously noted, Z is the side-out state that ends each half-inning. Y is the only unused letter.

Half-inning Records

A half-inning changes state whenever (a) there is an out, (b) there is a change in the number or position of base runners, or (c) a run is scored. Note that some changes occur as a *result* of a time at bat, while others take place *during* a time at bat. States that occur only briefly during continuous action are disregarded.

A half-inning record is a listing of the letter codes for the successive states, in the order that they appear, supplemented by an indication of the number (if any) of the runs scored in the transition from one state to another. Examples will make this clear:

A I Q Z Three up and three down
A I K KI S Z After an initial out, back to back doubles, then 2 outs
A AI I Q Z Lead off home run, followed by 3 outs
A B F A3 I K S U T2 Q1 Z A big inning with 6 runs

Note that the letters can repeat, but only if runs score, and if any baserunners are "replaced."

Transition Pairs

The rules of baseball impose some conditions upon the changes from one state to the next.

(a) The number out can never decrease.

(b) Baserunners can stay still, disappear, or go forward; but they can not move back.

(c) In any transition the number of new baserunners cannot exceed 1.

(d) The number out in any transition cannot exceed the initial number of baserunners plus 1.

Because of these limitations, of the 600 potential pairs of successive states some 310 are impossible. Examples of impossible pairs are QA, LM, JP, and BZ.

There are some 90 *extra* transition possibilities. Two or more transitions may be indicated by the same letter pair, the difference lying in the run indicator carried by the second letter:

B C represents a runner's advance from 1st to 2nd with no change in batter but B C1 indicates that the runner has scored as the batter reaches 2nd.

S Z represents a 3rd out leaving a runner on 2nd.

S Z1 indicates that the runner scored prior to the out.

After eliminating the impossible and adding the extras, we find the universe of possible transitions to be about 380.

A Probability Matrix

It is not difficult to visualize a probability matrix, consisting of some 380 entries of the form $\Pr s_1 \rightarrow s_2$, where s_1 stands for the initial state, s_2 for its successor. If we can assume that these probabilities are independent of how state s_1 came into being, the Markov model may be valid.

We should be able to get good estimates of the entire matrix via the collection of a large number of half-inning records. (From all the major league games of a single season, a complete set of half-inning records will number approximately 35,000). Count all of the times that state s_1 appears, and compute the proportion of such appearances that are immediately followed by state s_2. This proportion would seem to be a good estimate of $\Pr s_1 \rightarrow s_2$.

Since the probabilities so computed are averages, they may well be inappropriate when we have further information. If we know that the batter (or the pitcher) is somehow "unaverage", we must assume that the true probabilities are different.

The Average Expected Value

Let V_s represent the "expected value" or the "run potential" of state s. Turn to the collection of half-inning records and the count of the number of times that each state s appears. Then count the number of runs indicated *after* state s but in the same half-inning. V_s can be estimated as the second count divided by the first. Because these 24 values of V_s too are averages, we will refer to V_s as the average expected value, measured in runs, of state s.

Common sense tells us something about the magnitude of V_A. By its very nature V_A must be close to "average runs per half-inning", which is about 0.45. V_s should decrease with the number of outs ($V_Z = 0$); and increase with baserunner advance. The largest of the 24 should be V_H, the smallest V_Q. Actual calculation of the V_s, which to our knowledge has not been attempted, should remove any speculation as to the relative sizes of the 24 values.

Interrelationships

If it is true that "half-inning records have no memory", and that the Markov model is reasonably accurate, V_s can be expressed in terms of the probability matrix and the average expected values of all successor states. Checks by means of a formula similar to that shown below should prove useful in solidifying the estimates of both the V_s vector and the probability matrix.

$$V_Q = \Pr Q \rightarrow R \cdot V_R + \Pr Q \rightarrow S \cdot V_S + \Pr Q \rightarrow T \cdot V_T + \Pr Q \rightarrow Q1(1 + V_Q) + \Pr Q \rightarrow Z \cdot 0.$$

Applications

Interesting as this theory may be, it will have little practical use unless it can be applied to real baseball problems.

As a first application, consider the V_s table and its relationship to baseball strategy. Experienced managers may well have some feel for the chances of a rally after two are out, or what to expect from a good start; but the availability of V_Q in one case, of V_H in the other,

Major League Baseball

should be of help to informed judgement. A comparison of V_K with V_B tells something about the wisdom of sacrificing with one on and none out, while the two-on one-out sacrifice can be partially evaluated by comparing V_W and V_N. Such comparisons do not provide definitive answers because they do not take into account the possibilities of either unsuccessful or overly successful sacrifice attempts, but they provide useful information nonetheless.

There is another potential use with greater possibilities. Just as a stock market average permits the comparison of an individual stock against the average, the V_ss make possible the comparison of one offensive player against the average of all, and hence against any other. Moreover, one average can include all of the skills of the baseball offense, baserunning, runs batted in, as well as the more commonly calculated "batting" average.

Let a player's "offensive performance index" be calculated by adding (algebraically) his "values added" and dividing by "times at bat". A value added is V_s for the state after he has batted + any runs indicated by the attachment to $V_s - V_s$ for the state in which he came to bat. Value added will normally be positive if the batter gets a hit, draws a walk, or especially if he drives in runs; but will be negative if he makes an out without advancing a runner, or especially if he hits into a double play.

Baserunning skill too is measured by value added. With two out a runner on 1st successfully steals 2nd. He is credited with $V_S - V_R$, whereas if he fails his value added is $- V_R$. Whenever state changes, but the batter is not involved, the value added is charged or credited to the baserunner, and treated as if it were a part of his earlier time at bat. In relatively infrequent circumstances it may be appropriate to credit part of the value added to the batter, another part to the baserunner. As an example, in state B the batter singles, and the runner on 1st advances to 3rd. If in the opinion of the official scorer the extra base is more the result of the baserunner's speed than the place to which the ball was hit, $V_E - V_B$ might be credited to the batter, $V_F - V_E$ to the baserunner now on third.

Summary

The analysis of the game of baseball, in terms of a Markov chain, shows promise. The Markov theory is based on the premise that the chain has no memory, so that the transitional probabilities starting from state s are independent of what occurred before. Whether this is truly characteristic of the game of baseball may be difficult to determine, but it seems to be a reasonable assumption.

The author knows of no attempts to quantify the transition matrix or the potential run values indicated here by V_s. Such an attempt would seem to be the next logical step. If successful, the spin-offs might be surprising. ☐

Settlement Annuity

definiteness of the claim settlement, and that fact that the claim will be lower by the action of interest. The life company finds that substantial premium is produced in big chunks, and the annuity payments have good cash flow characteristics. The Settlement Annuity seems to be one of those synergetic arrangements in which everyone gains.

The life insurance company issuing such annuities must answer two main questions as to pricing. What interest rates and what mortality table are to be used in the rate development, and how are persons with life-impairing injuries to be evaluated? Other questions are expense factors, profit margins, the types of annuities, and any limits that the company may need to impose.

An Actuary or life insurance executive involved with this business, or considering becoming involved, must realize that theoretical assumptions are of no value unless business is produced. To produce business, by far the most important factor is the premium quoted. In this field the lowest premium is vital — perhaps to a greater extent than in most other insurance lines. The premium is being paid by a casualty insurance company, which has more than a "casual" interest in keeping its claim costs low. The casualty company will (and should) demand the lowest possible premium from the life insurance industry.

The agent or broker presenting the rates of a life insurer has not only an ethical responsibility to present the lowest rate (assuming the life companies available are all well rated and with good financial structure), but a very practical reason for doing so. If he doesn't, someone else will! And if someone else does, the agent will not only lose this case, but the casualty company as a customer for future cases. Unless a life company is willing and able to be price competitive, there is no reason for it to be in the field.

This does not mean that a company whose rates are not the lowest will get no business at all; nor that the company with the lowest rates will get all of the business. Service to the agent, flexibility, and cooperation are important, and if rates are reasonably competitive will attract a certain amount of business. Poor service, inflexibility, and lack of cooperation will drive away business despite a low rate. Rate structures are not static, so one life company may be the lowest bidder on one case, another the lowest bidder on the next.

life insurer on the next.

There is one new development. The author is now engaged, full-time, as an expert witness testifying in court trials as to Settlement Annuity costs. This testimony seems to be very successful in reducing huge lump-sum verdicts to more reasonable levels. Judges like it, juries can understand it, and the casualty companies truly appreciate the savings in claim dollars.

The Settlement Annuity field is fast rolling, fun, frightening at times, amazing as to the premium volumes than can be developed — and always exciting. ☐

WANTED: M.A.A. REPRESENTATIVES

Comparing the Actuarial Exams

Padres less than a month before the November exam. World Series fever put a screeching halt on any studying for a week.) In contrast, most CPA candidates take formal review courses.

Anyway, I was startled by the differences. Here are some of them.

1. The most fundamental difference is that the breadth of topics on the CPA exam is more extensive than the actuarial syllabus. Because of this, CPA questions tend to be more general. In other words, financial common sense and educated guesswork get you farther on the CPA exams than on the actuarial exams.

2. Multiple choice questions on the CPA exam were easier because you only had four choices, instead of five. Also the dreaded answer (e) on actuarial exams, "None of the above answers," never reared its ugly head on the CPA exam.

3. When taking actuarial exams, I usually felt much time pressure. Not so on the CPA exam, as ample time is allotted. Many finished the CPA exam early. I found it disconcerting that some people were aimlessly walking around with a cup of coffee during the exam. Tell me, did any of you *ever* see that at an actuarial exam?

4. The number of people taking the CPA exam was at least 20 times greater than I ever encountered at Part I or Part II of the actuarial exams. The exam room had all the trappings of a convention hall, making me feel that I could have just as easily been attending a sporting event or a Van Halen concert.

Well, I achieved comparable result gradewise on the four CPA exams as I did on the ten actuarial exams, albeit with much less effort. Does it prove anything? Perhaps not, since my study habits and concentration level have undoubtedly improved considerably over the past 15 years. However, this barometer reaffirmed my belief that it is quite an accomplishment to get through the gauntlet of Society exams.   □

COMPOUND INTEREST VIDEOTAPES

The University of Michigan has produced a series of videotapes to prepare students for the compound interest portion of Part 4. The lecturer is Professor Jack Goldberg of the UM Mathematics Department. Inquire at (313) 763-1233.
□

Recent Research from LIMRA

	Code
Investing in New Agents	33.22
The Financial Dynamics of Disability Income	30.80
Persistency of Flexible-Premium Annuities	63.30
Buying Directly: The Consumer's Response	56.00
Manufacturer-Distributor Agreements	54.00
Long-Term Ordinary Lapse Survey	63.30
Measuring Universal Life Persistency	63.30
Replacement: The Consumer's View	81.00
1985 Buyer Study	84.00

In your company library, or from LIMRA Library, P.O. Box 208, Hartford, CT 06141.

Spring Exam Seminars

During April, Georgia State University will offer seminars to help students prepare for the following of the 1986 spring exams: Parts 2, 3, 4, 5, 6, and 7P (EA-1). For further information contact Robert W. Batten at his *Yearbook* address.

Recent Research from 1985.1 Issue of ARCH

A Multiple Decrement Theorem	Jim Connor; comments by Cecil Nesbitt
On the Moments of Compound Interest Functions When Interest Varies as an AR(2) Process	Colin M. Ramsey
Accumulation Functions	S. David Promislow
The M-Linear Hypothesis and Varying Insurance	John A. Mereu
A New Derivation of Life Annuity and Life Insurance Functions	Hung-ping Tsao
More on Optimum Premium Payment Plans	Colin M. Ramsey
Distributional Aspects and an Evaluation of some Variance Indicators in Credibility Models	Stuart Klugman
Teacher's Corner	E.S. Rosenblum, James C. Hickman, Beda Chan, Robert L. Brown, E.S.W. Shiu, E.R. Vogt

OTHER ACTUARIAL NEWSLETTERS

This being Vol. 20, No. 3, *The Actuary* is in its 20th year, having been published continuously since 1967. Except for an informal newsletter once put out by Ralph Edwards, replaced when this newsletter started publication, we believe *The Actuary* to be the oldest of the newsletters serving the actuarial profession.

Today, however, there are no less than ten such publications, not including the several now published by Society Sections, and exclusive of letters or reports put out by segments of the insurance or employee benefits industries, or by actuarial consulting firms. For our readers' easy reference we list on page 7 ten actuarial publications of the newsletter or reports nature, together with sponsoring organization and how often and how long published. In keeping with its place in alphabetical order, *THE Actuary* is listed last.

L E T T E R S

Actuarial Demographics I

Sir:

I was not previously aware of the "Bartlett Rule", but it seems to work for the entire Society membership. The proportions, based on pages rather than an actual count, are A-K 49%, L-Z 51%.

Robert J. Myers

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Sir:

Dwight Bartlett's recent article on research into his silver anniversary class, FSA's of 1960, brings back memories. Virtually all of the 61 new Fellows passed Part 8 that Spring, the last examination, and for which I served as Committee Chairman. Mostly from memory, I can say that no 10's were given and only three 9's, but all candidates met minimum requirements and 50% passed; a rock solid group. Mr. Bartlett's history of the group confirms it.

Regarding his provocative question about the preponderance of last initial A-K's among the new Fellows: First, I can confirm that among all candidates sitting for all exams that Spring, essentially 50% had last names beginning with A-K, and 50% with L-Z. Candidate numbers were alphabetical with the L's at the midpoint. As a matter of fact, after mailing results by candidate number to Chicago, we accurately determined the Hartford pass list by finding the page of the Hartford telephone book on which the candidate appeared (or would appear), multiplying by 3.14, and comparing the result with candidate numbers.

Ideas Wanted for A Second Issue of "The Actuarian"

Volume 1, Number 2 (or perhaps Volume 2, Number 1) of "The Actuarian" will appear among these pages in May. Deborah Poppel, who introduced readers to this off-beat publication in November, will be pleased to hear from any actuary with tongue-in-cheek ideas, especially if you can get these to her by April Fool's Day.

But getting back to Dwight's question, I reject the theory that the greater success of the A-K group is due to lifetimes of sitting nearer the teacher; and also anything involving standard deviations. I believe the cause was the grading process. In those days, each grader sat nightly at his kitchen table grading one question for all candidates — arranged alphabetically. The L-Z group, graded in the wee hours of the morning, got less benefit from the graders' innate compassion than did the A-K group, graded after a hearty dinner and the latest episode of Gunsmoke.

Dwight modestly did not mention that so far two members of the 1960 group have served as President of the Society (both in A-K).

Niels H. Fischer

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Actuarial Demographics II

Sir:

This January article mentioned that seven FSA's had graduated from one high school in Portland, Ore.

I graduated from North Platte High School in North Platte, Neb., in 1966. At that time, the graduating classes were approximately 350 students per year. The classes of 1965 and 1966 have produced four Fellows and one Associate. There is one additional Associate who graduated in 1958.

Following is a list of these graduates, their year of high school graduation, and their year of Fellowship or Associateship:

Richard L. Files	1958	FSA 1968
Gerald A. Lockwood	1965	FSA 1978
Richard L. Helms	1965	FSA 1974
Donald L. Peterson	1966	FSA 1976
Norma J. Coufal	1966	FSA 1976
Gerald A. Mischke	1965	ASA 1982

North Platte is a town of about 20,000 people located in the west central portion of Nebraska.

Donald L. Peterson

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Sir:

I am a 1966 graduate of Stuyvesant High School in New York City. Although it may not be fair to compare Grant H.S. (a non-technical high school) with Stuyvesant (one of the leading Math/Science high schools in the nation), I know of at least two FSA's from a class of approximately 600 '66 graduates, i.e., 3.33/1000. Let's hear from you other Stuyvesant grads.

Joel I. Wolfe

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Actuaries as Managers

Sir:

This is a comment on the letter in the January *Actuary* by Steve Prince concerning actuaries as managers. The let-

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ACTUARIAL NEWSLETTERS

Name	Sponsor	Issues/Year	Began	Last in 1985 Volume	Number
Actuarial Digest	Triple E Publications	6	1982	4	6
Actuarial Review	Casualty Actuarial Society	4	1974	12	4
Actuarial Marathoner's Newsletter	Michael J. Cowell	4	1984	2	4
Actuarial Update	American Academy of Actuaries	12	1972	14	12
Bulletin	Canadian Institute of Actuaries	6	1981	December	20
Disability Newsletter	John H. Miller (after 1/1/86 by Tillinghast, Nelson & Warren)	—	1974	—	45
Enrolled Actuaries' Report	American Academy of Actuaries	4	1976	10	4
FIASCO	Institute of Actuaries Student Society	11	1979	—	75
Fresh Air	Actuaries in Regulation	2	1982	4	2
The Actuary	Society of Actuaries	10	1967	19	10

We feel sure that our readers will correct any errors or omissions.

Letters

ter related to my own experience. I have ended up as a company manager without having taken any MBA or similar courses. I am sure I would have had much to learn and would be a better manager for having been guided by appropriate courses. In my case I did not originally intend to end up as a manager; my career simply developed in that direction. Thirty years ago I would not have guessed that I would be in my current function. I am, therefore, much interested in the CIA approach and agree with what Steve Prince has written.

I, for one, feel that for those actuaries who have the desire and the ability to help the industry in a managerial capacity, it would be good for everyone concerned to assist them in this goal.

Abraham Hazelcorn

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Halley Research
Sir:

I was very interested to read the letter from E.J. Moorhead in the December issue.

The question of the pronunciation of Halley's name has been discussed at great length and indeed in this country a society has been formed, one of the objects of which is to promote the pronunciation HAWLEY.

I personally am a supporter of the far more popular pronunciation HALLEY, as in Valley, and was interested to read recently a letter from a U.K. correspondent which was published in the November 1985 issue of the American magazine, *Sky & Telescope*. The individual contacted as many Halleys as possible, listed in the London telephone directory, and indeed eventually spoke to some three dozen of them. The result was that two pronounced their name HAILEY, two others HAWLEY and all the remainder, namely some 89 per cent, used the form that rhymes with Valley. As this was a far larger sample than that of the two to which Jack Moorhead refers, I am more than satisfied that the vast majority of present day Halleys use the traditional pronunciation.

Geoffrey Heywood
Liverpool

Biblical Quotations
Sir:

Murray Projector misuses both of the Biblical quotations contained in his article "You should live so long" in your January issue.

The 70 to 80-year lifespan contained in Psalm 90.10 is not meant to be any Biblical estimate of true life expectancy. Rather, it is an example of how short the human lifespan is compared to God's timing. The contrast is with Psalm 90.3 "... a thousand years in your (God's) sight are like a day ...."

The 120 years maximum time period in Genesis 6.3 doesn't apply to any individual's lifespan at all. Rather, it was the period of time from God's pronouncement until He destroyed the earth by flood.

Thomas W. Reese

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Some Magic Numbers
Sir:

I thought you might be interested in the enclosed paper from the *Journal of the Institute of Actuaries Students Society.* It appeared in 1972 or thereabouts and hence preceded your "Magic Number" article (October) by more than a decade.

Ralph Garfield

Editor's Note: The author of the "Magic Number" article might well have conducted a more thorough literature search. Mr. Garfield refers to a paper by M.T.L. Bizley entitled "Multiplying at Compound Interest". The approaches taken are similar, except that Mr. Bizley uses smaller "magic numbers" (close to 100 log f), then corrects for higher interest rates by an addition to the result. Mr. Bizley's method is a bit more complicated, and his results more accurate. For those interested in an exact comparison:

	Magic Number	Addition to Result
Bizley		
f = 2	69.3	1/3
3	110	1/2
5	161	3/4
Trowbridge		
f = 2	72	none
3	114	none
5	167	none

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Old Exam Questions
Sir:

I enjoyed the December editorial about the Part I exams of the '30s Although I am not of the generation that took that exam, I recall one time browsing in an actuarial library and coming across some old green-covered booklets that gave sample exam questions of the type illustrated.

Besides the usual computation-intensive problems, there were also some that yielded to ingenuity. Some of *The Actuary's* readers may enjoy solving the following problem, which I first came across in one of those booklets.

How many times during the course of a day do the hour, minute, and second hands of a clock all coincide?

Although the problem has a relatively straightforward algebraic solution, there is also a simple and elegant number-theoretic solution.

Edward Scher

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Exam Results
Sir:

An actuarial milestone may have been passed with the May 1985 examinations. The list of passing candidates indicates that the "pass ratio" on EAI — first segment was 100%.

Is this the first time that all of the candidates actually taking an exam passed?

Leslie John Lohmann

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"The Actuarian"
Sir:

I am somewhat surprised that some readers took objection to "The Actuarian." My only complaint about it was that some of the items weren't as amusing as FIASCO. For those readers who insist on something serious, I suggest you re-print a page from the Internal Revenue Code or the Canadian Income Tax Act.

J. Bruce MacDonald

Coming in April Issue
"Non-traditional Perspectives"