The Actuarial Review

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From the President

Our Place in the World

by Robert F. Conger

During my year serving as president, I have enjoyed the opportunity to work with a wide variety of organizations throughout North America and around the world, including many actuarial organizations. I want to talk about one of the organizations that I have found to be particularly interesting in the global development of the actuarial profession.

This actuarial organization has members in 15 countries and has administered examinations to students in 24 countries. The organization's global impact is even greater than these statistics might suggest, because the members' employers and clients have business interests in virtually every country. Further, this organization makes its research and educational resources instantly and globally available via its Web site, not only to members and students, but to any other interested party.

You probably have figured out that the organization I am describing is the CAS. Although our historical roots trace to the United States, we have evolved into an international organization. It is critical that we embrace, continue, and very actively pursue our evolution in this direction. Why?

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Miller Wins President-Elect; Ross to Become President

ARLINGTON, Va.—**Mary Frances Miller** won her bid to become CAS president-elect for 2003 with 55 percent of the vote. **Sholom Feldblum** finished with 45 percent of the votes. The election was the second CAS competitive election in recent years.

Miller will become president-elect at the close of the 2002 CAS Annual Meeting in Boston this month. **Gail M. Ross** will succeed **Robert F. Conger** as CAS president.

Gail M. Ross

Mary Frances Miller

Balloting for the 2002 CAS election closed on September 23, 2002, and CAS tellers verified the election results. Nearly half of CAS Fellows (49.1%) cast votes in the 2002 elections, a total of 1,158. This compares to 58.2

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Board Elects New Vice Presidents

CHICAGO, Il.—In an election conducted during its September 12-13 meeting, the CAS Board of Directors elected the following vice presidents: **Thomas G. Myers**, vice president-admissions; **John C. Narvell**, vice president-international; and **Donald F. Mango**, vice president-research & development. These Fellows will assume their new positions at the close of the 2002 Annual Meeting in Boston.

A 1986 Fellow, Myers has been heavily involved in the admissions process, serving on the Examination Committee in a variety of capacities since 1987. Myers currently serves as Examination Committee chairperson.

Narvell received his Fellowship in 1985 and served as a member of the Membership Survey Task Force (1993), the Syllabus Committee (1992-97), the International Relations Committee (1991-99), and the International Issues Committee (1999-present). He has also served as president of the Casualty Actuaries of Europe and representative to the General Insurance Research Organising Committee.

Mango is a 1994 Fellow who is currently a member of the Committee on Review of Papers, the Future Education Task Force, the Enterprise Risk Management Committee, and the Dynamic Financial Analysis Committee. He also served as a member of the Committee on Reinsurance Research (1998-01), the Research Policy and Management Committee (2000-01), the Committee on Theory of Risk (1998-02), and the Joint CAS/CIA/SOA Committee on Academic Relations (2000-02). Mango is a prolific author and cowinner of the 2002

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Inside This Issue:

In My Opinion

Walter Wright

by Paul Lacko

Walt Wright has been editor in chief of *The Actuarial Review* for the past four years or so and was the managing editor when I first joined the editorial staff eight years ago. I've spent many hours talking to Walt over long-distance lines during this time, so I certainly recognize his voice. But I can't tell you what he looks like, because I've yet to meet him in person!

Walt has decided to step down from his post, so this is the last issue that will show Walt's name in the upper right-hand corner of this page. On behalf of the staff of *The Actuarial Review*—past, present, *and* future—and the members of the Casualty Actuarial Society, I want to wish Walt all the best as he moves on to confront new challenges. He'll still be at his desk in New York (unless he's out visiting clients), at MMC Enterprise Risk Consulting, and his voice will still be heard in the CAS and in the American Academy of Actuaries.

"I want to wish Walt all the best as he moves on to confront new challenges."

One treasure that Walt leaves behind is "*The Actuarial Review* Statement of Purpose and Editorial Policy." Walt was instrumental in crafting this document and subsequently helping us to interpret and apply it to our editorial work. The Statement of Purpose is clear and concise: "The *AR* is an official publication of the CAS. The purpose of the *AR* is to provide a forum for CAS members to exchange news and views regarding items of professional interest to casualty actuaries."

This doesn't mean we restrict the book reviews to mathematics, statistics, and actuarial science. It does mean that most articles will be about the insurance industry, actuarial science, insurance law and regulation, emerging issues of interest to actuaries, members of the CAS, the CAS itself, and other actuarial organizations.

The Editorial Policy is a set of rules about what the *AR* will and won't publish. For example, one of the rules is: "***AR* will make it clear that all opinions expressed in the *AR* represent the views of the writers and are not intended to represent the position of the CAS**." Have you noticed that you never see a piece titled "Editorial" in the *AR?* We don't use that title, because some readers interpret it to mean "official opinion of the CAS."

When the author of an opinion piece is speaking in an official CAS capacity, we will print both the author's name and CAS title (for example, vice president-professional education, chairperson of Committee on Online Services). When you don't see a CAS designated title, then you can be sure that the author is expressing a personal opinion. If you wish to express an alternative viewpoint, the *AR* will provide you the column space.

Here are additional items from the Statement of Editorial Policy:

- ***AR* will provide an element of amusement in addition to news and views pieces.** In other words, it is official policy to publish such things as "Nonactuarial Pursuits," "Actuarial Sightings," a puzzle column, and even poems, jokes, and other items that members may find amusing.
- ***AR* articles, with rare exception, are subject to editing and cutting.** We will correct mistakes in grammar, spelling, and usage. We may excise certain kinds of remarks—those made in bad taste, for example, or statements presented as

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The Actuarial Review is the quarterly newsletter of the Casualty Actuarial Society.

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Remember the Ratemaking Seminar!

by Linda Torkelson-Brobeck, Chairperson, Committee on the Ratemaking Seminar

San Antonio Convention & Visitors Bureau/Craig Stafford

The River Walk, San Antonio

Hey y'all, come join us for a walk down by the river, Texas hospitality, and the 2003 Ratemaking Seminar at the Marriott Rivercenter in San Antonio, Texas on March 27-28, 2003.

In today's hardened property/casualty market, concerns about claims are arising from new sources, such as mold and terrorism. There are also claim concerns from old sources thought to be more or less under control, such as asbestos and medical malpractice. Investment returns intended to support these costs have sunk to new lows. With the increased pressure on the accounting and actuarial aspects of the insurance business, the 2003 Ratemaking Seminar promises to offer important insight for actuaries.

The general session will focus on the issue of toxic mold, which has exploded claim costs, especially in Texas and California, and may have had a potentially adverse impact in other markets across the U.S. Our featured speaker is the Texas Commissioner of Insurance, José Montemayor.

Concurrent sessions are rated according to the expected level of audience knowledge and experience. An introductory track will cover standard ratemaking procedures. Intermediate and advanced sessions will cover topics related to emerging technology and data management; financial and dynamic financial analysis; workers compensation, commercial, and personal lines ratemaking; regulation; and reinsurance issues. Call papers from the Ratemaking and Data Management Research Committees will also be presented.

Many topics will be featured, such as the value of Internet technology beyond the World Wide Web, workers compensation issues in several markets, captive formation, policyholder retention, capital allocation, coherent risk metrics, business owners insurance, updates on the use of credit in ratemaking, and much more! Look for information on the CAS Web Site and in the mail in late December or early January.■

In My Opinion

From page 2

fact, but found to be untrue. Occasionally we will shorten an article to make it fit in the available space. We will also assist authors with the writing process itself. (Please take advantage of *AR* editing services, provided free of charge! If you send us a first draft, our editors can help you create a finished product.)

- ***AR* will not generally print letters that are received anonymously.** However, at the request of the writer of a letter to the editor, we may withhold the author's name.
- ***AR* does not accept paid advertisements.** Generally, the *AR* prints no advertisements at all, paid or otherwise. The newsletter will publish brief notices of academic job descriptions and may cite books, software, or other tools that would be of interest to CAS members.
- **The Editorial Board will provide advice and counsel to the editorial staff of *The Actuarial Review*.**

The *AR* Editorial Board (AREB) is another lasting legacy of Walt's tenure at the *AR*. The Editorial Board consists of four ex officio members and three members appointed by the CAS president for three-year terms. The ex officio members are the editor in chief, the managing editor, the chairperson of the CAS Editorial Committee, and the vice president-administration, who serves as the chairperson of the AREB. The CAS publications production editor serves as an advisory member.

The AREB's role is to provide advice and counsel to the *AR* editorial staff. Its members routinely review the regular opinion pieces, which are "Random Sampler," "In My Opinion," and "From the President," to make sure that the contents are not unintentionally incendiary, insulting, false, or mean-spirited. In addition, the AREB will also solicit CAS members to generate alternative points of view, suggest professional issues that should be addressed in the *AR*, and occasionally write an opinion piece to be published in the *AR*. Hence, the *AR* Editorial Board does not censor. It cannot override decisions made by the *AR* editors, and it has no control over what is published in the *AR*.

Before closing, I want to thank Walt for stressing, over and over again, that the articles published in the *AR must* consistently maintain the highest standards for correct grammar, spelling, punctuation, and style. To the readers, this is probably the most visible and the least obvious result of Walt's work. He has kept us editors on our toes.

Good luck to you, Walt, in all that you do. I will certainly try to apply what you've tried so hard to teach me! **John Robertson** has agreed to serve as our new managing editor as of the next issue. Our readers should recognize John's name—he's been keeping us all puzzled for roughly twenty (!) years.■

Kudos for *Forum* Chair

Dear Editor:

I have published many papers in actuarial journals, and I have worked with a wide range of editors. Editing work is tedious, and it is always a pleasure to work with actuaries who perform the task well.

Many editors have their own perspective on the qualities of a good paper, which may at times conflict with the intentions of the author or the needs of the readers. Some editors make idiosyncratic demands on the author, involving extensive rewrites that do little to enhance the paper. Sometimes editors lack the perseverance to finish a complex task, and their editing changes are not always well considered. Professional editing is a highly skilled task, and it is rare to find volunteers to undertake this job.

My own papers are generally geared to the practicing actuary. They deal with issues that are vital for the practitioner but of little interest to others. Papers on statutory accounting, such as Schedule P and Schedule F, are examples. Few editors have the patience to check carefully the statutory regulations and accounting illustrations in such papers.

Practicing actuaries value these papers. They value them not for theoretical insights but for clarity of exposition, comprehensiveness of coverage, and the numerical illustrations that accompany each section.

Authors get tired when the work is tedious, and I am no exception to this rule. I recently submitted four papers to the CAS *Forum*, all of which are geared to the practicing actuary, and all of which provide painstaking explanations and illustrations. Sometimes the exposition was not clear enough, sometimes the illustrations were not complete, and sometimes the style was not consistent from section to section.

Two weeks ago, I was astonished to receive **Dennis Lange**'s FedEx package in the mail. Dennis is editor of the *CAS Forum*, and he undertook the task of completing what I had begun. He meticulously reviewed 350 pages of accounting text, checking every illustration, every figure, every comma. He corrected every arithmetic error and...I found his red check marks neatly penciled in next to each entry.

Dennis put himself in the reader's shoes, continually asking: "Does this paragraph make sense? Is the exposition clear? What changes might help the reader in dealing with this topic?"

"Professional editing is a highly skilled task, and it is rare to find volunteers to undertake this job."
—Sholom Feldblum

In dozens of places Dennis inserted suggested changes to clarify the language. Sometimes he just wrote: "This doesn't seem correct." More often than not, he was right, and I corrected the offending text.

At one point, Dennis wrote: "This section seems incomplete." Dennis then included his recommendation for completing the illustration. I had not finished the example simply because it required too much effort to write out the documentation. With Dennis's guidance, I filled in the necessary entries and the associated explanation.

Authors should accommodate their readers. In accounting papers, the reader wants specific line and column information, though authors tire of giving exact references for each item. I also tire, and sometimes I do not give the needed references. Dennis did not just note the places that references were missing. Not only did he insert the references himself, but he corrected several of my references that were mistaken. I am truly indebted to Dennis for this—and readers are doubly indebted to him.

This type of editing is vital for the clarity of papers geared to practicing actuaries. Yet the editing of CAS papers is an unpaid task. We all work for a living, and we do not have the spare time for even an hour or two of volunteer editing, much less the weeks of exacting effort that Dennis put in.

Dennis does not work alone. Two other members of the *CAS Forum* committee, **Thomas Ryan** and **Steve Groeschen**, assisted in reviewing the papers I submitted. They also fulfilled their responsibilities well, making the writing clearer and correcting errors.

Every so often I meet an actuary who has benefited from a paper of mine and who thanks me for the time that I spent writing it. I acknowledge the thanks, and I add: We must equally thank actuaries like Dennis Lange, who have made these papers truly useful for practicing actuaries.

Sholom Feldblum, FCAS

A Chief Clarification

Dear Editor:

"Tales From the Chiefs" was a most interesting article (*The Actuarial Review*, August 2002). I would like to correct one error in my comments. When I went through the chairs [starting as vice president, then president-elect and president], the executive officers met regularly and frequently, but did not include the immediate past president.

I also noted another change for the better. In one of **Irene Bass**'s answers, she stated that travel to get to some of the COP (Council of Presidents) and international meetings "was time-consuming and exceedingly expensive to the CAS." In my time, such expenses were picked up by the employer.

Ruth Salzmann, FCAS■

Executive Council Election

From page 1

Ratemaking Prize.

The Board of Directors reelected the three other vice presidents. They are **Sheldon Rosenberg** (administration), **Roger A. Schultz** (marketing and communications), and **Christopher S. Carlson** (professional education).

(See story on page 7 for more on the Executive Council Realignment.)■

Random Sampler

A Global Profession

by Michael A. Walters

At a recent international actuarial conference in Eastern Europe, the local countries were reviewing how to offer exams to their students. The existing exam-giving bodies offered to help, but their systems were not ideally suited to the new countries (too nation-specific). This prompted me to try to construct the ideal structure of the actuarial profession for that purpose, but also to further advance the profession's needs globally.

Prominent in the design of the structure is the notion that actuarial principles and techniques are global and fairly sophisticated, which implies specialization. However, exposure to techniques in different areas of practice can be enlightening to the actuarial student. In addition, common skills invite uniform testing of all actuarial students.

Allowing for reasonable travel time is another goal, which, together with globalizing the syllabus, might involve excising some of the nation-specific material today. Finally, the existence of several exam-giving bodies (but not dozens for various countries) helps to spur competition and innovation on ways of testing actuarial students.

Overall Structure

The International Actuarial Association (not a membership organization) would provide oversight of the structure, with recommendations on minimum standards to qualify as a profession.

In each country, one country-specific organization (CSO) would deal with discipline, regulation/legislation, and the public. In the U.S. this would be the American Academy of Actuaries. In Canada this would be the Canadian Institute of Actuaries.

Five different areas of actuarial practice—life insurance, pensions, health, casualty, and investments—would each have an international exam-giving body (EGB) to provide basic and advanced education. Their exams would be in the English language, as would many of the readings, but accommodations could be made for translation to any language.

There would be joint sponsorship of basic actuarial mathematics exams common for all major areas (or possibly a separate EGB for them). These exams would cover calculus, probability and statistics, basic life and casualty contingencies, loss distributions, and credibility theory. University credit could be substituted for some but not all of these exams. Other topics such as economics, finance, and basic accounting might be considered prerequisites for entering the actuarial profession, requiring university course credit for those subjects. There could also be alternatives to some exams, such as seminars or a thesis.

"Exposure to techniques in different areas of practice can be enlightening to the actuarial student...common skills invite uniform testing of all actuarial students."

Where local regulations and unique conditions require it, such as signing a public actuarial opinion, each CSO could have a country-specific exam, perhaps one for each major area, relevant to those local issues.

Transition to New Structure

Many of the CSOs are already in place and some of them also give exams (U.K., Australia, Germany). The international EGBs would assume responsibility for administering the non-CSO exams (although there could be some commonality of staff).

The international EGBs would collaborate and remove some of the nation-specific material in designing a more focused global exam on their specialized topics.

The international EGBs might also help in fashioning some CSO exams. In that process it is recognized that detailed information, while useful in immediate practice, can become outdated in the practice over time. This suggests more emphasis on continuing education to ensure current qualification to sign an actuarial opinion, for example.

Some smaller countries may have just one CSO exam covering all areas of actuarial work for that country, to allow a single actuary to sign various opinions. However, a universal practice standard would require an actuary to meet the "mirror test," that is, does the actuary have sufficient experience and expertise to sign off on this project? If not, then the actuary may need to get a second signer who is more versed in the technology of this project, even as the actuary may be more familiar with the local regulations and conditions.

The international casualty EGB would start with the CAS syllabus, but would need to incorporate important parts of the U.K. and Australian syllabus. Casualty associateship would require exams on coverages, basic ratemaking, and reserving. (A CSO exam would cover accounting, regulations, legal systems, and any unique coverages.) Casualty fellowship exams would include advanced ratemaking and reserving and other techniques such as DFA and valuations.

The investment EGB might draw heavily on the U.K. experience (where 25 percent of its actuaries practice in investments, not insurance), while the life and pension EGBs would meld SOA, U.K., and Australian material. The health EGB might be more U.S.-based, as other countries tend to have less of a private health insurance system.

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From the President

From page 1

- Our clients and employers have global business interests; we must position our members to meet the actuarial needs associated with these interests. We must educate our current members about the critical issues globally and be prepared to service current and future members working in diverse environments.
- Many of our members today—and more in the future—need a "portable" actuarial designation, a designation that allows the flexibility of practicing in various countries.
- We seek the best and brightest students to become CAS members, but can do so in many jurisdictions only if the CAS credential is a pathway to local recognition as a qualified actuary. As incoming Vice President-International **John Narvell** notes in an interview on page 11, this factor is a most compelling argument in favor of the CAS being receptive to mutual recognition agreements.
- We are receiving requests for our expertise in educating property/casualty actuaries in China, India, Eastern Europe, and elsewhere. Other organizations will respond to this need, if we do not.

Our best bet for assuring that property/casualty actuaries around the world are well educated and well qualified is to be actively involved in the process. We will not be the *only* source of education and accreditation for property/casualty actuaries, but we should be the preeminent source of this expertise. The CAS should be taking the lead in creating a global definition of a qualified property/casualty actuary—a definition that our members, our clients and employers, and regulators can be satisfied with in every jurisdiction.

Another compelling reason for our involvement in the international actuarial community lies in our mission to advance the body of knowledge. CAS members develop many new ideas. We also find many examples of outstanding, practical research performed by non-CAS actuaries responding to marketplace issues where they work. Through a greater sharing of ideas via publications and an increased level of cross-participation in meetings and seminars (by speakers and attendees alike), we can facilitate the spread and further development of the frontiers of actuarial science.

Several years ago, the CAS Board of Directors recognized the importance of our activities outside North America and created a vice president position to focus on this dimension of our activities. More recently, the CAS Board has articulated the framework of our international strategy (see reports and reference materials under the "Member Services" section on the CAS Web Site), has approved a budget to support an increased level of global CAS activity, and started reexamining the issue of mutual recognition.

Of course, the CAS has finite financial and volunteer resources. We cannot be everywhere or do everything immediately. We are involved in an ongoing process to identify and prioritize the places and the activities for the CAS to focus our energies around the world. We will build a committee structure supportive of these priorities. If you have ideas or energy that will help the CAS move forward globally, I encourage you to share them with John Narvell at john.narvell@xlwi.com or volunteer for an international committee. It's an excellent way to get involved with the global issues affecting the CAS's future—and yours!■

Random Sampler

From page 5

Advantages of the New System

Separate EGBs would have the focus on their primary mission to get the best syllabus for their constituents in those major areas. (There probably have been past compromises by trying to cover too broad a scope.)

Separate EGBs would also provide competitive energy to experiment and innovate, which would benefit all organizations.

The global focus would improve the education with innovations and participation from around the world.

Emerging economies with a much newer actuarial profession would reap the wisdom of this combination via global exams administered by others, which they could marry with their own customized country-specific exam.

With a global syllabus, university-based actuarial educators in some countries could better plan the migration to exam-based actuarial education, even beyond common early mathematical exams.

The controversy over mutual recognition would almost become moot, as the EGBs would be truly international. Thus, a pension fellow would be recognized as highly trained in pension matters worldwide. However, if a particular CSO requires country-specific knowledge for an actuary to sign an opinion, the actuary may need to take that exam or co-sign with one who has.■

CORP-Accepted Papers Posted on Web

The CAS Committee on Review of Papers has released its quarterly update of recently accepted papers. Electronic versions of the accepted papers are located on the CAS Web Site at www.casact.org/pubs/corponweb/papers.htm. The CAS Editorial Committee will be editing these papers for inclusion in the *Proceedings of the Casualty Actuarial Society*. As of October 1, 2002, CORP has accepted the following papers:

1. "Tails of Copulas" by Gary G. Venter.
2. "Testing the Reasonableness of Loss Reserves: Reserve Ratios" by C.K. "Stan" Khury.■

Actuaries Abroad

General Insurance in the U.K.

by Kendra M. Felisky-Watson

Institute and Faculty of Actuaries Briefing Statement

In August, the Institute and Faculty of Actuaries issued a Briefing Statement on Asbestos Related Diseases in the U.K. Briefing statements are occasionally issued in response to questions about important topical issues and are not formal guidance. U.K. asbestos-related claims are generally recognized as less developed than those in the U.S. but the ultimate level of U.K. claims is still under speculation. Studies indicate the ultimate number of asbestos-related deaths in the U.K. may be 80 percent of the number of U.S. deaths even though the U.S. population is five times that of the U.K.! The U.K. House of Lords has recently ruled in the U.K. on a test case regarding mesothelioma cases where there are two or more defendants. While the House of Lords determined that all defendants are liable, it deliberately side-stepped the issue of apportionment of liability. The briefing statement was issued to describe how actuaries can help insurance companies and others assess the required levels of asbestos claim reserves. The full briefing statement can also be found on the Institute's Web site.

Financial Conditioning Reporting

In November, an all-day seminar will take place on financial condition reporting. While the Financial Services Authority (the regulatory body here in the U.K.) will not require financial condition reporting for a few years, it is imperative that insurance and reinsurance companies start planning for the impact financial condition reporting will have. Financial condition reporting is the regulation of an insurer's solvency from a dynamic financial analysis perspective. The first new requirement within the FSA proposals is that insurers should have adequate financial resources to protect policyholders against the risk that insurers may not be able to meet claims. This is a positive obligation, rather than the current passive one not to trade while insolvent, and is clearly more rigorous than the existing "snapshot" test of solvency. The second new requirement is that an insurer must have documented the process it has used to ensure its financial solvency. Basically, companies will have to demonstrate that they have adequate resources to meet valid claims, not only if the outcome is as expected, but also if there are adverse developments. The obligation will be on the company to identify the risks it faces, and to ensure there is adequate capital or an appropriate response. This seminar will present several case studies and models.

Allan Kaufman

Congratulations are in order for **Allan Kaufman**! Just so you know, the actuarial profession in the U.K. consists of the Institute of Actuaries (England and Wales) and the Faculty of Actuaries (Scotland). Practically all matters pertaining to actuaries are administered jointly between the two societies, which delegate governing responsibilities for each of the practice areas (pensions, life, investment, and general insurance) to practice boards. And, importantly, the General Insurance Board has a newly appointed member—our own past president, Allan Kaufman! Now there are two casualty actuaries serving on the General Insurance Board: Allan and yours truly. We are hoping that Allan's appointment will enable relations between the CAS, Institute, and Faculty to continue to grow and prosper.■

Board Approves VP Renaming and Realignment

New EC Succession Schedule Implemented

CHICAGO, Il.—At its September meeting, the CAS Board of Directors approved the renaming of two Executive Council (EC) vice president (VP) positions and realignment of their committees, as well as adjustment to the EC succession schedule.

The VP-programs & communications will now be VP-professional education and the VP-continuing education will be renamed VP-marketing & communications.

The two affected VPs, **Chris Carlson** (professional education) and **Roger Schultz** (marketing & communications), analyzed the common characteristics in their responsibilities. Under the realignment, all meeting- and seminar-related committees will fall under professional education. Marketing & communications will conduct activities on behalf of the CAS and the casualty actuarial profession and will oversee development of a continuing education strategy to support the educational needs of members.

The board agreed that these changes more efficiently group the responsibilities and work flow for each vice president position.

To foster continuity within the EC, the new succession plan will have two new VPs appointed in any given year. With the revised schedule, balanced VP succession will be achieved by November 2005.■

Election Results

From page 1

percent of the Fellows voting in the 2001 election and 39.7 percent of the Fellows voting in the 2000 election.

Members of the CAS Nominating Committee for the 2002 CAS elections are Chairperson **Steven G. Lehmann**, **Robert A. Anker**, **Alice H. Gannon**, **Patrick J. Grannan**, **Leon R. Gottlieb**, **Steven A. Kelner**, and **Mavis A. Walters**.

A CAS Fellow since 1988, Miller is a senior partner with Select Actuarial Services, a risk management actuarial consulting firm in Nashville, TN. This month Miller completes her term on the CAS Executive Council as vice president-admissions. Miller's CAS activities have focused heavily on education. She served in various capacities throughout the late 1980's and the 1990's on Examinations and Education Policy Committees. She currently chairs the Future Education Task Force and is a member of the Examinations and International Actuarial Association Liaison Committees. Other committee involvements include liaison to the Enterprise Risk Management Advisory and the SOA Education & Examination Management Committees, and chair of the Task Force on Mutual Recognition.

CAS Fellows also elected new CAS Board of Directors. They are **Gary R. Josephson**, **David J. Oakden**, **Patricia A. Teufel**, and **Oakley E. Van Slyke**. The new directors will serve three-year terms commencing at the close of the 2002 Annual Meeting. They succeed **Amy S. Bouska**, **Stephen P. D'Arcy**, **Frederick O. Kist**, and **Susan Witcraft**. As the most recent past president, Conger will serve as chairperson for the CAS Board of Directors during 2003.■

Election Counts

According to the 2002 election procedures approved by the Board, all vote counts are released to the membership.

President-Elect

Candidate	Votes
Mary Frances Miller	624
Sholom Feldblum	517
Total	1,141

Director

Candidate	Votes
Patricia A. Teufel	631
David J. Oakden	492
Oakley E. Van Slyke	445
Gary R. Josephson	437
Robert F. Wolf	413
Alan M. Hines	392
Ginda Kaplan Fisher	380
Clive L. Keatinge	327

25 Years Ago in *The Actuarial Review*

by Walter C. Wright

Matt Rodermund *registered this complaint in the October 1977 issue of* The Actuarial Review*:*

Probably many of our readers have not seen a preview of the 1977 casualty and property annual statement. They have a surprise in store...Not with the schedules. Not with the statements. Page 5 of the statement will present a new schedule asking for cash flow data...So old pages 5, 6, 7, 8, 9, 10, and 11—pages that have been part of our insurance culture since 1949—have been renumbered...We're appalled that this so-logical format has been altered, to no particular advantage...The accountants don't care what page the numbers are on, as long as the totals balance.

Some of us remember page 14 when it was on, yes, page 14. In 1997, it moved to page 15, with the title "Exhibit of Premiums and Losses (Statutory Page 14 Data)." In 2001, it moved to page 24 as the "Exhibit of Premiums and Losses (Statutory Page 14)." Clearly, Matt, the problem has been solved. When an exhibit moves to a new location nowadays, the original page number moves along with it—in the title!■

CAS Trust Awards Academic Scholarships

The CAS Trust recently awarded three $1,500 scholarships to students pursuing a career in actuarial science for the 2002-2003 academic year.

Scholarship recipients were Jeffrey Donald Bellmont, University of St. Thomas; Jennifer Marie Randall, University of Wisconsin-Stevens Point; and Jennifer Ge Kang, University of Waterloo.

The intent of the CAS Trust Scholarship Program is to further students' interest in the property/casualty actuarial profession and to encourage pursuit of the CAS designation. Scholarships are awarded to U.S. or Canadian college students who have demonstrated high scholastic achievement and an interest in mathematics. A committee comprised of academic professionals and External Communications Committee and University Liaison volunteers administered the scholarship in conjunction with the CAS Office.

The Casualty Actuarial Society Trust was established in 1979. It affords CAS members and others an income tax deduction for funds contributed and used for scientific, literary, or educational purposes. For more information, please visit www.casact.org/academ/02schapp.PDF.■

Cheap Oil for How Long?

Hubbert's Peak: The Impending World Oil Shortage by Kenneth S. Deffeyes (Princeton University Press, 2001, $24.95)

Reviewed by Curtis Gary Dean

In 1956, a geologist named M. King Hubbert, working at the Shell research lab in Houston, made an unsettling prediction: U.S. oil production would peak in the early 1970's and then begin to decline. Of course this controversial prediction was challenged, but according to the author, the actual peak production year turned out to be 1970. Foreign oil became essential to the U.S. economy.

The author of this book, a professor emeritus at Princeton University, and others have applied Hubbert-type methods to global oil production and forecast that world oil production will peak sometime during 2003-2009. Take a moment to ponder the economic effects that such an event would have on our oil-hungry world! The author says that there is nothing we can do to delay this reckoning. Aggressive new initiatives, whether for more conservation, alternative energy sources, or more expensive oil discovery and retrieval methods, will take years to bear fruit. We will be extracting oil from the ground for decades to come, but the peak production year will come long before the last drop is recovered.

The author was a colleague of Hubbert in Shell's Houston laboratory and later joined the Princeton faculty. He has been close to the oil business his entire life and covers a lot of material in this concise book of 208 pages. Much of the book is devoted to explaining how oil was created, the geological conditions necessary for the formation of underground oil reservoirs, and how to find it and extract it. Given the importance of oil in modern life, I would highly recommend this book. One shortcoming of the book is that some of the explanations are so brief that I found them hard to follow, but I did grasp the general concepts.

In a chapter titled "The Origin of Oil" the author explains that more complex hydrocarbons from organic matter deposited millions of years ago were broken into oil's shorter molecules (commonly referred to as the cracking process) given the proper temperatures. Ground temperatures increase by about 14°F per 1,000 feet and the right temperatures can be found in the "oil window" from 7,500 feet (180°F) to 15,000 feet (295°F) underground. For oil to be created, organic-rich source rocks had to be buried for a million years or more in this oil window. If the material is buried below 15,000 feet, the higher temperatures break the molecules into the smaller molecules of natural gas. Above 7,500 feet the temperatures are too low to crack the organic molecules into oil.

After oil is created, the necessary geological formations have to exist for oil fields to survive. Without the right conditions the oil would leak away or be devoured by microbes. Understanding the requisite geological formations can also provide clues on where to find oil fields.

The author describes some of the discovery and extraction technologies developed to obtain this valuable and highly profitable natural resource.

The author outlines the methods that he, Hubbert, and others have used to estimate peak production years. A key assumption is that a bell-shaped distribution (a smooth curve symmetric about the mode) fits annual oil production. The x-axis represents the production year and the y-axis the amount of oil produced. Normal, Lorentz, and logistic curves are all bell-shaped and the author explains why he believes that a normal curve is the best choice. He displays a graph showing that the normal curve fits U.S. oil production quite well. Because U.S. oil production peaked in 1970, there are data points on both the ascending and descending sides of the curve. For global oil production, only data points on the ascending side of the curve are available and the trick is to predict the peak, that is, the turning point. As actuaries, we know well that identifying turning points is a risky endeavor.

One variation of the forecast methods can be summarized as follows:

1. Collect the historic data on annual oil production by year,
2. Estimate the total oil that will ultimately be produced by adding cumulative past production to recoverable reserves, both known reserves plus estimated future discoveries, and
3. Find the normal curve that best fits the data points from (1) such that the area under the curve matches (2).

Using 2.1 trillion barrels of oil as the ultimate cumulative global oil production, this method gives a peak production year of 2009. The author states that 2.1 trillion barrels is a "reasonably generous upper guess."

Note how (2) resembles incurred losses: paid losses [past oil production] + case reserves [discovered oil reserves] + IBNR [future discoveries]! Do any readers want to try our reserving methodologies on this problem?

Another method is to fit two cumulative normal curves. The lower cumulative normal is fit to cumulative production while the higher curve is fit to cumulative production plus current reserves (i.e., already discovered oil). With an additional assumption about the spacing between these two curves, a peak production year of 2003 and ultimate cumulative oil production of 2.12 trillion barrels result.

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CAS Board Approves New CAS Exam 3

CHICAGO, Il.—At its September meeting, the CAS Board of Directors reviewed the recommendations of the Design Task Force on Exams 3 and 4 and elected to discontinue joint sponsorship of Exam 3. This change will not affect the Fall 2002 or Spring 2003 exams. The CAS will first offer CAS Exam 3 on October 30, 2003.

In November 2001, the board created the Task Force, charging it with designing and preparing Exams 3 and 4 that are appropriate for casualty actuaries. The syllabus for the new exam will be based on the recommendations of the Task Force regarding the appropriate content of Exam 3, excluding the Task Force recommendation to add a section on pension mathematics. In particular, the life contingencies portion of the exam will return to the approximate level of old CAS Part 4A and, when possible, questions will be geared toward casualty practice.

The Syllabus and Examination Committees will be working over the next few months to finalize the learning objectives, recommended readings, and format for CAS Exam 3. Details will be posted on the CAS Web Site in late spring 2003 and mailed to everyone on the Syllabus mailing list.

After the new CAS Exam 3 is implemented, the CAS will also give Exam 3 credit to candidates who pass SOA Course 3. College students and CAS candidates therefore will have the option of writing either the SOA or the CAS version of the examination.

The board made a conscious decision to keep joint CAS/SOA sponsorship of Exam 4 because it continues to meet the needs of casualty actuaries. The CAS and SOA will also continue joint sponsorship of Exams 1 and 2 and will continue to work together on a wide variety of issues related to the education of actuaries.■

University of Iowa Seeks Assistant Professor

Applicants are invited for a tenure-track assistant professor position in actuarial science starting in August 2003. Applicants must show promise for excellence in both teaching and creative research. Fellowship or Associateship in a professional actuarial society and a Ph.D. in a relevant field are required. The appointee is expected to conduct research in actuarial science/financial mathematics, to assist in building a Ph.D. program in this area, and to supervise Ph.D. students.

The selection process begins December 1, 2002, and continues until the position is filled. Please send a CV and have three confidential letters of reference sent to: Actuarial Search Committee, Department of Statistics & Actuarial Science, University of Iowa, Iowa City, IA 52242.■

D.W. Simpson Makes CAS Trust Donation

The Trustees for the CAS Trust (CAST) are pleased to announce that D.W. Simpson & Company has donated $10,000 to the Trust on October 15, 2002. This brings the total contribution of the D.W. Simpson & Company to the Trust to $70,000. The CAST was established in 1979 as a nonprofit 501(c)(3) organization to afford members and others an income tax deduction for contributions of funds to be used for scientific, literary, research, or educational purposes. The CAS is grateful to the D.W. Simpson & Company and its employees for their contribution to the advancement of actuarial science.■

Quarterly Review

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These forecasts are certainly open to debate. First, why should a normal curve fit the data? Second, the ultimate cumulative global oil production figure of 2.1 trillion barrels is questionable. The U.S. Geological Survey has estimated that 3.012 trillion barrels can be produced globally, a number that the author considers to be way too high. **Jon Evans** directed me to two Web sites that readers may want to check out. One is www.bp.com, which shows estimated oil reserves by country. The other is www.hubbertpeak.com, which is managed by a group of people who are studying questions about peak and ultimate oil production.

Do I believe these forecasts? Not being an expert in the field, I have to reserve judgment. I am intrigued enough to look for ways to put some money into the game by finding profitable ways to invest, possibly in companies with large oil or gas reserves. Hey, what good is a forecast if you can't make a few bucks from it?!■

New VP-International Takes on Global Actuarial Issues

by J. Michael Boa

The CAS Board of Directors voted during its September 12-13 meeting to elect **John C. Narvell** as vice president-international (see story, page 1). I recently asked Narvell his views on the most pressing issues facing the CAS in the international arena.

Boa: *Describe your experience and background in international work both professionally and for the CAS.*

Narvell: Having sat for (and passed!) my last four exams while working in Belgium (1982-85), I could say my international experience with the CAS began as a student in 1982. Immediately after Fellowship in 1985, I moved to Bermuda for four years where I worked as a consulting actuary. Interestingly, when I arrived in Bermuda there were only five CAS members there; today there are more than 50. In late 1989 I returned to the U.S. where I was based in Philadelphia but with consulting clients in Denmark, France, Switzerland, and the U.K., I recently spent four years in Zurich building an actuarial team as chief actuary for a Swiss insurance company. And about a year ago I relocated to London, continuing in my existing position, after my employer was acquired by a Bermudian insurer.

For several years while in Philadelphia, I worked on the Syllabus Committee. I have also served as the president of Casualty Actuaries of Europe. For the past two years, I have acted as the CAS representative to the General Insurance Research Organising Committee (GIRO) in the U.K. In addition, I am actively involved in developing CAS support for actuarial seminars in India, having recently represented the CAS at a meeting sponsored by the Institute of Actuaries of India. While there I presented (in conjunction with **Madan Mittal**) a two-day introductory seminar on casualty practice in Mumbai.

Boa: *What is the importance of international issues to the CAS?*

Narvell: The CAS is not a purely American organization. We officially qualify actuaries in Canada as well as the U.S. In addition, the CAS is the predominant source of qualified actuaries in Bermuda. Further afield, CAS members are employed in 15 other countries. But perhaps more importantly, we have exam centers in 24 countries where students are actively pursuing our exams.

As an educational body, the CAS is concerned with the advancement of actuarial science. However, some of the most significant technical advances in casualty actuarial science in the past two decades have originated outside the U.S. These include generalized linear modeling in pricing work, stochastic loss development models, and extreme value theory. It is to our benefit to be open to greater interaction with the global actuarial community, present and future.

"...some of the most significant technical advances in casualty actuarial science in the past two decades have originated outside the U.S."
—John C. Narvell

Boa: *What are the most important international issues currently facing the CAS and how do you hope to address them during your tenure as vice president-international?*

Narvell: The growth in the number of CAS members and students outside the U.S. requires us to provide better services to those constituencies. There is clearly a strong and growing international demand for the CAS educational credentials. However, students in foreign countries face the risk that they will not be recognized as qualified actuaries in their home countries. This, in my opinion, is the overwhelming argument in support of pursuing balanced mutual recognition agreements. In order for the CAS to gain access to a larger body of talented and qualified candidates, we need to be open to more formal relationships with other actuarial organizations outside North America and achieve greater acceptance of the CAS training in more countries. We owe this to the students who are pursuing our exams.

Additionally, we should expand our involvement and interaction with other actuarial organizations. We ought to encourage the current CAS members in foreign countries to be more active in the actuarial societies of their host countries. To the same extent, foreign property casualty actuaries working in the U.S. should be invited to participate in professional development with the CAS. Lastly, in order to ensure the CAS perspective is represented in the development of global actuarial practice, we need to continue the CAS involvement in the International Actuarial Association.

The evolution of the CAS toward a greater international focus is of great interest to the present CAS membership. We need not fear that CAS growth outside the U.S. will lead to a dilution of the quality standards and value of the CAS credentials. This has not happened with our role in Canada and Bermuda and will not occur as we continue to evolve. Instead, the continued international expansion of the CAS will further raise the profile of the CAS credentials. One of my tasks as vice president-international will be to provide communication and information to the membership to ensure they are comfortable that the CAS standards of excellence are paramount in all the CAS initiatives on the international front.■

ERM Committee Reviews Financial Risk Management Texts

by Donald F. Mango, Member, Enterprise Risk Management Research Committee

In 2001, the CAS Advisory Committee on Enterprise Risk Management (ERM) identified the measurement of financial risk as an element of the ERM framework that was of immediate interest to CAS members. To help meet this continuing education need, the ERM Committee has identified and reviewed a set of four financial risk management texts. These texts cover a broad spectrum, from a high-level overview to detailed technical manuals. More detailed reviews are available on the CAS Web Site in the "Research" section.

The Practice of Risk Management by Goldman Sachs and SBC Warburg Dillon Read (Euromoney Publications PLC, 1998, $225)

The Practice of Risk Management provides a high-level, practical guide to implementing the theory of risk management at leading securities firms. It is accessible to technical and nontechnical audiences, and focuses on structure, process and implementation, politics, coordination, and communication. It describes how recent financial disasters have set the stage for the risk management culture now mandatory in well-run financial institutions. The book also discusses measurement techniques (with an eye to market risk), the challenges of implementing an effective risk management function, and the influence of risk management on regulatory and reporting requirements.

Risk Management by Michel Crouhy, Dan Galai, and Robert Mark (McGraw-Hill, 2000, $70)

This mid-level text provides a comprehensive reference for the entire financial risk management field, including policies, methodologies, data, and infrastructure. The authors are highly respected practitioners with vast experience across the entire range of financial risk management. They cover risk integration, regulatory policy (e.g., the Basel Committee proposals), capital attribution and performance measurement, credit risk, and model risk. They also delve into operational risk, a critical area where traditional data-driven quantification techniques often fail. Their sections on modeling credit risk are worth the price of the book alone, as they effectively distill the essentials of the many approaches into a few chapters.

FRM Handbook 2001/2002 by Philippe Jorion (Wiley/GARP Risk Management Library, 2001, $150)

Jorion's textbook is specifically written for the Global Association of Risk Professionals (GARP) Financial Risk Manager (FRM) designation exam. The author is one of the most respected academics in the field. The FRM examination focuses on analytical skills, general knowledge, and intuitive capability acquired through experience in capital markets. General behavior and risks of various markets and financial instruments, regulation, and credit risk concepts are also covered. The handbook provides step-by-step guidance through the entire FRM syllabus, with clear, concise explanatory chapters and example problems. The FRM syllabus covers topics similar to those found in *Risk Management* but is focused on problem solving and quantitative analysis. See www.garp.com for more on the FRM exam.

Market Models: A Guide to Financial Data Analysis by Carol Alexander (John Wiley & Sons, 2001, $95)

Alexander describes the use of financial market models by investment risk managers and investment analysts. The author has created a text that balances theory and practice, building a bridge between the academic and practitioner. It is a graduate- or advanced undergraduate-level textbook that presumes extensive prerequisite knowledge of math, probability and statistics, regression, time series, and finance. It includes a CD-ROM (with detailed examples, graphs, and spreadsheets) that provides hands-on experience to complement the text. The text covers the pricing and hedging of options using GARCH (generalized autoregressive conditional heteroscedasticity) models, modeling of portfolio market risk via factor models, and an econometric approach to modeling relationships between financial asset prices, including concepts of cointegration and co-movement. The book also contains six excellent detailed technical appendices covering the statistical theory and methods of topics such as regression analysis, statistical inference, and maximum likelihood estimation.

The ERM Committee hopes you will find value in these texts and that you provide members with information on emerging topics within the ERM field.■

Setting Capital Requirements With Coherent Measures of Risk—Part 2

by Glenn G. Meyers

In the August edition of *The Actuarial Review*, I began a description of the paper, "Coherent Measures of Risk" by Philippe Artzner, Freddy Delbaen, Jean-Marc Eber, and David Heath.[1] In this article, I will complete my description and provide a link between these measures and risk-adjusted probability measures.

Let's begin with a quick review of our definitions. Let X be a random variable representing insured losses. Let $\rho(X)$ be a measure of risk. ρ is a coherent measure of risk if it satisfies the following axioms:

1. Subadditivity—For all random losses X and Y,
$$\rho(X + Y) \le \rho(X) + \rho(Y)$$
2. Monotonicity—For all random losses X and Y, if $X \le Y$ for all scenarios, then
$$\rho(X) \le \rho(Y)$$
3. Positive Homogeneity—For all $\lambda \ge 0$ and random losses X,
$$\rho(\lambda X) = \lambda\rho(X)$$
4. Translation Invariance—For all random losses X and constant loss amounts α,
$$\rho(X + \alpha) = \rho(X) + \alpha$$

Let X take its values over a finite set of scenarios. In the last article, we identified $\rho(X) = \text{Maximum}(X)$ as a coherent measure of risk.

In most insurance situations, the maximum loss leads to capital requirements that are too conservative, that is to say, expensive. So other measures of risk may be appropriate. Artzner et al go on to prove that, "a measure of risk is coherent if and only if it can be expressed as the supremum of the expected losses taken over a class of probability measures on our finite set of scenarios." A simple example of a class of probability measures is one that assigns the probability of $1/n$ to each element of each subset of n scenarios. The supremum of the expected losses over this class of probability measures is the average of the n largest losses.

This example leads us to the Tail Value at Risk, $TVaR_\alpha$, which is equal to the average of the top $1-\alpha$ percent of the losses.

A problem with the Tail Value at Risk is that it reacts only to very large losses. So recently I began to look for other coherent measures of risk that respond to the full range of losses. Noting that Artzner's representation of coherent measures of risk allowed for risk-adjusted probabilities, I looked at a formula for transformed probabilities proposed by **Shaun Wang**:

$$W(x) = \Phi(\Phi^{-1}(F(x)) - \lambda).$$

$W(x)$ represents the cumulative distribution function for the transformed probability measure, $F(x)$ is the cumulative distribution function for the objective probability measure, and $\Phi(x)$ is the cumulative distribution function for the standard normal distribution. λ is a free parameter representing risk aversion. Wang has used this transform to establish links between traditional actuarial pricing methodologies and financial pricing methodologies such as the Black-Scholes option pricing formula and the Capital Asset Pricing Model.

It turns out that if you calculate expected values with the risk-adjusted probabilities generated by the Wang Transform, you get another coherent measure of risk. This is not an obvious statement. To calculate a measure of risk with the Wang Transform, you first arrange the possible values of X in increasing order, calculate the cumulative probabilities, and then calculate the transform using the above formula. It takes some effort to prove that this gives the same result as taking the supremum of expected values over a class of probability measures, as characterized by Artzner. In fact, by replacing $\Phi(x)$ with other cumulative distribution functions in the Wang Transform formula, I found examples where the resulting measure of risk is not subadditive.

When I discussed this with Wang, he referred me to a paper that he wrote jointly with Virginia Young and Harry Panjer[2] that proposes a set of axioms that are satisfied if and only if a measure of risk, $\rho_g(X)$, can be represented as the expected value of a risk-adjusted probability measure. That is:

$$\rho_g(X) = \sum_{i=1}^{n} x_i \cdot \left(g(F(x_i)) - g(F(x_{i-1}))\right)$$

where g is a nondecreasing function with $g(0) = 0$ and $g(1) = 1$. If, in addition, g is concave up, then $\rho_g(X)$ satisfies all of the axioms that define a coherent measure of risk. As an example, the Wang Transform uses

$$g(u) = \Phi(\Phi^{-1}(u) - \lambda).$$

If $g(u) = \text{Max}(0, u-\alpha)/(1-\alpha)$, then $\rho_g(X) = TVaR_\alpha(X)$.

We say that two risks, X and Y, are comonotone if $(X_i - X_j)(Y_i - Y_j) \ge 0$ for all scenarios i and j. The Wang/Young/Panjer axioms replace the subadditivity axiom with an axiom that requires $\rho(X + Y) = \rho(X) + \rho(Y)$ for comonotone X and Y.

Table 1 provides a sample calculation of $\rho_g(X)$ for the Wang Transform with $\lambda = 2$. I will leave it as an exercise to the reader to verify that $TVaR_{85\%}(X) = 4.33$ and $TVaR_{90\%}(X) = 4.50$.

Table 1

x_i	P_i	$F(x_i)$	$W(x_i)$	$W(x_i)-W(x_{i-1})$
1	0.50	0.50	0.0228	0.0228
2	0.20	0.70	0.0700	0.0473
3	0.15	0.85	0.1676	0.0976
4	0.10	0.95	0.3612	0.1936
5	0.05	1.00	1.0000	0.6388
$E[X]$ =	2.00		$\rho_g(X)$ =	4.3784

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Ethical Issues Forum

Cruising for an Ethical Bruising?

Editor's Note: This article is part of a series written by members of the CAS Committee on Professionalism Education (COPE) and the Actuarial Board of Counseling and Discipline (ABCD). The opinions expressed by readers and authors are for discussion purposes only and should not be used to prejudge the disposition of any actual case or modify published professional standards as they may apply in real-life situations.

Joe Fellows, FCAS, MAAA works for an international actuarial consulting firm. Although Joe works with several clients throughout the year, approximately 80 percent of Joe's time is spent consulting with the Acme Widget Company (AWC). AWC has been a longstanding and loyal client of the firm and Joe Fellows. The fees paid to his firm for work performed on behalf of AWC in large part dictate the amount of bonus Joe will receive at the end of the year. Joe estimates that, on an annual basis, AWC fees have accounted for approximately $20,000 of his personal bonus. Les Risk, the president of AWC, is Joe's main contact. Mr. Risk's wife, Patty, sits on the board of directors of the Bedford Hospital Authority. The Bedford Hospital Authority is a prospect of Joe's and is expected to send out an RFP for actuarial consulting services next month (with fees expected to be in the six-figure range).

Joe's company decided that they would like to express their appreciation to their largest clients by extending to each of them, and their significant others, an invitation to play golf at an exclusive PGA golf course. The golf outing is followed by a lavish dinner complete with gifts for each of the attendees and their spouses. The cost for the golf, dinner, and gifts is approximately $700 per client who attends the event. AWC is one of the clients designated to receive an invitation. Unfortunately, Les Risk and his wife do not like to play golf, and they have a prior engagement for the dinner portion of the evening, so they are unable to attend any part of the outing.

Joe feels that the AWC deserves some recognition for their contribution to the success of his actuarial consulting firm. He would also like to make a favorable impression on Patty Risk. Joe approaches his boss to ask for permission to send Les and his wife on a two-day cruise costing approximately $2,000. Joe makes the following statement to his boss: "In addition to showing our appreciation, the cruise is a great opportunity for Les to tell Patty that we are the best choice for the Bedford work." After some discussion, Joe's boss declines the request citing budgetary concerns and that the golf outing will far exceed the original cost estimate and that the $2,000 amount is considerably more than the $700 per client to be spent for golf and dinner. Despite his boss's decision, Joe decides to send Les and his spouse on the cruise anyway and pays for the cost of the trip out of his own pocket. His boss is unaware of his decision. Has Joe violated any professional standards?

No

There is no professional standard that specifically prohibits giving gifts to clients. Joe is not expecting any specific benefit from AWC as a result of his gift but is only expressing his appreciation for the past opportunity to work together. Further, Joe is simply making sure that Les is not neglected as a result of his scheduling conflict or his lack of interest in golf. While this may be a bit more expensive than normal, it is common practice for consulting firms to entertain their clients as a sign of appreciation and relationship building. Joe would pay for the cruise regardless of Patty's work affiliation and is not directly asking for any special consideration. While Patty will have to decide whether she can accept the gift, Joe has not violated any professional standard.

Yes

The special treatment that Joe is giving to Les and his wife casts a shadow of suspicion on Joe's gift. While Joe may not be explicitly asking for special consideration on the Bedford Hospital Authority RFP, the proximity to the RFP and the size of the gift could be interpreted as inappropriate. Under Precept 1 of the CAS Code of Professional Conduct, Joe is required "**to act honestly, with integrity and competence, and in a manner to fulfill the profession's responsibility to the public and to uphold the reputation of the actuarial profession.**" Joe is using his client relationship with AWC as a backdoor way of asking Les to intercede so that Joe gains an unfair advantage with the Bedford RFP. Joe has violated Precept 1.■

CAS Welcomes New Affiliate Members

William R. Gardner
Aon Re Services
Chicago, Illinois
Fellow, Institute of Actuaries of Australia

Linda M. Phillips
First Insurance Company of Hawaii
Honolulu, Hawaii
Fellow, Institute of Actuaries

CAS Continuing Education Calendar

Bookmark the online calendar at www.casact.org/calendar/calendar.cfm

November 10-13—CAS Annual Meeting, Marriott Copley Place, Boston, MA

January TBD—Seminar on Loss Distributions,* TBD, TBD

March 27-28—Seminar on Ratemaking, San Antonio Marriott Rivercenter, San Antonio, TX

* Limited Attendance

Nonactuarial Pursuits of Casualty Actuaries

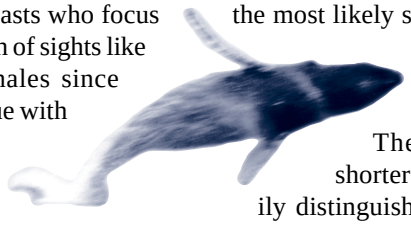
Thar She Blows!

by Ginette Pacansky and Marty Adler

Photos courtesy of Chuck Gegax

A group of Orcas cruising along in sleep mode.

There are few sights in life more breathtaking than that of a 50-foot humpback whale breaching high above the Pacific Ocean and then thundering back down into the water. Or a glistening, black, six-foot dorsal fin of an orca emerging stealthily from the depths of the water, just feet from you. Our Fellow, **Chuck Gegax**, and his wife, Ginette Pacansky, an actuarial student, are avid whale enthusiasts who focus their vacations in search of sights like this. Interested in whales since childhood, their intrigue with these cetaceans has allowed them to share in the awe of numerous sightings as well as to pursue an understanding of the migration patterns and social structures of the different species.



The two spent a recent vacation on San Juan Island, off the coast of Washington state. The San Juan Island chain is a group of several small islands frequented by three orca pods (called J, K, and L pods) of resident orca whales. Orcas, also known as "killer whales," can be classified as either resident or transient. While transients travel in very small pods and do not stay local to a specific area, residents are members of much larger pods, which remain local to a specific area. These pods are based on a matriarchal society, whose social structure is led by the elder females. Once born into a pod, an orca remains a member for life. The summertime salmon migration off San Juan Island attracts these resident orcas. Chuck and Ginette planned their trip for July, the peak of the salmon run, to have the best chance for an orca sighting. They were not disappointed.

At Lime Kiln Point, the dominant female led one of the resident pods within feet of the shore. Lime Kiln Point, on the west side of the island, is the most likely spot in the continental U.S. to view whales from shore. The scene was incredible. The females, with the shorter dorsal fins, were easily distinguishable from the males, whose dorsal fins can exceed six feet in height. Mothers swam by with their new calves. Chuck was lucky enough to capture a breaching male in a photo.

Another highlight of this trip included a boat trip in which a pod in sleep formation swam directly under the boat. (Orcas don't sleep as humans do; they swim closely together and take frequent shallow breaths when they sleep.) Shiny black dorsal fins surrounded the boat and one could feel the spray as the orcas exhaled.

Chuck and Ginette have organized several group whale-watching trips with actuarial friends in the San Francisco Bay Area. These trips traveled under the Golden Gate, 30 miles out to sea, past the Farallon Islands. It's near these islands that many of the great whales come in search of food during the summer. These trips were full-day excursions and have proven to be a real test of survival for many actuaries. The choppy seas and unpredictable weather off of San Francisco can make for a very uncomfortable day if one is not prepared with the proper clothing and seasick precautions. No matter what warnings Chuck and Ginette gave their fellow actuaries, some did not feel the need to follow them. One trip made so many people sick that it practically put the whole department on sick leave. Even the sickest passengers on the most recent trip, however, seemed to perk up when they spotted upwards of a dozen humpback and blue whales feeding. It was phenomenal! The boat was surrounded for about an hour with whales coming so close spectators could see barnacles on their backs.

For our Fellow, what began as a childhood interest has turned into a passion for an amazing and endangered group of animals. Whale watching provides a rare opportunity to see sights most people never see and sharing these times with friends and family makes for many treasured memories. A greater interest in whales will also lead to a more solid future for the animals. "After all," they say, "as actuaries, we know from survival functions that extinction is forever."■

Latest Research

From page 13

Since any measure of risk written in the form of $\rho_g(X)$ above is coherent, we now have a good supply of coherent measures or risk which are comonotone additive. Are all coherent measures of risk comonotone additive? The answer is no. Table 2 gives an example of a coherent measure of risk that is not comonotone additive.

Table 2 consists of three scenarios. The measure of risk is a maximum of the expected values over two probability measures.

Table 2

Scenario	X	Y	$X+Y$	p_1	p_2
1	1.0	0.0	1.0	0.4	0.3
2	2.0	0.0	2.0	0.3	0.6
3	2.0	1.0	3.0	0.3	0.1
E_1	1.6	0.3	1.9		
E_2	1.7	0.1	1.8		
ρ	1.7	0.3	1.9		

If we accept the proposition that an insurer's required assets should depend upon its distribution of losses, I believe that coherent measures of risk have desirable properties for the formula used to establish the required assets. Because of these fine papers, we have a very useful representation of these measures of risk.

1 Philippe Artzner, Freddy Delbaen, Jean-Marc Eber, and David Heath, "Coherent Measures of Risk," Math Finance 9 (1999), no. 3, 203-228 www.math.ethz.ch/~delbaen/ftp/preprints/CoherentMF.pdf.

2 Shaun S. Wang, Virginia R. Young, and Harry H. Panjer, "Axiomatic Characterization of Insurance Prices," Insurance Mathematics and Economics 21 (1997) 173-182.■

Actuarial Roundtable Discussion

Reserving the Berquist-Sherman Way

by Arthur J. Schwartz

James Berquist and **Richard Sherman** wrote a classic paper on reserving in the 1977 *Proceedings*. Among many notable concepts, this paper introduced to the actuarial literature two interesting methods for adjusting loss development triangles. The incurred triangle is adjusted for changes in case reserve adequacy and the paid triangle is adjusted for changes in claim settlement rates. One year later, **Joseph Thorne** reviewed the Berquist-Sherman paper. The paper and the review are still required reading for the CAS Exam 6, which covers reserving.

Subsequently, in a 1988 Discussion Paper, **Kirk Fleming** and **Jeffrey Mayer** studied these methods and proposed several changes to improve their accuracy. A key point of their paper was that changes in claim settlement rates could give a misleading indication of case reserve adequacy.

Joining me in a discussion of the two methods are James Berquist, Richard Sherman, Joseph Thorne, and Jeffrey Mayer.

James Berquist is a retired actuary in Oceanside, California. His paper with Richard Sherman won the Dorweiler Prize in 1978. He has served three different terms on the CAS Board of Directors, most recently from 1985 to 1987, and has chaired or served on numerous CAS Committees, including the Committee on Reserves. He is the 2001 recipient of the Matthew Rodermund Service Award.

Richard Sherman is president of Richard Sherman and Associates, Inc., in Ashland, Oregon. He has participated in loss reserve studies for 28 of the nation's largest insurers. He has written papers on estimating the variability of loss reserves and extrapolating loss development factors. He jointly won the Dorweiler Prize with James Berquist in 1978. He has written 65 "Ask a Casualty Actuary" articles in *Business Insurance* over the past 16 years.

Joseph Thorne is a consulting actuary in Laguna Niguel, California. His review of the Berquist-Sherman paper appeared in the 1978 *Proceedings*.

Jeffrey Mayer is a senior vice president with AIG Risk Finance in New York City. He has been active with several committees, including the Long Range Planning Committee and the Advisory Committee on Valuation of P/C Insurance Companies.

Schwartz: *Some comments on the incurred method first. A) Thorne points out that the method is sensitive to the percent trend shown and uses a trend derived from closed claims, yet is applied to a triangle with a mix of open and closed claims. B) The method assumes the trend is constant at all evaluation dates; that by using the same trend factor it could introduce a trend to the data that's not really there; that using a single de-trend factor will reduce the inherent variability in the data, and that the method supposes that the case reserves along the latest diagonal are adequate, which puts a disproportionate weight on the accuracy of the most recent diagonal. C) Mayer and Fleming point out that changes in claims settlement rates can give a misleading impression of case reserve inadequacy. What are your views on these comments?*

Sherman: I would take issue with the word "adequate" in item "B" above. The method really adjusts to the adequacy level inherent in the latest diagonal. The triangle is adjusted to a *constant level* of adequacy, yet not necessarily "adequate."

Mayer: The goal is not to adjust to adequate reserves, but to the current level of reserve adequacy.

Thorne: Regarding item "A," in my 1978 discussion I stated on the first page, "For the most part, the methodology used in the model is designed for analysis of paid losses rather than incurred losses." I was just out of graduate school and in my first actuarial job; the statement seems a bit strong to me now. I use both adjustments where warranted. Yet three decades later I continue to believe the estimates from the methods adjusting paid losses are much more useful and less sensitive to assumptions than those adjusting incurred losses.

Sherman: I disagree somewhat. Both methods are vulnerable and have their own unique sensitivities. One key area is to get a good triangle of claim count data, on a consistent basis, and to understand any changes that have occurred in the claim reserving or handling process. Situations can happen with the claim count triangle, such as inclusion of trivial claims, or the inclusion of claims without payments, or shifts in the relative presence of either, that can throw the adjustment methods out of whack. For example, if trivial claims are a growing percentage of total counts, this can cause claims disposed ratios to increase, indicating an illusory claims speed up. Since the paper was written, I have mellowed, and I take the results of applying the techniques in the paper with a grain of salt.

Mayer: I agree with the point. Some actuaries view the mechanical adjustments as sacred. If done properly, the adjustment techniques will use insight. Look at the claim settlement rates. If it shows a speed up, then it's important to adjust paid dollars. In the Fleming-Mayer paper, we saw that reviewing the average outstanding levels should not be independent of settlement rates. So we looked at claims closed on a percent basis. You can also look at the triangle of average outstanding levels on a percent closed basis.

Berquist: Whether trivial claims are included in the claim count triangle can be important. We need to define the triangle of reported claims carefully.

Mayer: What you do not want to happen is the blind application of the adjustment techniques. Then applying the techniques becomes a blind exercise, and your analysis is in trouble. The

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assumptions behind the techniques are important. A good actuary applies the techniques but interprets the results with good judgment and a good understanding of the underlying claims process. A mechanical exercise can bring a computer to its knees, but we should not use technology as a substitute for knowing, really knowing, the underlying claims process.

Berquist: I recently reread our paper. I think we hit a few things dead on. You cannot do reserving mechanically. I'm reminded of a project on medical malpractice reserving in California. It turned out that the claim count was defined differently in the northern part of the state versus the southern part.

Mayer: In the back of the Berquist-Sherman paper is an appendix with a very detailed questionnaire. It covers a good deal of the questions that you need to ask before carrying out any reserving assignment.

Berquist: I agree one hundred percent!

Sherman: In the paper and in Fleming-Mayer, there's an assumption that all other things are equal. If there is a huge increase in the retention, and you're dealing with a net triangle, then adjusting for the adequacy of case reserves has another dimension. You must also adjust for changes in the retention.

Mayer: The data may indicate an increase in reserve adequacy, when all it really is is a change in retentions. You may need to de-trend the losses to index the retentions. So you have more than the simple inflationary trend in claim sizes.

Sherman: Sometimes changes in the mix of business written need to be reflected. There can be a change from low severity type of business to a higher severity type of business. That can also distort the adjustments.

Berquist: I see our paper as if it were a 1977 automobile. Things change. Technology has changed. One of the prime motivators for writing our paper was that the accountants were moving in on our area of expertise. We needed to show that reserving was not a "Simple Simon" exercise, that you could not simply extrapolate or develop a paid and incurred triangle. We wanted to show that actuarial methods and actuarial judgment were as important in setting reserves as they were in ratemaking, where the actuary's role was unquestioned.

Mayer: In item "C" above, the Fleming-Mayer paper really points out not so much that there's a change in case reserve adequacy, as that there has been a change in the *perception* of case reserve adequacy.

Schwartz: *Now looking at the paid method: A) Thorne points out that the method supposes that there is a mathematical relationship between number of closed claims and loss payments. B) Thorne points out that the method may need to be adjusted to recognize settlement patterns by size of loss. This seems especially valid for long tail lines where increasing size claims have become more common in recent years. C) The method supposes that the relation between closed claims and loss dollars paid is captured well by an exponential formula. Each of these three hypotheses is only tested empirically. What are your views on these comments?*

Thorne: Jim's comments are right on the mark. Accountants were moving into reserving. There was a temptation to treat reserving as if it were a black box. Even the articles on the syllabus in the 1970's such as Stern on automobile ratemaking, Marshall and Kallop on workers compensation ratemaking and Salzmann's reserving chapter in the IASA text were mostly at the "Triangles 1A" course level for reserving. I benefited greatly from each of these articles. However, the loss methods were primarily focused on how to select development factors from a variety of triangles. This was particularly true for ratemaking articles. The triangle was what you had left from ratemaking articles when you tried to estimate reserves. Triangles became the whole basis for the reserving methods of the day.

I believe empirical evidence supports the notion that the Berquist-Sherman paper must have been a quantum leap over the literature of the day; namely, it is still on the syllabus three decades later. However, around the same time there was a paper by **Bob Finger** regarding pure premium by layer of loss. That paper was one motivation for my consideration of shifts in losses by size of loss and for writing the 1978 discussion of the Berquist-Sherman paper. I actually felt a need to pull out my college statistics book while reading Bob's article. The Berquist-Sherman paper took us to "Triangles 101A," but I did not need my college statistics book while reading it.

Three decades later, I continue to find little need for my college statistics book when reviewing actual reserve studies of property/casualty actuaries. Our love affair with triangles continues. The magnitude of distortion in reserve estimates due to shifts in size of loss distributions can be huge! In a related recent case involving a very large client company, the actual reserve estimate with hindsight was double the unadjusted estimates made at the time.

Sherman: I've seen that as well.

Thorne: It should be noted though that over 90 percent of the time the adjustments in Berquist-Sherman are not needed. For the other 10 percent, the adjustments can be critical. This potentially critical effect invites at least testing for these types of shifts.

Sherman: Few insurers even have a good history of size of loss data. That's surprising but true.

Thorne: Thirty years later we ought to be seeing better data. It is interesting to note that corporate clients often do have the size of loss data that insurers lack. However, most commercial insurers have been submitting their workers compensation loss data to HNC Software, Inc. for a decade or more. The interest of the insurers in submitting quality data to HNC is primarily due to their desire to get back reliable estimates from the artificial intelligence statistics methods of HNC's MIRA software. The MIRA estimates can aid their claims adjusters in setting case reserves. HNC data is a source of claims by size of loss for workers compensation.

Sherman: In the paper, we used an

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exponential curve to relate paid claim counts to paid loss dollars. Over the years, this curve has proven to be a pretty good choice.

Thorne: There may be a cause and effect relation between that exponential assumption and the underlying experience. Smaller claims tend to close out sooner, which leads to an exponential formula. The ultimate test though is to step back and make the empirical observation that the graph sure does look exponential.

Berquist: We agree on the exponential formula. We [Sherman, Thorne, and Berquist] worked together on a large number of reserve studies.

Thorne: That environment, which Jim created, was so different from today. You did not have the current level of competition among major consulting firms. We worked on a large spectrum of different situations. That spectrum included very large to very small insurers as well as more volatile lines of business such as medical malpractice and workers compensation to the very stable automobile property damage coverage. The questions in the appendix benefited from this tremendous variety of situations, as each situation was an actual wrinkle that had been encountered in practice during the 1970's. Many of them continue to be encountered today.

Sherman: I'm glad that Joe [Thorne] wrote that review of the paper. There's a tendency to blindly apply methods without serious regard for possible problems. Applying the adjustment for a change in case reserve adequacy is only as valid as the consistency of the count data. There also needs to be a review of changes in claim count data or other shifts that are going on.

Schwartz: *Since the time each of you wrote your papers, have you come across any improvements in the two methods or simply better techniques for making the indicated adjustments for case reserve adequacy and for claim settlement rates? Also, are there any special situations—for example, changes in retention levels—in which either method may be misleading without further testing? (Also, I want to clarify the Fleming-Mayer approach. A key point of the paper is that an increase in the outstanding losses may seem to show reserve strengthening. Instead it may simply reflect a speed up in claims settlement rates.)*

Thorne: How does the Fleming-Mayer approach differ from the hindsight outstanding severity method?

Mayer: First, start with adjusting the paid triangle as in Berquist-Sherman, with all caveats noted above. Second, take the original incurred loss and reported count triangles and subtract the paid loss and paid claim count triangles. Third, look at the trends in average case outstanding losses. Look at the trend at various percentiles of settled claims. The trend rate should be the weighted trend rate of closed claims.

Thorne: An advantage of using the ultimate is that it's not as dependent on the case reserving philosophy. A disadvantage of the hindsight average outstanding method is that it's like playing claims adjuster without the detailed knowledge the adjuster has of the actual claims.

Sherman: The Fleming-Mayer paper proposes a helpful enhancement to the Berquist-Sherman adjustment methods. I'm glad this paper is part of the actuarial literature.

Thorne: You will need to look carefully at trends in closed claims.

Mayer: If the data is too volatile, then you need to pick a trend rate. The Fleming-Mayer approach makes sense for the most recent three to four years. At some point, for older years, you should just use traditional methods.

Thorne: A weighted average trend factor is based on all claims not yet closed, including late reported IBNR claims. The average in the paper is applicable more to difference of the ultimate losses minus paid losses since that difference includes IBNR claims. The reported losses used in the paper do not include IBNR claims.

Mayer: Exactly.

Thorne: Over three decades since the paper was written, we have so many better techniques available. We have seen vast improvements in part due to the personal computer revolution.

One key transformation is data. Over the past ten years, corporations such as HNC have been accumulating individual workers compensation claim data for most large commercial insurers in the nation. The WCRI [Workers Compensation Research Institute] in California and the NCCI [National Council on Compensation Insurance] are currently working on a similar workers compensation database designed to provide such data to support rate filings by better understanding the underlying forces driving rates. This kind of data is crucial to understanding what I call the "whys behind the numbers." It is much easier to find an actuarial student (or senior actuary) who can play with the numbers than one who will get into changes in the underlying claims environment or changes in insurance company operations. From my experience the ones who can do more than "play with the numbers" seem to rise to the higher paid positions (take note, actuarial students).

The other area where I have seen progress is methods. Methods that were at best cumbersome in the 1970's are much more accessible now. There's some very powerful software available to run on a PC. For example, there is @Risk from Palisades Software. Just with a PC you can fit dozens of distributions to the size of loss data and obtain related statistics for evaluation of those fits. A second example is Stata. This software is a standard among Ph.D. statisticians working in econometrics and multilinear regression. I have applied size of loss distribution fits and multilinear regression concurrently for some very useful results—adjusting for changes in claims closure rates, adjusting for changes in case reserve adequacy, and identifying "red flags." For example, the mean or coefficient of variation of the fitted size of loss distributions at various levels of development in the triangle can be a measure for severity or frequency. Whether it is the mean or coefficient of variation breaking out of historical trends at some common point of development, that is a red flag to me. A

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PC can now combine distribution theory and econometrics where you may not even want to look at the triangle except for purposes of reconciliation to higher macro levels of loss summarization.

However, Sherman made a very good point earlier. The size of loss data often does not exist to apply these methods—especially among commercial insurers. I have not found this much of a limitation since in the later part of my career I have worked substantially with medium-to-large corporations. They or their third party administrators (claims adjusting firms) seem to have systems that can provide such claim data by size of loss. As noted above, I have also found such methods more available for workers compensation than other coverages. Perhaps that is due to the statutory nature of the business.

We should also remember that the availability of size of loss data and these methods requiring reference to our college statistics books do not imply their immediate application. That is even true if we are working in the traditional triangles environment of the Berquist-Sherman adjustment methods. As noted earlier, over 90 percent of reserve studies do not require any of these adjustments. The adjustments could be a waste of the actuary's time and the client's money.

Sherman: In many situations, however, it is a fact that there are no major changes in the reserving environment and no clear need to apply the techniques. You see randomness, yet no real trend.

Thorne: Many reserve reports that I have reviewed do not address whether they have tested for such changes [in claims settlement rates or case adequacy]. I'd like to think that three decades later it would be standard to test for those changes and note it in the reserve report or at least in the work papers. This testing and documentation would be appropriate even if the adjustment methods end up not being applied. I believe that an actuarial stu-

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Brainstorms

A Case for Stochastic Budgeting

by Stephen W. Philbrick

I've managed to work in the insurance industry for a quarter century without spending any appreciable time in a company's budgeting process, but I'm not going to let that lack of experience dispel me from talking about budgeting. If you haven't yet fallen asleep, there is an actuarial aspect to the process.

Most budgets are deterministic, despite the fact that actual outcomes generally form a distribution (very, very few budget items are truly fixed). Given the stochastic nature of outcomes, the people generating the budget have to "collapse" this distribution into a single point. An obvious question is which single point is used or should be used.

Experience shows that most companies fail to achieve their budget. Usually, this is for an obvious reason. Some CEOs deliberately want a "stretch" budget, for motivational purposes. Others are simply overly ambitious, discounting last year's problems as solved or nonrepeatable, and failing to account for next year's unanticipated problem because, well, it is unanticipated. In either case, we can say the budget has been established at an aggressive percentile of the distribution.

"The simple mathematical answer is that most companies will fail to meet their budgets if the budgets are more aggressive than the true expectations."

The simple mathematical answer is that most companies will fail to meet their budgets if the budgets are more aggressive than the true expectations. Some companies may decide that stretch or optimistic budgets are legitimate management tools, but may also want more realistic budgets. In terms of a stochastic budget, a company can generate both on a consistent basis. One advantage of a formal stochastic approach to budgeting is that the stretch in the stretch budget can be comparable among divisions, by selecting a common percentile for each division. However, one must be cognizant of the fact that percentiles do not "add." For example, the 75th percentile of each business unit does not aggregate to the 75th percentile of the total company.

For many budget items, the distribution of possible outcomes is reasonably close to normal, so the mean, median, and modes are identical. (For the statistically minded, we can relax this to uni-modal, symmetric distributions.) Insurance losses are notoriously skewed. Should a line manager budget for mean losses, median losses, or some other level? This situation is probably most extreme in catastrophe-exposed business. Actual catastrophe losses will fall below the mean level most years. If a budget is linked to performance bonuses, this could lead to odd results. In the case of catastrophe losses, the phenomenon is so well recognized that any decent performance bonus system will account for it, possibly by capping or excluding catastrophe losses from the calculation and setting a target consistent with the capping.

In other areas, the difference between mean and median results may be closer

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Puzzling Dissection

by John P. Robertson

The following puzzlement is harder than it may look. It involves fitting together 30°-60°-90° triangles of various sizes. You may recall that these are right triangles and have sides and hypotenuse proportional to 1, √3, and 2. The puzzle is to dissect one such triangle with shortest side 10 into one such triangle with shortest side 1, two with shortest side 2, three with shortest side 3, and four with shortest side 4. Otherwise put, arrange ten 30°-60°-90° triangles, of the given sizes, into one 30°-60°-90° triangle.

Because the areas of similar triangles (ones with the same angles) are proportional to the squares of corresponding sides, the above dissection illustrates the relation $1^3 + 2^3 + 3^3 + 4^3 = 10^2$. In fact, $1^3 + 2^3 + 3^3 + \cdots + n^3$ is a square for any positive integer n. (Actually, $1^3 + 2^3 + 3^3 + \cdots + n^3 = (1 + 2 + 3 + \cdots + n)^2$.) This is a nonobvious result that may come as a surprise to many of you who thought you were experts in numerical analysis! I don't think there are any geometrical figures known so that one of size 1 and two of size 2 fit together to make one of size 3, or one of size 1, two of size 2, and three of size 3 fit together to form one of size 6.

Palindrome Challenge

Thank you to all who submitted palindromes in response to the August 2002 "Puzzlement." Judging on originality, difficulty, and wit has now begun. Winners will be announced and prizes awarded in the February 2003 issue of *The Actuarial Review*. All entries will be posted on the CAS Web Site.■

Roundtable

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dent can fall in love with triangles and do quite well in a career "squaring triangles." One can just apply Triangles 1A methods without even going to Triangles 101A or beyond. What a pity, though.

Mayer: If you put in some hard and honest work in getting answers to the questions, in asking underwriters about the book of business, in asking about the retentions by line of business, then the technology we have today is terrific. It only works if you do the hard work, though.

Schwartz: *Thanks for a great discussion!*■

Brainstorms

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and, paradoxically, more of a problem because the company may not specifically address it. Many expense items may have a distribution that looks close to normal over most of its range. Yet the potential for an extraordinary expense exceeds the likelihood of an extraordinary expense savings. Lest this be dismissed as rounding error, it amounts to tens of millions of dollars for some of the larger insurance companies.

It may be reasonable to assume a company estimating its upcoming costs produces numbers that are more in line with median results than mean results. Again, a seeming paradox is that this may be less true when results are seriously skewed (as in the case of catastrophe losses) because companies will formally model the results in these cases. However, in expense categories, it might be reasonable to assume numbers are median results. A formal approach to budgeting from a stochastic point of view will help identify the potential for outliers, ensure management is aware of the aggregate exposure to extreme events, yet still budget to achievable results.

Ironically, the existence of insurance may help explain why this issue doesn't come up in general budgeting for other industries. The prototypical widget factory, in the absence of insurance, would have to budget for the possibility that their building might burn to the ground. The odds are against this happening, so the modal value is zero. The median value may well be zero. But any company that budgets zero for this contingency will, in the long run, not budget enough to cover its costs. In the real world, the company insures the building, converting a highly skewed distribution into a fixed point (the cost of the insurance protection), and budgets accordingly. Other potentially skewed exposures to a widget factory—the cost of liability claims, the cost of raw materials—are addressed through risk management techniques, such as the purchase of insurance or the use of commodity futures contracts. These have the effect of converting potentially skewed results into point estimates or costs more resembling normal distributions.

In conclusion, whenever one works with a budget, one needs to ask the purpose and then determine whether the metrics used to produce the values match that purpose. A stochastic budgeting process forces one to think about issues such as mean versus median levels, and helps ensure transparency and consistency of results.

(Thanks to Rob Painter, who helped improve this discussion.)■

In Memoriam

Dunbar R. Uhthoff

(FCAS 1947)

June 7, 2002