actuarial REVIEW

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PUBLISHED BY THE **CASUALTY ACTUARIAL SOCIETY**

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2016

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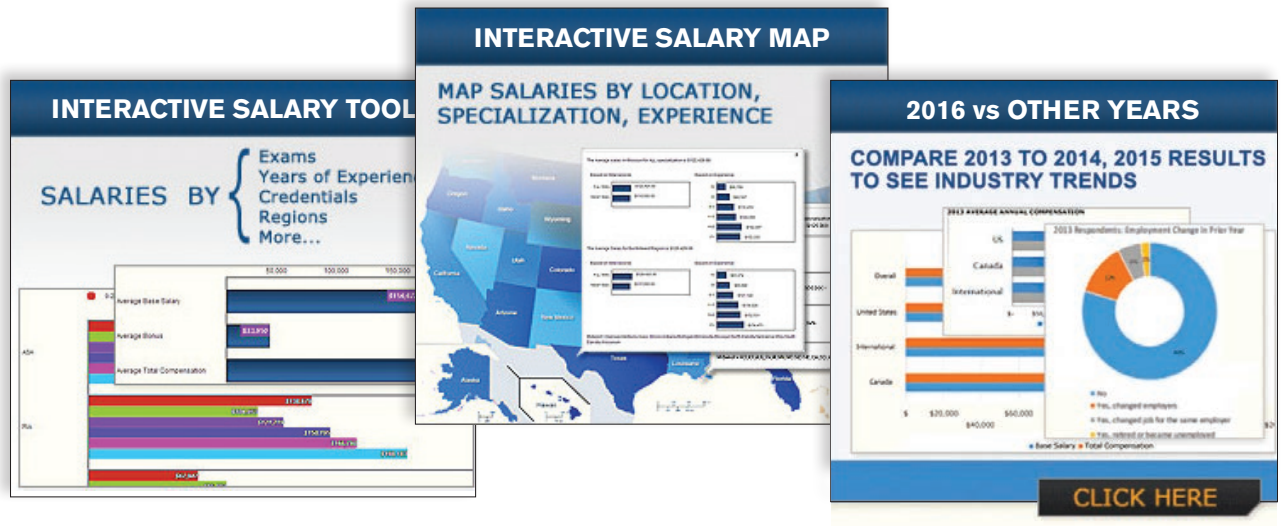

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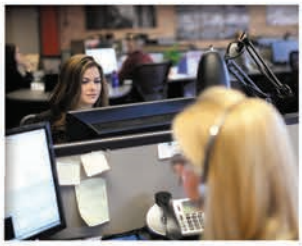

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FAQ: Working Abroad

For professional development and/or personal purposes, some Actuaries may investigate career opportunities abroad. We at DW Simpson frequently field inquiries about making such a move[...]

Trends in Actuarial Hiring

By: Margit Vogele, Manager & Sean Loboda, Manager The demand for Actuaries and analytics professionals has increased greatly in the [...]

Actuaries & Counteroffers: Worth the risk?

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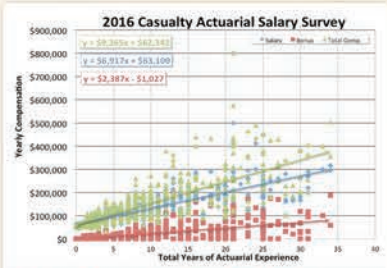
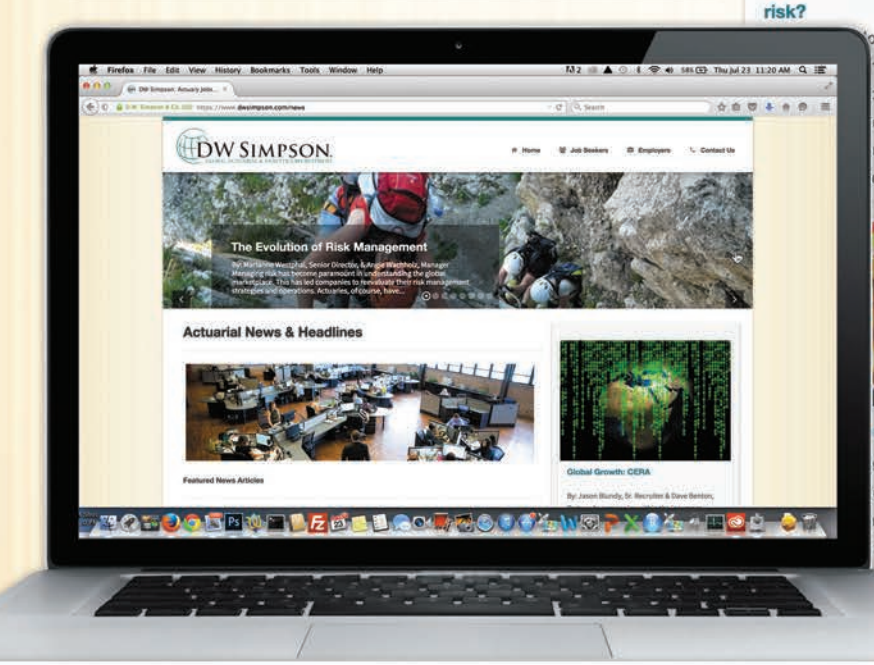


Salary Discussions And The Interview Process

The discussion of salaries can be a delicate one and it is important to position this dialogue at a timely point in the interview process. [...]



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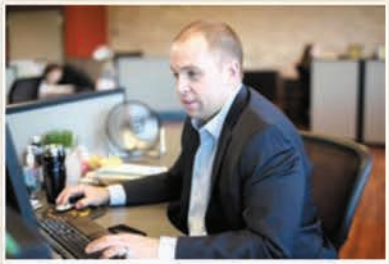

Making the Most of Your Recruiter Relationship

By Derek Mulder, Director & Elsa VanHove, Senior Recruiter At DW Simpson, we understand that the

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March/April 2017

actuarial REVIEW

departments

FSC LOGO

on the cover

Predictive Prudence 22

BY ANNMARIE GEDDES BARIBEAU

Annmarie Geddes Baribeau wraps up her three-part series on predictive analytics, this time focusing on the opportunities to fine-tune model applications and insurance operations.

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actuarialREVIEW
The magazine of the
Casualty Actuarial Society

Something for Everyone

A number of our members move into nonactuarial roles, including directing business units and heading up underwriting divisions. If you are one of those actuaries, or work with one of them in a "nontraditional" role, the "Professional Insight" would be good to read, if not now, then for future reference.

Regardless of where you stand on environmental issues, I recommend that you read about Gene Connell in "Downtime." Some people only talk about environmental remediation; Gene and his wife, Anne, are doing something about it.

Annmarie Geddes Baribeau completes her trio of articles on predictive modeling in this issue. As excited as many of us are about the prospects of predictive modeling, there are obstacles to overcome. Even if predictive modeling is not your thing, this article illustrates why some insurers are reluctant to embrace new techniques and technologies.

CAS President Nancy Braithwaite declares "constant change" to be her theme for the year. She asks two excellent questions that should generate a lot of discussion.

Speaking of change, as insurance changes internationally, our members are responding to the need to assist emerging insurance markets. Be sure to read Bob Conger's account of how some CAS members are working with actuaries in the Malaysian insurance market to help implement the latest in motor insurance.

Corrections

In an article titled "CAS Honors Award Winners" (*AR* January/February 2017), Paul E. Kinson's designation is incorrect. Kinson is an Associate of the CAS. In the same article, Christopher Styrsky and Paul Grammens are misidentified. The photos with corrected captions are below. *AR* regrets these errors.

Christopher Styrsky

Paul Grammens

Actuarial Review always welcomes story ideas from our readers. Please specify which department you intend for your item: Member News, Solve This, Professional Insight, Actuarial Expertise, etc.

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Education in a World of Constant Change

At this stage of my tenure, I can wholeheartedly declare that my presidential theme for the year is constant change. Since writing my last column, The CAS Institute announced its first credential, the Certified Specialist in Predictive Analytics (CSPA). We've also announced changes to our basic education system with the introduction of two Modern Actuarial Statistics exams, known as MAS I and MAS II.

These two developments are inspired by the growing emphasis on predictive analytics in our world. Actuaries have always been predictive modelers, but in recent years, the data and tools available for modeling have changed drastically, and the CAS is keeping pace. I am particularly excited about these changes because they are evidence of the CAS culture of innovation and educational excellence.

A New Credential Marks Growth

The CAS Institute is moving ahead with an innovative approach to bringing analytics business partners into our community. The CSPA credential provides our new partners with a business context for their models. At the same time, the credential establishes a standard that gives employers an objective measure of a candidate's knowledge. Employers trust that the CAS is an organization that sets and maintains high standards for education, and this trust extends to the new credentials that will be offered by The CAS Institute.

Development of the syllabus and the assessments for the first credential has come together at an extraordinary pace. We'll be honoring those awarded the credential as experienced practitioners, our first class of CSPAs, at the Ratemaking and Product Management Seminar in March 2017. We're looking forward to welcoming these professionals into our community.

The New Basics

In order for actuaries to remain valued business partners, we need to stay up to date with the latest techniques available for evaluating and assessing risk. To this end, we are continuously evaluating our ACAS and FCAS requirements. As new tools are developed, the relevance of subject matter can change. The emergence of big data and predictive analytics predicates the need for all actuaries to understand the basic theory underlying the new tools. We may not all become expert users of these new methods, but we will all be working side by side with those who are, and we need to be informed.

The new Modern Actuarial Statistics exams, MAS I and MAS II, represent a broader scope of change borne of necessity. MAS I and MAS II will ensure that our candidates have that fundamental understanding.

New Delivery Systems

As the world becomes more complex, actuaries need to be responsive and inventive. We need to be able to integrate knowledge from multiple domains. Consequently, our admissions volunteers are scanning the environment for better ways to deliver educational material and to verify knowledge. We are moving to more integrative questions on our exams, and The CAS Institute's CSPA credential will require candidates to complete an integrated project.

These responsive innovations are a good start, but we also need to consider further changes to our education system:

- Could our past methods have attracted candidates with a less than fluid approach to the world?
- Does pen and paper testing from prescribed readings encourage agile and innovative thinking?

These are challenging questions to consider.

The CSPA credential ... gives employers an objective measure of a candidate's knowledge.

A Changing Work Environment and Education

Workplaces have been revamped. Attention spans and expectations for career progress have changed. Today, we work side by side (and often remotely) with other team members with different areas of expertise. The business problems we are analyzing are more complex and are changing daily.

We can be proud of our rigorous education system, but we also need to accept that other training and perspectives add value to final decisions. The reasoning behind our education can't just be, "This is how it's always been done." It has to become, "This is a new

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President's Message

from page 6

way we can think about it." Otherwise, how will we attract the best and brightest to the profession? If we stick to our current model — with an average travel time from date of first employment to Fellowship of 6.5 years — we may find that we are stuck. We must adapt.

Change is Good

Considering all that is happening, I get very excited when I think about actuarial education. The CAS is making changes! We are responding with innovative solutions to the challenges of preparing our candidates for successful actuarial careers.

But as we look to our future, our goals haven't truly changed that much. The *actions* we undertake to achieve those goals may change radically, but the things we need to excel at remain very much the same.

ACTUARIAL REVIEW *LETTERS POLICIES*

Letters to the editor may be sent to ar@casact.org or the CAS Office address. Include a telephone number with all letters. Actuarial Review reserves the right to edit all letters for length and clarity and cannot assure the publication of any letter. Please limit letters to 250 words. Under special circumstances, writers may request anonymity, but no letter will be printed if the author's identity is unknown to the editors. Announcement of events will not be printed.

COMINGS AND GOINGS

Rich Piazza, ACAS, chief actuary for the Louisiana Department of Insurance (LDI), has been awarded the Robert Dineen Award for Outstanding Service and Contribution to the State Regulation of Insurance. The award, given by the National Association of Insurance Commissioners (NAIC), recognizes a staff member of an insurance department who has made a significant contribution to state regulation of insurance. Piazza began working at the LDI in 1992 and is responsible for actuarial analysis for all lines of insurance.

Captive Review has included CAS Board member **Robert J. Walling III, FCAS, MAAA, CERA,** among its "Power 50" list for 2016. The list recognizes key influencers in the global captive insurance industry and includes votes from nearly 5,000 captive insurance professionals. Walling is a principal and consulting actuary for Pinnacle Actuarial Resources, Inc. in Bloomington, Illinois. Walling has been consulting in the captive insurance space since 1997.

EMAIL "COMINGS AND GOINGS" ITEMS TO AR@CASACT.ORG.

IN MEMORIAM

LaVerne J. Biskner (ACAS 1994)
1955-2016

Charles F. "Chap" Cook (FCAS 1966)
1941-2017

Robert A. Weber (ACAS 1987)
1958-2017

CALENDAR OF EVENTS

March 27 - 29, 2017
Ratemaking and Product Management (RPM) Seminar & Workshops
Marriott Marquis San Diego Marina
San Diego, CA

May 21 - 24, 2017
Spring Meeting
Sheraton Centre Toronto Hotel
Toronto, ON

June 5 - 6, 2017
Seminar on Reinsurance
Fairmont Washington, DC
Washington, DC

September 10 - 12, 2017
Casualty Loss Reserve Seminar (CLRS) & Workshops
Loews Philadelphia Hotel
Philadelphia, PA

November 5 - 8, 2017
Annual Meeting
Fairmont Austin
Austin, TX

March 19 - 21, 2018
Ratemaking and Product Management (RPM) Seminar & Workshops
Fairmont Chicago, Millennial Park
Chicago, IL

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MEET THE VEEP BY MIKE BOA, CAS CHIEF COMMUNICATIONS OFFICER

A Less "Administrative" Administrator

Our Meet the Veep column introduces CAS Vice Presidents who serve on the Executive Council to our members and candidates. In this installment, we are pleased to introduce CAS Vice President-Administration Sean McDermott.

Sean McDermott

What do you do?

I'm the leader for the capital division of Willis Towers Watson's risk consulting and Software segment, which includes management responsibility for the life, property-casualty and corporate practices for our Bermuda, New York, Philadelphia and Washington, D.C. offices. In addition, I'm involved with the coordination and delivery of Willis Towers Watson's property-casualty merger & acquisition services.

What is your role as VP?

The VP-administration covers a few different areas of the CAS. For starters, I oversee the committees dealing with financial matters, like the Finance and Investment Committees. I also oversee the publishing function as well as the continuing education policy compliance. Basically, the VP-admin has responsibility for all the functions that do not fit neatly into what the other CAS VPs do.

What volunteer work had you done for CAS that led to your appointment as VP?

Most of my volunteer work has been in the administration areas. I served on the Finance Committee for many years and was appointed assistant treasurer for two separate terms. The assistant treasurer is an interesting position that is pretty low-key, but important for the day-to-day running of the CAS. The CAS executive director has a dollar limit on check payments. Any check payments that exceed a certain amount need signatures from the executive director and the assistant treasurer. By signing the CAS checks, you learn a lot about how the CAS runs. Through my work on the Finance Committee and as assistant treasurer, I gained valuable insights about the CAS finances and budgets and also got to work very closely with the CAS staff, which I have always enjoyed. After almost 30 years of volunteering and as the current VP-admin, I still rely on the CAS staff heavily and thank them for all they do!

What are your goals as VP?

Besides the goals specific to the work of the administration committees, like developing and presenting the annual budget for board approval, my goal is to streamline as much of the committee work as we can. I would like to make the administrative process less "administrative" so we can focus on moving things forward quickly.

Could you share an interesting fact about yourself?

I enjoy music and playing the guitar. Although an actuarial career has been good to me, I have not yet given up my dream of being a rock star. I am self-taught and enjoy figuring things out musically or writing the occasional song. Strumming and singing is a great way for me to relax, and hopefully those within earshot feel the same way.

When you meet new Associates and Fellows at the Spring and Annual Meetings, what information or advice do you try to impart to them?

When I talk to our newer members, I pass on some words of wisdom given to me by CAS Past President Al Beer many years ago when I was a college student. He told me that one of the great things about being an actuary is exposure to a wide variety of business and technical concepts. As you progress in your career, you find out what you like, and the credentials give you the flexibility to pursue a particular area or passion. For me, it was always working on the financial side of things, so I was drawn to reserving, mergers and acquisitions, and how insurance companies run. I try to stress to our new members that they need to find their niche and then excel in doing what they like.

CAS Releases Syllabi for New Modern Actuarial Statistics Exams

BY MIKE BOA, CAS CHIEF COMMUNICATIONS OFFICER

The CAS Syllabus and Examination Committee has released the syllabi for two new exams that will be offered as part of the CAS's revised credentialing requirements in 2018. The new exams, Modern Actuarial Statistics I and II (MAS-I and MAS-II), will address the emerging needs of future actuaries and their employers. The syllabi, which are now available on the CAS website, outline the learning objectives, knowledge statements and readings that will be covered by the exams.

MAS-I is largely a modification of current CAS Exam S, which it will replace when it is first offered in the spring of 2018. MAS-II will replace the current CAS Exam 4 requirement that is typically fulfilled by most candidates through completion of SOA Exam C, which is being discontinued. MAS-II will first be offered in the fall of 2018.

The discontinuation of Exam C provided an opportunity for the CAS to create a replacement exam that focuses on the modern statistics that actuaries are increasingly using. This will enhance the relevance of the CAS exam syllabus with respect to emerging statistical and analytics skills, with minimal changes to the overall exam structure.

Both MAS-I and MAS-II will be four-hour exams, resulting in practically no net increase in exam hours required for CAS credentials. The exams will be offered every six months, initially as multiple-choice paper-and-pencil exams, in the same general windows in the spring and fall in which other CAS exams are offered.

The transition rules allow candidates with credit for Exam S achieved through an examination administered prior to January 1, 2018, to receive credit for MAS-I. Candidates with credit for SOA Exam C achieved through an examination administered prior to July 1, 2018, will receive credit for MAS-II.

As reflected in the syllabi, candidates should expect MAS-I to be similar to Exam S but with more emphasis on applied modeling and a deeper coverage of generalized linear models. MAS-II will retain coverage of credibility from Exam C and will also include advanced statistical topics like Bayesian Markov Chain Monte Carlo (MCMC) methods.

The syllabi are subject to further revisions until the changes for the 2018 CAS *Syllabus of Basic Education* are approved by the Executive Council and announced for MAS-I in July 2017 and for MAS-II in January 2018.

To learn more about the CAS's revised credentialing requirements, review the list of frequently asked questions and responses on the CAS website. Additional questions can be addressed to the Actuaries' Resource Center at the CAS Office at ARC@casact.org.

CAS STAFF SPOTLIGHT

Meet Stephanie Litrenta, CAS Admissions Manager

Welcome to the CAS Staff Spotlight, a column featuring members of the CAS staff. For this spotlight, we are proud to introduce you to Stephanie Litrenta.

- **What do you do at the CAS?**
  I work with the CAS Admissions Committees and Task Forces to ensure that the CAS education structure and examination process are reliable, fair and valid, and that they meet testing industry standards for professional education. I also work with the Candidate Liaison Committee to publish *Future Fellows*, our quarterly newsletter for candidates. Recently I joined a team of CAS staff members to represent the Admissions Department on social media.


FUTURE CAS FELLOWS

December 2016, Volume 10, No. 4

Integrative Questions (IQs) – Coming Soon to Exam 9

By Asadi Ahmad, FCAS, Examination and Syllabus Committee General Officer

In an effort to further improve the relevance and efficacy of CAS exams and test candidates' ability to apply and synthesize syllabus materials, the CAS Examination and Syllabus Committee will adopt a recommendation by the CAS Board of Directors and gradually move to a more integrative testing framework. Integrative Questions, or IQs, will require candidates to understand multiple facets of the syllabus material and concepts in addressing complex business problems.

How is an IQ different than a typical exam question?

An IQ will differ from a typical exam question in three significant ways. First, it will be worth a lot more points. To put it another way, each IQ could be worth around 10% to 15% of the total exam. Second, each IQ will require the candidate to draw from multiple syllabus learning objectives in order to answer the question (hence the word "integrative"). Finally, IQs will naturally test at a higher average Bloom's level than a standard exam question.

Which exams will be affected?

Exam 9 will feature one IQ on the Spring 2017 exam, worth about 10% to 15% of the exam. Similarly, Exam 8 will feature one IQ on the Fall 2017 exam and Exam 7 will feature one IQ on the Spring 2018 exam. The number of IQs that will appear on these exams will gradually increase over time.

We are still considering whether to extend this approach to Exams 5, 6US and 6C. However, candidates already have some experience with IQs to a limited extent, in the sense that Exam 5 often features a full-run indication item that blends testing of reserving and ratemaking concepts.

Please note that there will be fewer exam questions overall to account for the presence of IQs in order to avoid any increase in the time length of the exam.

Will you be releasing sample IQs?

Yes. Exam 9 will be releasing a few sample IQs in January as a study aide for candidates to help prepare for the exam. Similar to Exam 9, Exams 7 and 8 will also release sample IQs at the appropriate time.

Just to confirm, does this have anything to do with integrals or integration?

Thankfully, no.

How else should candidates prepare for IQs?

We understand that candidates will have to adjust somewhat in getting used to this new type of question and that the point values might be daunting. For example, candidates will need to consider the time spent on IQs vs. other exam questions, which will be different than in the past. However, we do not expect these questions to necessarily be more difficult for prepared candidates. In fact, we believe IQs will benefit candidates by reducing the complexity of the exams overall, as the number of distinct scenarios, assumptions and datasets that candidates face will be reduced.

Part of the mission of the Candidate Liaison Committee is to foster two-way communication between candidates and the CAS leadership. If you have any question about IQs, or any concerns that you would like to share with the Exam and Syllabus Committee, please send us a note by visiting http://www.casact.org/newsletter/index.cfm?fa=feedback and we will do our best to address it.

CAS Releases a New Interactive Online Course

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Visit the Future Fellows Blog

Come check out our new future fellows blog, accessible through the new future fellows' portal at http://www.casact.org/future_fellows. You can go into basic news, read interviews with actuaries on a variety of topics, and learn tips and tricks to succeed in the workplace. It's a great way to interact with other actuarial students, including CAS leaders, by engaging in the online community.

What topics would you like the Future Fellows Blog to cover? Email your suggestions to atrenta@casact.org.

CAS Seminars and Meetings

Ratemaking and Product Management (RPM) Seminar & Workshop
San Diego, CA
March 27-29, 2017

- **What was your first job out of college?**
  My first full-time job after college was selling office equipment and software to businesses in the DMV (DC/Maryland/Virginia area).

- **What do you enjoy most about your job?**
  I like working with our volunteers and being able to meet some of them at the various in-person meetings throughout the year. I truly believe we have some of the most passionate volunteers — meeting them in person has been a treat.
- **What's your hometown?**
  I was born in Columbia, Maryland, and raised in Northern Virginia.
- **Where'd you go to college and what's your degree?**
  I attended the University of Tennessee, Knoxville (Go Vols!), and earned a BA in communications.

Stephanie Litrenta

- **Describe yourself in three words:**
  Loyal, determined, curious.
- **What's your favorite weekend activity?**
  I enjoy spending time with friends checking out a new restaurant or winery. I end the weekend with a Sunday family dinner at my parents' house.
- **What's your favorite travel destination?**
  Someplace tropical like the Bahamas is always nice, but I am dying to visit Cuba and see where my grandmother grew up.
- **Name one interesting or fun fact about you:**
  I absolutely love lunch! My friends have even named me the sandwich-making queen.

CAS Ratemaking and Product Management Seminar and Workshops

March 27-29, 2017 • Marriott Marquis San Diego Marina • San Diego, CA

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DOWNTIME BY LAURIE MCCLELLAN

We Bought a Forest!

When Gene Connell thinks about his retirement, the movie *We Bought a Zoo* comes to mind. That's not exactly what he did, although a surprising number of animals — ranging from coyotes to wild mink — now rely on the retired actuary for support. "When people ask me what I'm up to," says Connell, "I usually respond with, 'We bought a forest!'"

The project started out as a simple idea. After retiring as chief actuary and chief risk officer from Erie Insurance in Erie, Pennsylvania, Connell was looking for an alternative investment. "The stock market is volatile," he points out, "and savings accounts aren't paying any interest." Connell and his wife, Anne, had once owned land in New Hampshire. They began thinking about moving back to the state and investing in property there.

The Connells' daughter, Jennifer, 26, had a different idea, combined with a millennial's dedication to the internet. Hoping to keep her parents in the area, she began scouring posts on Craigslist. One day, she spotted an ad for an 80-acre parcel of land only 10 miles away from the Connells' home. The land was a forest. Its cherry, oak and maple trees had been logged to build furniture, and the logging had left it in rough shape. Still, Gene Connell saw its investment potential. In August 2016, he bought his forest. Located seven miles south of Lake Erie, the property was large enough that it took him nearly three hours to hike all the way around its borders.

Connell's plans started to shift, however, after he called the Pennsylvania Bureau of Forestry asking for advice. Forester Tim Ackerman made one request. "He says, 'Don't touch anything until I come out and take a look around,'" recalls Connell. When Ackerman arrived to walk through the woods, Connell got his first lesson in forest ecology — and his first clue that he was getting into more than he realized.

When Connell told the forester of his plans to remove the dead branches lying on the ground, part of the detritus left behind by the loggers, Ackerman pointed out something Connell hadn't noticed. In the shelter of the decaying branches, tiny saplings were poking out of the ground. "If you pull these tree branches out," Ackerman said, "the deer will have easy access to all these saplings. And they'll eat them all." Connell's response? "Fascinating!"

The more state officials saw of the forest, the more excited they got about its potential. "They're like, 'Holy mackerel, you've got a pond! You've got streams! You've got deer!'" Ackerman pointed out places where wild turkeys had clawed up the bare dirt to take a dust bath. Soon Pennsylvania Game Commission officer John Keller visited the property. The experts pointed out the tracks of wild mink, the weasel-like animal with a luxurious brown coat that hunts in the state's ponds and streams, as well as coyote prints. "This is what Pennsylvania is supposed to look like,"

A walk in the woods shows the beginning of something great.

the officials told Connell.

Gradually, Connell came up with a new goal: not just to own the land, but to restore its ecosystem. "We would like the property to be a showcase of Pennsylvania forest," he says. "We want to have a timber-producing forest, so that we can cut cherry and oak, maybe walnut. But [we want to] do it in a way that is sustainable, forever."

Actuary vs. Alien Invaders

Connell began reading books and learning about habitat restoration. "A lot of people assume … the trees grow on their own, right? Well, without intervention, because this was logged, it would not restore itself," he says. The first major problem, Connell learned, was invasive plant species. When the forest was logged, plants that are not native to the area moved into the clearings and began to grow. Because local wildlife, including everything from butterflies to birds to deer, isn't adapted to feed on those spe-

cies, the plants grow unchecked and can soon take over the woods. "The point of owning a forest is completely [lost]," Connell explains. "You have no wildlife and no native trees."

Non-native species are notoriously difficult to eradicate, but Connell was amazed to find that help was available. In exchange for allowing hunting on the land for ten years, state officials are applying for a grant to have contractors remove the invasive plants — a process that usually costs tens of thousands of dollars.

Erosion is a problem Connell is tackling himself. "They bulldozed roads so they could haul the trees out," he explains. "Those roads are eroding with rain and snow, and the silt is ending up in the streams." To stabilize the roads, Connell is using a method used during colonial times: picking up dead branches and laying them over the dirt to create a bumpy surface, a process known as corduroying. Connell even has a new assistant: a 1947 Ford tractor he bought on Craigslist. Because the forest has grown into a family project, his human helpers now include his son, Christopher, along with his wife and daughter. Their next project, scheduled for the spring, will be planting 500 oak, maple and pine seedlings grown at Penn State, and provided for free by the state.

Deer selfies!

Baby Boom

Spring may bring another kind of baby boom as well. A visiting game commissioner noticed that Connell's pond is quiet and remote, far from any houses or people — a perfect home for one of the state's most beautiful birds. "They said wood ducks really love to find a pond where they will not be disturbed by people," says Connell. Hoping to boost the bird population, officials installed several duck boxes, which look like birdhouses on stilts, near the water's edge. The boxes allow the ducks to lay their eggs in a place that's safe from predators. In the fall, game commissioners will return to look for evidence of nesting to find out whether the effort has been successful.

Throughout the whole process, Connell says, his favorite thing has been "the almost continual learning. The bottom line is that the forest … is a mental and physical challenge. Which is really kind of cool." Other rewards are more tangible. Recently, Connell visited the woods to retrieve photos from the motion-controlled wildlife cameras. Though the cameras have captured a variety of deer selfies, he's hoping for a photo of a wild turkey, or the red fox a friend saw on the property that he says was the largest he'd ever spotted.

"It was later in the evening," Connell says, "just starting to turn dark, and the owls started hooting. It was really neat. I just wanted to sit there and listen." ●

Laurie McClellan is a freelance writer and photographer living in Arlington, Virginia. She is on the faculty of Johns Hopkins University, where she teaches in the M.A. in Science Writing program.

CAS Announces New Web-Based Submission Platform for Publications, Creation of CAS Literature Review Board

BY KATE NISWANDER, CAS COMMUNICATIONS MANAGER

The Casualty Actuarial Society is pleased to announce the launch of its new publication management system, ScholarOne Manuscripts.

Owned by Thomson Reuters, ScholarOne is the leading web-based manuscript submission, peer-review, and tracking system used by scholarly publishers worldwide for over 3,400 academic books and journals. The ScholarOne platform will be initially introduced for *Variance* and monographs and will eventually act as a hub for submissions to all CAS publications, including *E-Forum* call papers and independent research.

The new platform provides authors with a centralized portal that will allow them to easily upload their manuscripts, supplemental materials, permission forms and other documentation necessary for submission. The system allows authors to check the progress of their submissions at any time. Manuscript review will also be handled online through the ScholarOne system, with the option for authors to view and respond to comments once the review process is complete. (Note that any papers now under review by the CAS will continue to be processed through the current manuscript review system and do not require additional action.)

"Producing top-quality, world-renowned literature is a cornerstone of the CAS legacy," said Stan Khury, FCAS, chair of the Strategic Review of Literature Task Force. "The new system helps us advance our mission to publish literature that provides critical value for CAS members and also advances property and casualty actuarial science."

The CAS also announced the formation of the CAS Literature Review Board (LRB), a group that will provide peer-review services for any CAS publication requiring it (e.g., *Variance*, CAS monographs, certain call paper programs). The LRB was created in response to increasing demands for CAS-oriented peer-review services across a wide array of publications. The new configuration allows the CAS to deliver peer-review options to a larger selection of CAS publications through a more centralized system. The LRB also will be responsible for improving the peer-review process while maintaining the high quality that the current reviewers provide.

"The creation of the Literature Review Board is a step that openly recognizes the important and great work that CAS peer reviewers have provided throughout the life of the CAS," said Eugene Connell, FCAS, chair of the Literature Review Board. "Offering peer review to a greater number and variety of publications can only improve the work that we produce each year."

CAS members and others interested in volunteering with the Literature Review Board should contact Elizabeth Smith, manager of publications, at esmith@casact.org.

The CAS Institute to Conduct Full-Day Predictive Analytics Event for Advanced Practitioners

BY KATE NISWANDER, CAS COMMUNICATIONS MANAGER

The CAS Institute (iCAS) is pleased to announce its first Predictive Analytics Community of Practice event to be held Monday, March 27, in conjunction with the Casualty Actuarial Society's Ratemaking and Product Management (RPM) Seminar & Workshops in San Diego, which is being held March 28-29.

The full-day event is designed for advanced practitioners working in the area of predictive analytics/data science, and it will include panels, presentations and roundtable discussions of advanced topics in predictive analytics both within and outside of the insurance fields. This iCAS event is independent of the RPM Seminar and will require a separate registration fee of $150. (Registering for the RPM Seminar is not required to attend the iCAS event; however, those registered for the iCAS event may attend the RPM opening reception for an additional $35.)

The content of the inaugural Predictive Analytics Community of Practice day will include:

- An overview of the new Certified Specialist in Predictive Analytics (CSPA) credential, including its exam process and continuing education requirements.
- Presentations/workshops on specific topics (within and outside of the insurance field).
- Roundtable discussions.
- Networking opportunities.
- Master classes.

Topics currently being considered for the program include:

- Experimental Design.
- Various Modeling Techniques.
- Measuring/Communicating Model Performance.
- Deploying Models and Designing for Implementation.
- Ethics of Predictive Modeling.

If you are an experienced practitioner who is actively doing this work (e.g., an actuary, data scientist either within or outside insurance or a faculty member) and are interested in joining the iCAS Community of Practice event, please email iCAS Director Amy Brener at abrener@thecasinstitute.org. Attendance will be limited.

While the iCAS Community of Practice event is a separate seminar designed for advanced practitioners, the RPM Seminar will also offer continuing education opportunities in predictive analytics.

CAS Participates in Student Conferences Across North America

BY TAMAR GERTNER, CAS UNIVERSITY ENGAGEMENT MANAGER

Gamma Sigma Iota

In the fall of 2016, the Casualty Actuarial Society (CAS) joined over 500 of the best and brightest insurance, risk management and actuarial science students at the Gamma Iota Sigma (GIS) 45th Annual International Conference in Columbus, Ohio. GIS supports the insurance industry in developing and sustaining a talent pipeline, and its annual conference provides the next generation of professionals with a wide array of educational and professional opportunities to support their insurance career pursuits.

As a GIS Sustaining Partner and a Platinum Conference Sponsor, the CAS had an active presence at the conference: presenting two educational sessions, meeting with university faculty, convening a roundtable of industry associations and connecting with students during the career fair at the CAS Student Central booth.

The annual conference is a significant opportunity for companies to connect with and recruit students. It is the largest insurance-specific career fair in North America, with more than 60 exhibiting organizations and over 300 pre-scheduled job interviews. At the CAS Student Central booth, CAS member volunteers shared their advice and insights as practicing actuaries with students.

The CAS conducted two educational sessions that were well attended by students. Scott G. Sobel, FCAS, principal for Oliver Wyman Actuarial Consulting

(Left) Former CAS Board Member and current University Engagement Committee Chair Wes Griffiths poses with Tamar Gertner (right). (Center) The author (front, left) with (left to right) Mike Boa, CAS Chief Communications Officer; Paul Hurd, FCAS, Grange Insurance; Phil Baum, FCAS, MAAA, Grange Insurance; Scott Sobel, FCAS, MAAA, MSPA, Oliver Wyman Actuarial Consulting, Inc.; Rick Gorvett, FCAS, MAAA, CERA, ARM, FRM, PhD, CAS Staff Actuary. (Right) GIS Board Members, alumni and students.

presented "Predictive Analytics and Your Actuarial Career" and CAS Staff Actuary Rick Gorvett, FCAS, presented "Actuarial Insights on the Risks of Tomorrow — Automated Vehicles."

We are looking forward to participating in this year's conference in Dallas, Texas, from September 28-30, 2017. Companies interested in sponsorship and exhibitor opportunities at the 2017 conference can find them on the GIS website, gammaiotasigma.org.

Actuarial Students National Association

The CAS kicked off 2017 by attending the 27th Actuarial Students National Association (ASNA) Convention in Toronto in January. This event is the largest gathering of actuarial students, industry professionals and academics in Canada and provides a platform for aspiring actuaries to learn about the industry and network.

The CAS participated as an ASNA Convention Diamond Sponsor, which offered a variety of opportunities for the CAS to connect with students from the 13 ASNA member universities:

Six CAS members joined staff to promote the CAS to students at the CAS Student Central booth in the career fair.

Claudette Cantin, FCAS, FCIA, senior vice president, chief actuary & CRO for Munich Reinsurance Company of Canada, represented the CAS on the featured panel of industry professionals.

The CAS hosted the Saturday luncheon, highlighted by a keynote address by CAS President Nancy Braithwaite, FCAS, MAAA, 2nd VP and actuary, Travelers Insurance Co.

For the second consecutive year, a P&C case study written by the CAS was used for the ASNA Case Competition, jointly sponsored by the CAS, CIA and SOA. Christopher Townsend, FCAS, FCIA, from the Office of the Superintendent of Financial Institutions, and David Wang, FCAS, FCIA, from EY, participated on the judging panel.

The CAS presented two educational sessions: Joel Li, ACAS, ACIA, from Allstate Insurance Company of Canada presented a session on predictive analytics, and Evgueni Venkov, FCAS, FCIA, from Aviva Canada, presented a session on automated vehicles.

Learn more about ASNA on on their website, anea-asna.ca.

(Left) CAS Staff Members Gertner and Boa are joined by CAS President Nancy Braithwaite (right) at the CAS Student Central career fair booth. (Center) Luncheon sponsored by the CAS. (Right) The winning team from McGill University accepts the ASNA Case Competition Award, presented by ASNA President Carlo Lahura and VP Case Competition Kevin Christiaens.

SPRING MEETING

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REUNION BY WALTER WRIGHT

Should Old Acquaintances Be Forgot? Not If You Are a Former Aetna P&C Actuary!

And there's a hand my trusty friend!
And give us a hand of yours.
And we'll take a deep draught of good will,
For long, long ago.

—*Auld Lang Syne*

Actuarial Review *is pleased to introduce the first of an occasional column called Reunion. Submissions can be accounts of any and all types of reunions — former employees, study group members or project volunteers — commemorating times when CAS members got together and made lasting memories.*

Aetna Life and Casualty sold off all its casualty business in 1996, ending its history of employing hundreds of CAS members since 1914. Over the years, generations of CAS Fellows and Associates had called Aetna "home," most of them achieving their professional designations while in Aetna's student program.

On September 23, 2016, I had the pleasure of attending a second reunion of Aetna P&C actuarial alumni at the Town & County Club in Hartford, Connecticut. It was well attended, with 68 alumni and 21 spouses — 81 in total (yes, the math is correct … go figure!). The time span represented by these alumni ranged from 1963, when Walt Farnum started as a new student, to 1994, when Tammi Dulberger began her career.

The attendees came from across the country to catch up with their old friends:

John "Bill" Wieder ("Mr." Wieder to all Aetna actuaries) achieved his FCAS in 1949 and is the CAS's oldest living member (98 years and counting). He was directly or indirectly involved with hiring all Aetna actuaries and is in touch with many of his protégés. When he joined Aetna in 1941 as an actuarial trainee, the company's P&C actuaries were few in numbers:

1. Burritt Hunt (FCAS 1914), a Charter Member of the CAS.
2. Edmund Cammack (FCAS 1914), another Charter Member of the CAS.
3. Paul Dorweiler (FCAS 1920), a CAS President who was first elected in 1932 and served two terms and who was also a prolific contributor to the *Proceedings,* the CAS peer-reviewed publication.
4. Nels Valerius (FCAS 1928), who joined the company in 1925 and, like Paul Doweiler, published many papers in the *Proceedings*.

By 1955, Aetna recognized that such a small number of casualty actuaries was not sufficient for its needs. So, Bill Wieder was charged with the responsibility of hiring actuarial students and starting a P&C actuarial department. His specific mandate: "Hire a handful of trainees and maybe one or two will work out." Bill hired five trainees: Harry Byrne, Jim Crowley, Walt Fitzgibbon, Joe Riccardo and Paul Simoneau. They definitely all worked out — all became CAS Fellows and spent their entire careers at Aetna! This "first round" of Aetna actuarial students was the basis for the excellent actuarial training program that continued until the dissolution of the Aetna P&C operations, 20 years ago.

Seated, left to right, are Beatrice Rodgers, Greg Bertles, Fran Lattanzio and Tom Weidman. Standing, left to right, are Steve Belden, Pete Bothwell, Will Morgan and Ralph Blanchard.

Left to right are Russ Buckley, Mike Visintainer, Bernard Gilden, Deb Horovitz and Bernie Horovitz.

The reunion drew former employees from California, D.C., Florida, Illinois, Iowa, Kansas and Michigan as well as from all over New England, New York and New Jersey. During the evening, the actuaries (and spouses) collaborated on five key predictions for what the future might hold in 2020. The group plans to reconvene in four to five years to do hindsight testing on their predictions.

I want to extend hearty thanks to CAS Fellows and past students Pam Sealand Reale, Deb Horovitz, Betsy DePaolo, Mary Beth Murphy, Bernard Pelletier, Bob Downer and Greg Bertles for their work organizing the event.

Former AR Editor-in-Chief Walt Wright, FCAS, is retired and living in Brooklyn, New York.

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Predictive Prudence
By ANNMARIE GEDDES BARIBEAU

There's more data for advanced analytical modeling, but innovation is moving carefully.

From new data sources and fresh modeling approaches to the emerging analytic insurance company structure, predictive modeling is cautiously generating new competitive opportunities.

Despite the game-changing success of predictive modeling, impediments to innovation remain. Many obstacles stem from the cautious nature of insurance companies.

Insurers are just as hesitant to move forward on new predictive modeling approaches as they were with generalized linear modeling (GLM) in the past, observed Roosevelt C. Mosley, principal and consulting actuary for Pinnacle Actuarial Resources. "The same companies that resisted GLMs 15 years ago," Mosley said, "are now saying the same things to me about advanced modeling."

Carriers are ramping up on research and development, said Claudine Modlin, who leads Willis Towers Watson's P&C pricing and product management for the Americas. However, since insurance companies tend to have a mindset to improve financial results in the short term, she said, it is difficult to get them thinking about innovation "that will not pay off in six months." Insurance companies often prefer waiting to see if an approach is tested and proven, and if it will impact the bottom line, Mosley said.

Insurers also realize, explained Stephen J. Mildenhall, a professor at St. John's University's risk management and insurance department, that the competitive edge to be gained from predictive modeling innovation can be short-lived in this "quick-to-copy" industry.

Larger carriers often find it hard to support innovation within their business structures, Mildenhall said, "even if they know it is the right thing to do." Strong program management is necessary for innovation, Modlin said, but only "a few companies in the industry excel around that."

Obtaining the right data remains a concern even though there is more collection and availability of that data than ever before. "There continue to be data quality concerns just as there were 10 to 20 years ago," said Louise Francis, founder of Francis Analytics and Actuarial Data Mining, Inc. This rings especially true for certain variables, such as injury type.

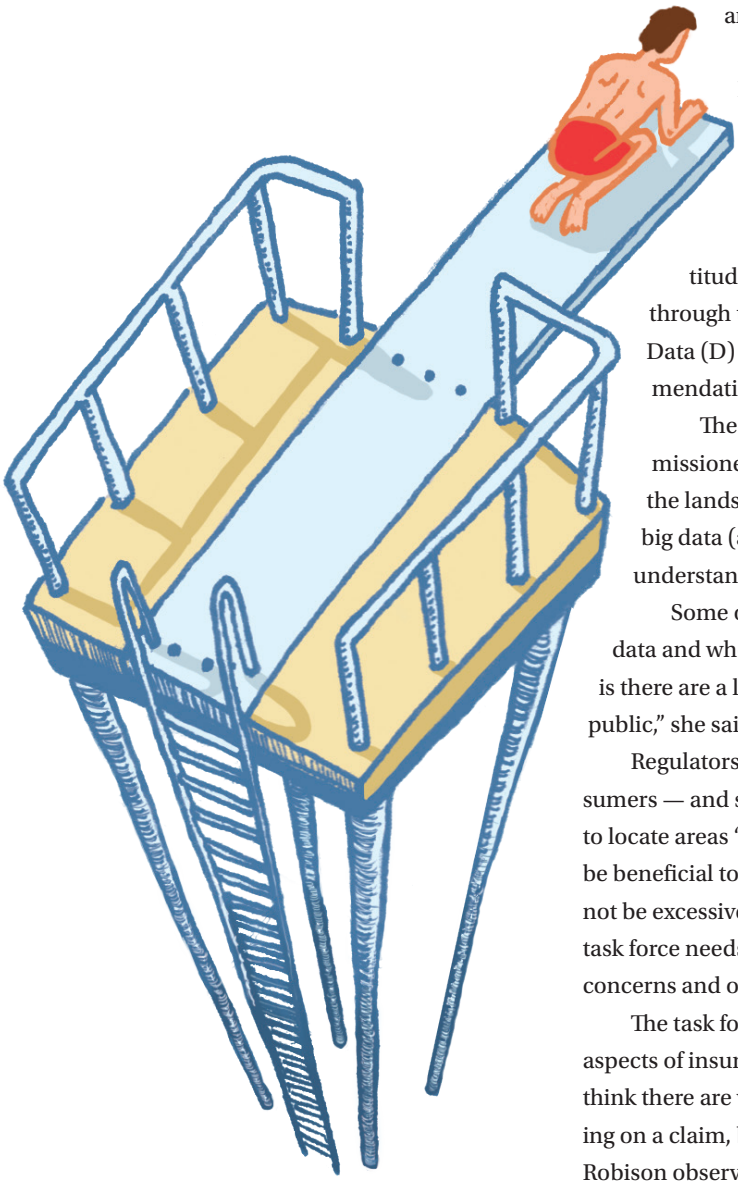
Many considerations go into collecting data, Christopher Monsour, vice president of analytics at CNA, pointed out. Insurers that sell commercial coverage through independent brokers need to consider the relationships with those brokers when deciding whether to collect additional customer information. "You also have a decision to make about agency relations if you are asking for information that your competitors might not be asking for," he added, because the additional time com-

mitment might encourage them to sell coverage from a competitor.

"This is one reason data vendors are so popular — they provide additional information without providing the agent with additional burdens, or at least, not with as many," he said. Meanwhile, Francis is not convinced that "boat loads of data from external vendors," will rescue companies from their data challenges. Choosing a vendor with trustworthy data requires a careful approach.

Regulatory Considerations

Regulatory restrictions — whether real or perceived — can also hamper innovation. One challenge of implementing advanced machine-learning models is that they can appear as black boxes to regulators, making them difficult to explain and to understand, Mildenhall said.



Regulators are really concerned with how insurers use data, said Bob Miccolis, a former managing director for Deloitte Consulting. Insurance companies do not want their actions to be misconstrued since that can lead to inquiries or even to an expensive market conduct exam, he observed.

Meanwhile, regulators are looking at how to address the multitude of issues and questions about data and predictive modeling use through the National Association of Insurance Commissioners' (NAIC's) Big Data (D) Task Force. Begun in 2016 as a working group, the task force's recommendations will likely lead to a model for state law.

The task force's chair is Laura N. Cali Robison, Oregon's insurance commissioner and an actuary. Currently, the task force focuses on understanding the landscape, she said. "We are trying to think differently in this new age of big data (and) to feel assured that we have the right information and tools to understand how the models are being used."

Some of the data issues the task force is exploring include who owns the data and who should be held accountable for its accuracy and its use. "The reality is there are a lot of different sources of data on the internet and a lot of it [data] is public," she said.

Regulators are also concerned about the effect of big data and models on consumers — and so are actuaries (see Data Ethics sidebar). The task force also desires to locate areas "where the current regulatory framework stifles innovation that could be beneficial to the public and the market," she said. Most states require rates to not be excessive, inadequate or unfairly discriminatory. Cali Robison said that the task force needs to explore whether those laws are sufficient to address potential concerns and opportunities for the use of big data in ratemaking.

The task force is also looking into the potential for how big data can affect other aspects of insurance, such as claim practices. "The environment has changed. I think there are ways data can be used to improve people's experience with interacting on a claim, but the use of big data in claims handling may also carry risks," Cali Robison observed.

Data Sources and Their Usage Present Ethical Concerns

As personal consumer data becomes more plentiful and models less straightforward, concerns about data ethics are being more closely examined. Questions include: Should the insurance industry use this data and, if so, how should it do so appropriately?

Coupling insurance companies' internal data with consumer preference information, for example, became controversial a couple of years ago when consumer groups successfully crusaded against price optimization for determining customer premiums.

So far, approximately 20 states have limited or banned the use of price optimization models. "I applaud putting the brakes on optimization rating methods," said Louise Francis, founder of Francis Analytics and Actuarial Data Mining, Inc. She considers this modeling application to be "predatory capitalism."

Another important consideration is the appropriate use of information gathered from social media. Only three years ago, using social media information to learn about consumers was something to which insurance companies would not admit publicly. Now there is greater acknowledgement of its use.

The kind of social media data that should be allowable for marketing and other purposes has not been clearly defined, said Laura N. Cali Robison, Oregon's insurance commissioner and chair of the National Association of Insurance Commissioners' Big Data (D) Task Force. "People have the responsibility to think about what they put in public view," she explained. But people do not expect that a post on Facebook will affect their insurance or a bank loan, she observed.

Even actuaries have different views on the use of information posted on social media differently. Using consumer internet breadcrumbs about life events to locate potential auto insurance buyers is one approach some insurers currently use.

Stephen J. Mildenhall, a professor at St. John's University's risk management and insurance department, offered that data gathered from social media would be unreliable for insurers because people can post whatever they desire to make them look good to insurance companies.

To Mildenhall, rating variables should be directly related to risk and ideally should be controllable, so that insureds understand how their behavior affects premiums. For example, he explained, instead of rating by age, insurers could rate (as required in Massachusetts) by the number of years a person has had a driver's license because it better reflects driving experience. Workers' compensation experience rating is another good example of basing premium on the actual employer's experience instead of using a proxy for the same.

Uncontrollable factors that the insured cannot change — age, sex, ethnicity, pre-existing conditions and genes for health/life insurance etc. — should not be included in rating, he added.

Regulatory constraints, whether real or perceived, are not the only forces affecting what might be considered the appropriate use of personal data. Public perception will also affect how insurers use greater sources of data, Cali Robison said. "'How will I explain this to my policyholders?' That might be a new big thing (to think) about," she said.

"Insurers need to think of ways to use the data that are acceptable and a win-win for companies and customers," said Jim Guszcza, U.S. chief data scientist at Deloitte Consulting. "[Changing] behavior through data may be a new 21st century way of being an actuary by helping insureds to understand and manage risk better."

The internet of things (IoT) has such potential for reducing loss, Mildenhall said. Home sensors to shut off water leaks and to measure air quality have the potential to lower costs and make homes safer, he said. Telematics also has great potential for loss mitigation.

Francis, who is a consumer privacy advocate, questions using data stemming from IoT's greater connectivity. "It's always discussed in a positive light without thinking of the implications of using personal data." For example, smart meters may present risks from malfunctions, or the data they generate may include private personal data, she said. Some consumers would rather opt out, but some public utilities now require their customers to use them.

The public debate concerning the collection, distribution and use of such data will continue. Companies in insurance and other industries will need to examine how they protect the public and ensure ethical practices regarding data and its uses.

Data and Analytics Business Model

Despite obstacles and regulatory unknowns regarding data and advanced analytics, applying predictive modeling to alter the traditional insurance business model moves forward. The approach uses data-driven business rules in predictive models to provide decision-making options, Miccolis said. "It is redefining the business," he added.

Unlike the current approach, which is based on a combination of business rules from past experience, he explained, the data-driven model is based on measurable information that can be put in a mathematical model. "The equation, or series of equations, gives you certain types of results, such as high or low probability of success as one kind of outcome," Miccolis said.

The advantage of applying analytics for decision-making is that the techniques provide an objective anchor, said John Lucker, whose title includes advisory principal and global advanced analytics market leader, analytics strategist and evangelist at Deloitte Consulting. Without it, he said, "the best an organization can do is to have an average performance that is a function of the independent aggregated thinking of every person." While some view the new approach as replacing people, Lucker believes it gives insurance companies consistency that can be lost from employee turnover.

"Since most mainstream property-casualty insurance products are largely commoditized with companies struggling to differentiate themselves with distributors and customers," he explained, "the analytics model allows insurers to address core functional problems and create a consistent and objective approach that should foster new ways to compete."

Reaching that point requires operational changes. "Pursuing the data-driven analytics model requires multidisciplinary collaboration because insurance companies are siloed," Modlin said.

Steve Lowe, a senior consultant with Willis Towers Watson, said that the transition from the traditional model to one that is data-driven often begins with combining actuaries and data scientists on innovation teams. "To some extent, the supply shortage forces you to concentrate the talent," he explained.

As more quantitative professionals have a solid grasp of both disciplines and the supply shortage eases, Lowe explained, they will gradually be embedded in different departments such as claims, pricing, underwriting and marketing rather than working within a concentrated innovation team. Actuaries can learn data science techniques and data scientists can gain deeper industry knowledge through the iCAS program.

The transition to the data-driven insurance business model is experiencing resistance, as did the evolution of predictive modeling innovation in general. The reasons are also similar, especially the pushback from employees who are more comfortable with judgment and experience-based decisions.

Industry movement toward this new insurance management and decision-making approach is much like the Parable of the Sower: Some companies go into the process, persevere, and flourish; other companies find the ground not ready due

Industry movement toward this new insurance management and decision-making approach is much like the Parable of the Sower: Some companies go into the process, persevere and flourish; other companies find the ground not ready due to internal pushback.

to internal pushback. Numerous companies have, for example, invested in the technology to become more data-driven but then could not make the move, Miccolis said, while others adjusted incrementally and succeeded in the effort over time.

Still other insurers wait, adopt the "show me" approach, and compare the results of models to human judgment, Lucker said, which is a very costly way to gain internal buy-in due to lost profit potential, potentially higher expenses and missed opportunity costs. Miccolis said that so far there are very few insurers that are comprehensively and holistically applying the data-driven modeling approach to improve their businesses.

The new model has its detractors. People tend to trust experience and educational qualifications more than data, Miccolis explained. On the other hand, he said, others see flaws in the traditional human judgment-based approach because people introduce cognitive biases due to how the brain works.

"Data is becoming more important than business relationships or clinical knowledge," Lowe observed.

Conclusion

As actuaries experiment with meaningful data sources and discover appropriate applications with different predictive models, there are plenty of opportunities for fine-tuning model applications and even insurance functions. Realizing the advances of predictive modeling means addressing multifold impediments from data to regulatory concerns.

As always, there is risk in an industry famous for caution, but if the past is a predictor of the future, predictive modeling will continue to challenge the status quo.

Annmarie Geddes Baribeau has been covering actuarial topics for more than 25 years. Her blog can be found at http://insurancecommunicators.com.

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ETHICAL ISSUES FORUM

Experienced or Out of Touch?

Ethical Issues is written by members of the CAS Committee on Professionalism Education (COPE). The column's intent is to stimulate discussion among CAS members. Therefore, positions are sometimes stated in such a way as to provoke reactions and thoughtful responses on the part of the reader. Responses are welcomed. 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 to modify published professional standards as they may apply in real-life situations.

Brie, an FCAS, was a product actuary for 10 years before transferring to the VP of underwriting position three years ago. Wayne took over Brie's role at the time of her transfer. Brie, along with the marketing department, has developed a new product with forms, rates and a five-year pro forma of the expected results of the new product on the company's financial statements. Wayne, also an FCAS, is the actuary supporting Brie's new product. Brie has reviewed Wayne's work and believes there are flaws in the pricing assumptions. Brie meets with Wayne to go over the assumptions and the following conversation ensues:

Brie: I'm not comfortable with some of the assumptions you've made. OK, not just some. Most. I think most of your assumptions are inappropriate. They don't give an accurate picture as to how we expect this program to perform.

Wayne: That's ridiculous.

Brie: It's not ridiculous. Let's start with your LDF picks. You use a countrywide average LDF. You need to pick something specific to this state. Why didn't you?

Wayne: I'm not comfortable using our state-specific data. We haven't written a lot of business in that state to date. Now, we hope to change that with this new program. But until we do and build up some history, I'm not going to rely on it.

Brie: Forget about our own data. Why not use state-specific industry data? It has more than enough volume to be credible.

Wayne: But it reflects the industry mix. Remember, the book of business we're going after is very different from that. Additionally, the industry data only reflects industry-average closure patterns and reserving patterns. With

all the changes that have happened in our claims organization the last several years, our losses are not going to emerge the same way as the rest of the industry. Using our own countywide data takes care of that.

Brie: But the legal and regulatory environment in this state is very different than that of the rest of the country. That gets muted when you use the countrywide data. Besides, most of the claims organization changes in practice have been in place for a couple of years. It's more stable now. How can it really be that different from the rest of the industry? The legal environment is the most important factor in picking the LDFs. You need to change them to statewide industry patterns.

Wayne: Look. Who's the actuary here, you or me? I know you had this job before me, but it's my job now and it's my call. If you want to be an actuary again, we have lots of openings right now. Go ahead and post for one and schedule some interviews if you like! In the meantime, let me worry about the LDF picks.

Brie: It's not just your LDF picks. It's your trend picks as well! You're using long-term averages for everything! Frequency trend, severity trend, exposure trend — none of them use less than the last decade!

Wayne: I think you're exaggerating a bit, don't you? Besides, what's wrong with using long-term averages for selecting trends? We're trying to project the long-term profitability of this program, after all. You of all people should know how cyclical these things are!

Brie: But look how much things have changed over the last couple of years! The economy has driven frequency down to levels I've never seen before. Tort reforms are actually working, and the Fed has taken inflation risk pretty much off the table. Sure, it's only been a couple of years, but why wouldn't you expect these things to continue in the time period we're considering? You need to be more responsive to the new reality — not just default to some long-term averages because that's the way it's always been done!

Wayne: Look, you're entitled to your opinion. And I do appreciate having someone in your position who actually speaks the language of an actuary. But you can't second-guess everything I do just because you used to have my job. It's counter-productive. You need to focus on the underwriting side of things and let me take care of the actuarial side. I'm happy to bring in your qualitative and business insights to let them inform my analysis. But at the end of the day, it is just that — *my* analysis. You need to let me make the calls I'm paid to make.

Brie: Listen, don't get me wrong. I respect the work you do. I'm glad the chief put you in this position after I moved on. But you're not being reasonable on this. You need to reconsider your assumptions and put in picks that are more appropriate. If you don't, I may have no choice but to go over your head and talk to the chief myself.

Wayne: Go ahead! I know you two are buddies from when you used to work together. But I'm his guy now, and he'll listen to me on this. It's my work product, and I have to use the assumptions that I feel are most appropriate. What I have now is my best estimate, and I'm not going to change it.

Should Brie talk to Wayne's boss about changing his assumptions?

Yes

Just because Brie has moved into a non-actuarial role in the company does not mean that her actuarial expertise is no longer valid. Her suggestions aren't random. She has valid reasons for suggesting the alternate assumptions; getting it right is the best thing for the company. If Wayne won't even consider her opinion, she needs to approach his boss. The company has made a substantial investment in this new product and Wayne's overly conservative assumptions could sabotage it before it even gets off the ground.

No

Brie has been out of the actuarial loop for three years. She is not privy to the internal discussions within the actuarial department related to assumptions, data and trends. In addition, her perspective has changed. Her judgment is clouded due to the pressures and goals related to her new role. She can no longer view the actuarial analysis objectively.

Considerations

- CAS Code of Professional Conduct
  - Precept 1. An Actuary shall 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.
  - Precept 10: An Actuary shall perform Actuarial Services with courtesy and professional respect and shall cooperate with others in the Principal's interest.

If Brie has continued to meet her CAS CE requirements and maintained her membership in good standing with the CAS, does your answer differ?

GET AHEAD BY SUSAN CROSS

Tapping the Right Resources for Career and Business Success

Everyone can have their own definition of career success. I certainly do. Over the years, I've celebrated many milestones — from surviving my first industry presentation to attaining my current position as chief actuary for a global insurance and reinsurance company. And I am not done yet.

While I'm proud of those career achievements, I will be even prouder of what I accomplished if someone else, especially the new generation of female actuaries coming up after me, can benefit from the lessons I've learned along the way. Career success takes on a whole new meaning if it can have a positive effect on someone else's path, especially in the insurance industry right now. And that's because we really need driven professionals who are ready to make an impact.

Industry estimates suggest that about a quarter of the 2.6 million insurance industry employees — about 650,000 individuals — are getting set to retire by 2020. However, only about 3,000 students per year are graduating from university insurance and risk management programs, with many of those choosing career paths outside the insurance industry. Insurers can only benefit from more of us helping others to take advantage of insurance career opportunities.

According to the International Labour Organization, roughly 865 million women will be entering the workforce worldwide by 2020. So there is a real opportunity to engage more women in the insurance industry, and helping them get here can be a career milestone for many of us.

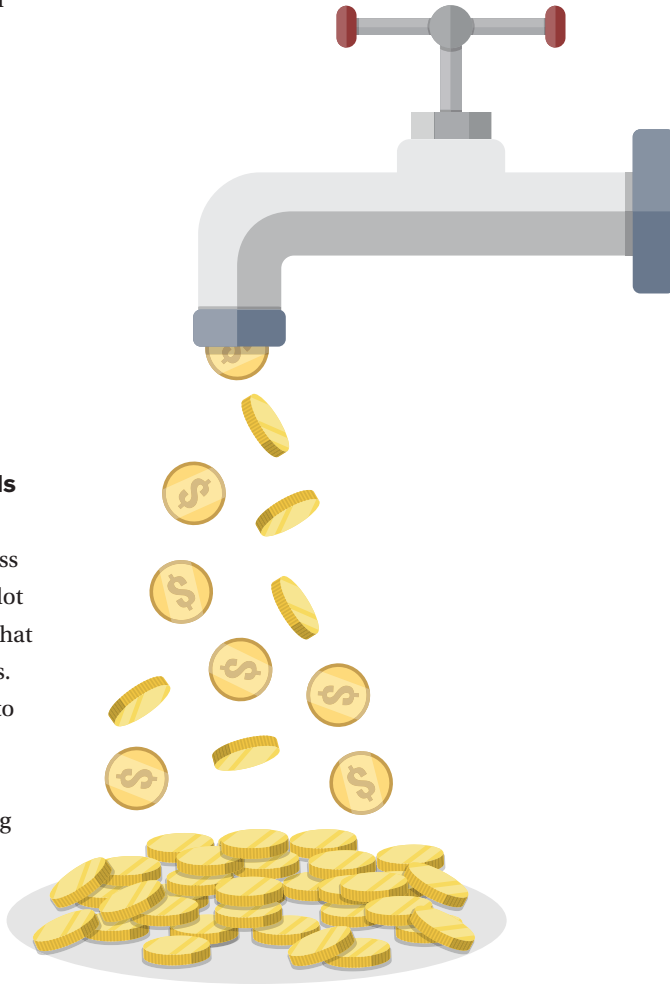
At my firm, I became the "go-to" person for assessing asbestos liabilities and developing innovative approaches to emerging risks. Since I had the knowledge, I shared.

Selling Ourselves — as Individuals and an Industry

Like most, I did not stumble on success but worked to achieve it. Even with a lot of hard work, no one should dismiss that luck also plays a role in career success. For instance, I consider myself lucky to have started my actuarial career at an international consulting firm.

Consulting is a hotbed of learning opportunities — opportunities to learn about being a good listener, developing expertise and building a productive and powerful network to advance your firm's business — and your own career's goals. At a consulting firm, these activities are aligned with your day-to-day responsibilities. It's expected of you. These are things you should be striving to do naturally and regularly to drive your career success and professional development in most enterprises, not just consulting firms.

For one, consultancies sell their employees' expertise. That's what clients are buying — their consultants' guid-



ance and know-how. That's why it's important for consultants to build up their qualifications and develop an area of specialization — skills that make them stand out from the rest — early in their careers. At my firm, I became the "go-to" person for assessing asbestos liabilities and developing innovative approaches to emerging risks. Since I had the knowledge, I shared it — publishing articles, speaking at conferences and promoting my abilities every chance I could.

This kind of sharing can pay off in multiple dividends, giving you tremendous industry exposure and helping you develop relationships that could be instrumental in moving your career forward. Collectively selling our expertise is advantageous for the industry too, in helping young graduates and professionals see the interesting potential that a career in insurance can present.

Connecting

Networking, both internally and externally, is also a very important career success strategy. Networking certainly takes time. It involves being active in professional associations, like the CAS, attending industry events and staying late for the receptions that follow. It can be a challenge, especially for women at certain points in their career. Careers and work/life balance often go in cycles, and so will our ability to network. And that's okay.

As a consultant, I was more outwardly focused on building a network. When I transitioned to working for an insurer and my family grew, my networking didn't stop — it shifted inward. As my work/life balance improved, my networking ramped up again with more involvement in industry activities. What's important, however, is to make an investment of time that works for you and ensure that you make that investment!

What's important ... is to make an investment of time that works for you and ensure that you make that investment!

An internal network not only helps to get a job done, but it can help us get a job done well. Plus, when new opportunities arise, like promotions or an opportunity to be part of a strategic initiative, an internal network is a valuable source of referrals and support. External networks are equally useful for a lot of the same reasons. They can help in recruiting, vetting ideas and connecting us with high potential candidates, which can help us advance the industry even more.

Give and Take

Sponsors and mentors can also help drive career success. Your sponsor is your biggest fan — someone who will advocate on your behalf. It is often not a formal position or designated role. Early in my career, my sponsor was my boss at the consulting firm. He recommended me for jobs led by consultants in other offices — giving me exposure to other senior consultants and involving me in stretch assignments, allowing me to show off my capabilities and learn new things, which, of course, led to more opportunity.

Admittedly, there are a few actuaries on my team who stand out to me. As their sponsor, I make sure that they are also known to others in our organization — whether they know it or not. If you are in a position to be a sponsor, be a sponsor, and speak up to advocate for someone.

No matter where we are in our careers, we all have some knowledge and experience to pass on to those following. That's being a mentor. You are someone's advisory council, someone to turn to for guidance and advice. Some companies have formal programs, but informal mentoring is also effective. Take an active interest in a colleague's career aspirations, start a conversation and listen.

An added advantage of mentoring is that it's a two-way learning experience. Many of us are serving as mentors to millennials and are learning as much from them. As they will be the majority of our workforce, learning how they like to work, interact and even buy insurance, gives us added insight into what lies ahead for our industry.

As the insurance industry and others face talent gaps, selling our expertise, building strong networks, advocating for others and learning more about what drives this next generation will be invaluable knowledge to help us drive more industry success and, in turn, our own career success.

Susan Cross is chief actuary for XL Catlin. She leads the 350-strong global actuarial team in a range of risk analysis activities to support the company's insurance and reinsurance operations.

Driving Into the Future: Motor Insurance in Malaysia

BY BOB CONGER, CAS INTERNATIONAL AMBASSADOR

The much-anticipated liberalization of tariffs for motor insurance and fire insurance in Malaysia set the stage for the annual general insurance actuarial seminar in Kuala Lumpur last December. In keeping with the dynamic evolution of the local regulatory control and oversight of motor insurance pricing, the theme of this year's two-day seminar was "Driving into the Future."

Yew Khuen Yoon, director of insurance development at the regulatory authority Bank Negara Malaysia, kicked off the first seminar session with an overview of the regulatory approach, which features gradually implementing product innovation and price competition. One of the goals of this phase-in process includes preventing a stampede of unsustainable price cutting in pursuit of dramatic (but destabilizing) swings in market share. Another goal is to create a transitional period during which marketplace participants can gradually adapt to the new market freedoms so any needed corrections can be worked out.

Another session featured lessons learned from experiences with de-tariffing in other jurisdictions around the globe. This session provided several case studies illustrating both the potential adverse effects of too-rapid movement to fully open rating and the effects of more controlled transitions.

Several seminar sessions had immediate and practical relevance to attendees. These included the use of the actuarial control cycle within the pricing discipline and various technical aspects of pricing within the Malaysia's phased liberalization, regulatory regime. Especially fascinating was a case study showing the power of clear and transparent actuarial communications. Day one closed with a "big-picture" session on the new tools being used by actuaries, who are increasingly becoming key strategists in developing, implementing and monitoring tactics for marketing, underwriting and pricing.

Bob Conger (left) is joined by panelists (left to right) William Song (MSIG Asia), David Whittle (Zurich Group, Asia-Pacific), Rob Malattia (Willis Towers Watson), and Guanjun Jiang, FCAS (Milliman) to share "Lessons Learned" in other jurisdictions that have moved from tariffs to competitive pricing.

Throughout the seminar, actuaries were challenged to develop the technical tools, business acumen and communication skills to earn a seat at the strategic table as insurers design, develop and deliver new products, services and business operation models that add real value to the customer, build customer loyalty and attract new customers. Throughout, it was striking how many of the essential themes of the speakers' remarks — though set in the context of the changing Malaysian regulatory environment — rang equally relevant in the wide range of different environments familiar to various speakers and attendees.

One last session gave us a glimpse of a different dimension of innovation: vehicle technology. Matt Moore of the U.S. Highway Loss Data Institute (HLDI) shared HLDI research illustrating actual on-the-road benefits, costs and challenges as well as unanticipated consequences arising from new collision avoidance and driver assistance technologies. These issues and autonomous vehicles, which will eventually be operating on public roads, signal challenging and exciting work ahead for automotive engineers, software developers, roadbuilders and policymakers.

Innovation — in the form of the Actuarial Society of Malaysia's meeting app — played a big part in having attendees

Attendees get ready for the start of the motor insurance seminar, "Driving into the Future."

shape the content of the seminar sessions. You may be familiar with awkward silences that sometimes fill Q&A periods or situations where one or two audience members monopolize the Q&A. At this year's seminar, attendees used the meeting app to not only post questions and comments throughout the session, but also to indicate their degree of interest in others' questions and comments. A facilitator then selected, prioritized and posed the questions to speakers. Every session this year attracted more than enough questions to stimulate conversation to the very end of the formal session — and it was clear that conversations spilled over into the coffee breaks between sessions.

More than 165 people participated in this year's event — significantly more than for meetings in 2014 and 2015. Consulting actuaries and company actuaries alike indicated a strong interest in keeping abreast of the latest thinking on the opportunities and challenges that lie ahead in Malaysia. There was a real sense of sharing — about ideas, roles, tools and skills — that will help actuaries be most effective and contribute to the success of their clients and employers.

This year's seminar was organized by the Actuarial Society of Malaysia, the Casualty Actuarial Society and the Institute of Actuaries of Australia. In addition, the Institute and Faculty of Actuaries (U.K.) joined this year as event co-sponsor and provided marketing support. Thanks to all of the speakers, attendees, the organizing teams volunteer and staff members, and all four supporting organizations — each played an important part in this educational and enjoyable event!

Former CAS president Bob Conger, FCAS, is a consultant with Willis Towers Watson.

Some seminar attendees and speakers gather on stage for a group photo. CAS Members Chun Kit Cheung, Bob Conger, Marcus Ewe, Jio Young Goh,* Andrew Heikes,* Gary Hoo,* Guanjun Jiang,* Christie Lee, Jin Fan Lim, Camille Minogue,* Judy Ng, Nurul Syuhada Binti Nurazmi, Shze Yeong Ong, Chee Lim Tung, Scott Yen and 29 CAS Candidates were among the 165 participants in the "2016 Actuarial Seminar: Motor Insurance" in Malaysia.*
**Seminar speakers*

Forming Partnerships to Enhance P&C Actuarial Education

BY JAMES TRIMBLE

In 2016, the University of Connecticut (UConn), University of California at Santa Barbara, University of Illinois at Urbana Champaign and Illinois State University were awarded the inaugural CAS University Award. This award recognizes the exemplary work of universities and their actuarial programs in preparing students for careers in the property-casualty insurance industry.

We at UConn are honored to be recognized among this select group of exceptional actuarial programs. We have been fortunate to partner with the Casualty Actuarial Society, our local and national industry partners and individual actuaries to educate and assist students on P&C actuarial science topics. In this article, I'd like to tell you a little bit about how we use these partnerships to enhance our program. My hope is that it will inspire some of you to form similar strong partnerships with a university program close to you.

In 2009, UConn was one of 13 actuarial programs that the Society of Actuaries recognized as Centers of Actuarial Excellence. We were, of course, honored to be among the first universities so recognized. At the same time, our own self-reflection led us to the conclusion that, like many university actuarial programs, our program more heavily emphasized the life side of the actuarial profession. We believed we should give equal weight to the P&C side of the business, so that our students have the knowledge they need to choose the best possible career path for themselves. We carried that strong conviction for our curriculum to our research, industry connections and innovation.

We built on our already strong industry connections. Today our actuarial science career fair attracts 35-40 companies and consulting firms from all fields. As a first step, we formalized these industry connections by establishing an advisory board. It was an important goal to ensure that the advisory board included representation from a wide range of partners, including P&C insurance companies, life insurance companies, health insurers, and consulting firms. We also established a separate advisory board for our Goldenson Research Center, with a similar broad mix of advisors. These advisory boards help us design curriculums and research projects that reflect all areas of actuarial practice.

For the curriculum, we added courses that prepare our students for actuarial work teaching skill sets not on the exams but that students need to develop. These include programming for actuaries, actuarial case studies using SAS and a writing for actuarial science majors.

The Janet & Mark L. Goldenson Center for Actuarial Research has worked on several P&C research projects completed by graduate actuarial students at UConn in partnership with industry professionals, under the supervision of Jay Vadiveloo, director of the Goldenson Center. Several of our faculty members are committed to research advancing casualty actuarial science. For example, Professor Emiliano Valdez is a recipient of the 2010 Charles A. Hachemeister Prize for his paper "Actuarial Applications of a Hierarchical Insurance Claims Model." Another of his papers,

James Trimble, Director, Actuarial Science Program, University of Connecticut

"Empirical Investigation of Insurance Claim Dependencies Using Mixture Models," was funded by the Casualty Actuarial Society through the CKER/AERF Individual Grants. The full list of examples is too numerous to mention in this article.

When UConn hosted the 46th Actuarial Research Conference in 2011, one of our goals was to increase P&C industry participation in the event. To do so we introduced the custom (maintained ever since) of having the CAS president address the conference. We sought and secured principal sponsorship of the conference by a P&C company, Liberty Mutual, and we held an optional field trip (attended by two-thirds of conference participants) to the Liberty Mutual Research Center outside of Boston. We also featured Eric Brosius, FCAS, as a keynote speaker for the conference. Finally, we generated additional interest in conference attendance from several practicing P&C actuaries (apart from the usual academic attendees) by offering "day trip" participation options.

UConn also takes advantage of the many outreach programs initiated by

the CAS. We actively encourage all of our students to join CAS Student Central, which provides valuable information and tips for all actuarial students. In addition, all of our faculty has enrolled in CAS Academic Central, and our University Liaison Brian Chiarella has been very helpful to us. Our faculty regularly attends casualty actuarial events, including the Casualty Actuaries of New England (CANE) meetings.

In fact, the CANE meetings have turned out to be a terrific source for casualty actuarial connections for both our students and faculty. Once a year, CANE invites us to bring five students and a few faculty members to the meeting. We typically choose students who are undecided between the life and the P&C fields to attend the CANE meetings, in order to give them excellent exposure to P&C actuarial work. CANE even held one of its meetings on our campus, and well over 100 of our students took advantage of that opportunity to attend a session or two of interest to them.

CAS Past President Pat Teufel was a keynote speaker at the first CANE meeting I attended with our students. Her comments so interested our students that they sought her out and invited her to speak on our campus, where she addressed a standing-room-only audience of more than 125 students. That engagement led to her becoming an adjunct professor at UConn and later an official advisor to more than 50 of our students. All of our students appreciate the access they have to an expert in the P&C actuarial field.

But you needn't be a former CAS president to make such a connection. At another CANE meeting, William Borgen, FCAS, expressed interest in teaching at UConn. I told him it would be helpful if he would teach a P&C-specific course. Borgen developed and now teaches a course on P&C ratemaking, covering about half of the material on CAS Exam 5. This spring we will, for the first time, offer the other half of the material in a course on P&C reserving, which is being co-developed by Pat Teufel and another CAS Fellow, Matthew Jewczyn.

We believe that university actuarial programs should give equal weight to all of the challenging and promising actuarial career paths available to aspiring students. This is a daunting task, and a university with limited full-time actuarial faculty and resources is unlikely to be able to do so on its own. We can achieve this goal, however, by forming strong partnerships with both the CAS and SOA, with industry partners and with individual actuaries. Our efforts with our partners led to an even stronger actuarial science program with a better balance of life and casualty topics in both our education and research. They also directly led to a richer faculty and advisor mix.

I hope this article inspires some of you to get involved, or perhaps more involved, with university programs close to you. I can tell you from my own experience that the rewards that come with helping promising students learn about our career, attain success on the exams and see themselves succeed in their actuarial jobs are hard to match!

James Trimble is director of the University of Connecticut's actuarial science program. The program serves 450 actuarial students and is taught by six full-time faculty in actuarial science and 12 adjunct professors.

EXPLORATIONS BY JOHN A. MAJOR, ASA

Bayesian Dragons: A Cautionary Note

"Here Be Dragons"

— Ancient map label for unexplored regions

This is the story of how I discovered moment-busting monsters lurking in the unexplored regions of Bayesian predictive distributions. Don't get me wrong. I'm a believer. I used to be a skeptic, but recently I saw the light. Bayesian methods, and Markov Chain Monte Carlo (MCMC) technology in particular, now have a special place in my toolbox. But on my journey to the light, I stumbled upon some interesting facts that, it seems, are not widely appreciated.

Background

The task set out before me was to reproduce the fit of the leveled chain ladder (LCL) model to the "Illustrative Insurer" ultimate incurred losses in Meyers [2015]. Readers unfamiliar with Bayesian methods are urged to read Meyers' monograph for background and literature references. The LCL model on this data consists of 29 parameters and the likelihood function is still simple enough to be able to program directly. Numerical methods sufficed to find the maximum likelihood estimate (MLE) of the parameters.

The parameters, of course, are not known precisely; they are simply estimated and there is some uncertainty around them. One way to express this uncertainty is to generate a *predictive distribution*. In effect, one mixes the various possible lognormal distributions implied by a range of plausible model parameter values.

My challenge was to get estimates close to Meyers' using methods faster than MCMC. My weapon of choice was importance sampling [Rubinstein & Kroese, 2011]. It failed miserably, but in an interesting way. No matter how many samples I drew (and I went into tens of millions), the estimator of the mean ultimate loss would not stabilize. The central limit theorem (CLT) seemed not to apply.

This got me thinking … when does the CLT not apply? One failure mode is when the target random variable does not have a finite variance. Could it be that the variance of the predictive ultimate loss in the LCL model did not exist?

Eventually, I traced my problems to the curse of dimensionality. Even a 29-dimensional problem, modest though it might be compared to the thousands or even millions of dimensions in some industrial-strength statistical models, was too much for importance sampling.

Yet my initial speculation continued to haunt me. Eventually, I found out I was right … sort of.

Bayesian Dragons in a Simple Model

Consider the following simple model, basically a one-cell triangle. There is one accident year with parameter μ and one development period with parameter ϖ. The ultimate loss is a random variable $Z = \exp(X)$ where X has a normal distribution with mean μ and variance ϖ.

Given particular parameter values, the expected value of Z can be readily calculated as $\exp(\mu + \varpi/2)$.

Say we impose a flat prior over $(-\infty,\infty)$ on μ and another flat prior over $(0,\infty)$ on ϖ. Say also we have $n>1$ independent and identically distributed observations z_i. The likelihood can be written down easily; it is the independent multivariate normal formula. With flat priors, the posterior distribution is the same formula, with a restriction that $\varpi>0$ and with a normalizing constant:

$$Post(\mu,\varpi) = K_1 \cdot \left(\frac{1}{\sqrt{2\cdot\pi\cdot\varpi}}\right)^n \cdot \exp\left[-\frac{1}{2\cdot\varpi}\cdot\sum_i (z_i-\mu)^2\right] \quad [1]$$

Say the data exhibit mean M and variance V>0 (the case V=0 leads to a singular solution at $\mu = M$). Rewrite [1] as

$$\begin{aligned} Post(\mu,\varpi) &= K_1 \cdot \left(\frac{1}{\sqrt{2\cdot\pi\cdot\varpi}}\right)^n \cdot \exp\left[-\frac{1}{2\cdot\varpi}\cdot \left(\sum_i (z_i-M)^2 + n\cdot(\mu-M)^2\right)\right] \quad [2] \\ &= K_2 \cdot \varpi^{-\frac{n}{2}} \cdot \exp\left(-\frac{n\cdot V}{2\cdot\varpi}\right)\cdot\exp\left[-\frac{n\cdot(\mu-M)^2}{2\cdot\varpi}\right] \end{aligned}$$

where the K_i are constants not involving the parameters. This is the product of an inverse gamma in ϖ, and, conditional on ϖ, a normal in μ. Therefore, the predictive distribution is proper and $K_2 > 0$.

Proposition: Assume the model described above with the posterior distribution given by [2] with V>0. The predictive mean loss is given by the fol-

lowing expression:

$$P = K_3 \cdot \int_0^{\infty} \left[\varpi^{-\frac{n-1}{2}} \cdot \exp\left(-\frac{n \cdot V}{2 \cdot \varpi} \right) \right] \cdot \exp\left(\varpi \cdot \frac{n+1}{2 \cdot n} \right) d\varpi \qquad [3]$$

and this integral diverges. Therefore the predictive mean does not exist. (So neither does the variance.)

The formal proof of this, to appear in another paper, is omitted here. Notice that the expression [3] can be recognized as the expectation of exp(k*ϖ) where ϖ is distributed as an inverse gamma. Such expectations do not exist for the inverse gamma. It should also be pointed out that with the usual conjugate reference priors, the predictive distribution of a lognormal random variable is log-t, and the log-t has no finite mean.

What if a 1/ϖ prior were used instead of a flat prior on ϖ? The same result obtains; it doesn't help. (Thanks to Gary Venter for raising this question.)

It is instructive to examine the attempt to calculate expression [3] numerically.

Take, for example, the concrete values n=11 and V=1 (M doesn't matter up to a constant).

The inverse gamma posterior density of ϖ (square brackets in [3]), up to a constant, is shown in Figure 1.

One might think that truncating ϖ at, say, 15, would suffice to estimate the value of [3]. After all, this encompasses roughly 99.95% of the probability. However, see Figure 2. This shows what the integrand of [3] looks like. Note: this *includes* the probability density factor.

Evidently, at 15, one is only beginning to see the exponential rise in the integrand. And the choice of where to truncate, in this example, has a material impact on the calculated value, as an inspection of the cumulative integrand in Figure 3 shows.

LCL's Potential Dragon

The leveled chain ladder is different from this simple model in several respects. In particular, the priors on the variances are bounded. This is an important difference, and it guarantees that the predictive mean does indeed exist. If they were not bounded, would the LCL have the same problem?

Figure 4 shows a "profile" of the posterior density $f(\varpi_N)$ of the LCL as a function of the last development period variance ϖ_N, with all other parameters held constant at their MLE values.

By the time ϖ = 4e-05 is reached, over 99.99% of the cumulative posterior probability has been covered. Yet this is still far from the truncation boundary of ϖ = 1 that Meyers used.

Figure 5 shows the integrand, i.e., the product of posterior density $f(\varpi_N)$ and conditional expected loss for the final accident year $E[Y_N|\varpi_N]$.

Figure 1: Density of inverse gamma distribution.

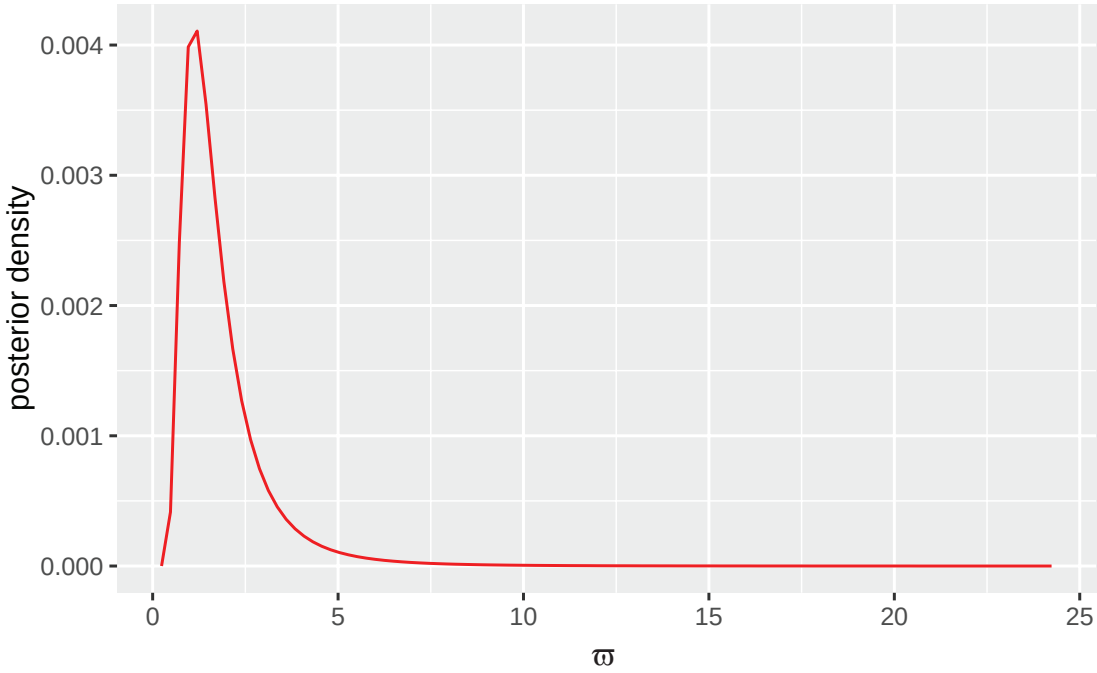


Figure 2: Integrand for predictive mean ultimate loss.

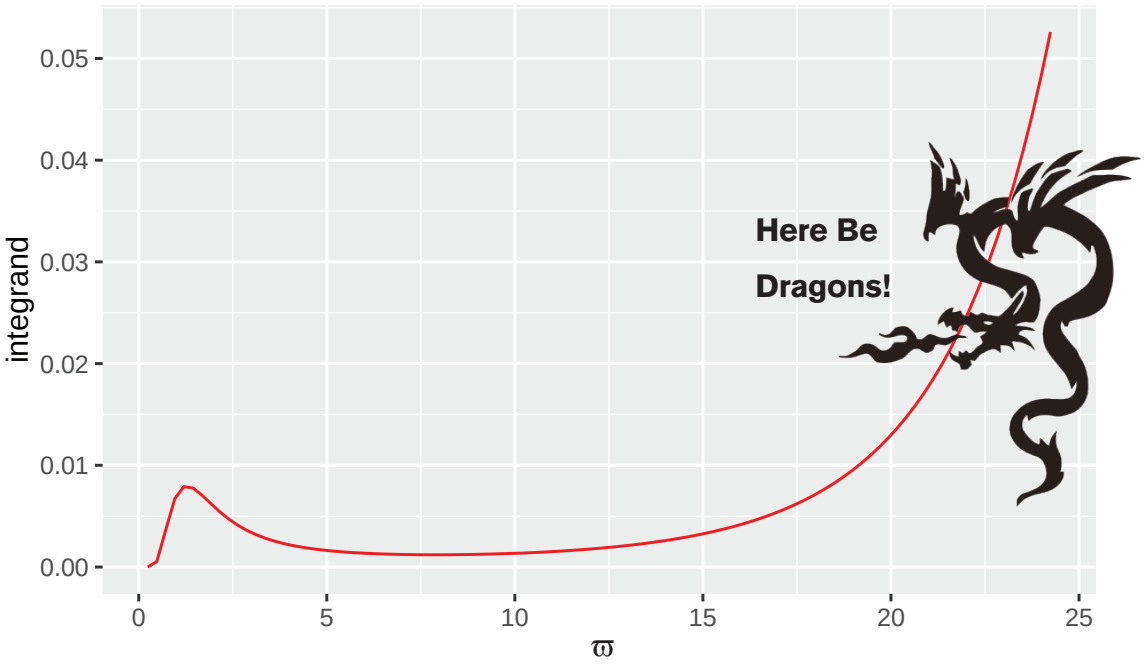


Figure 3: Cumulative sum of the integrand of Figure 2.

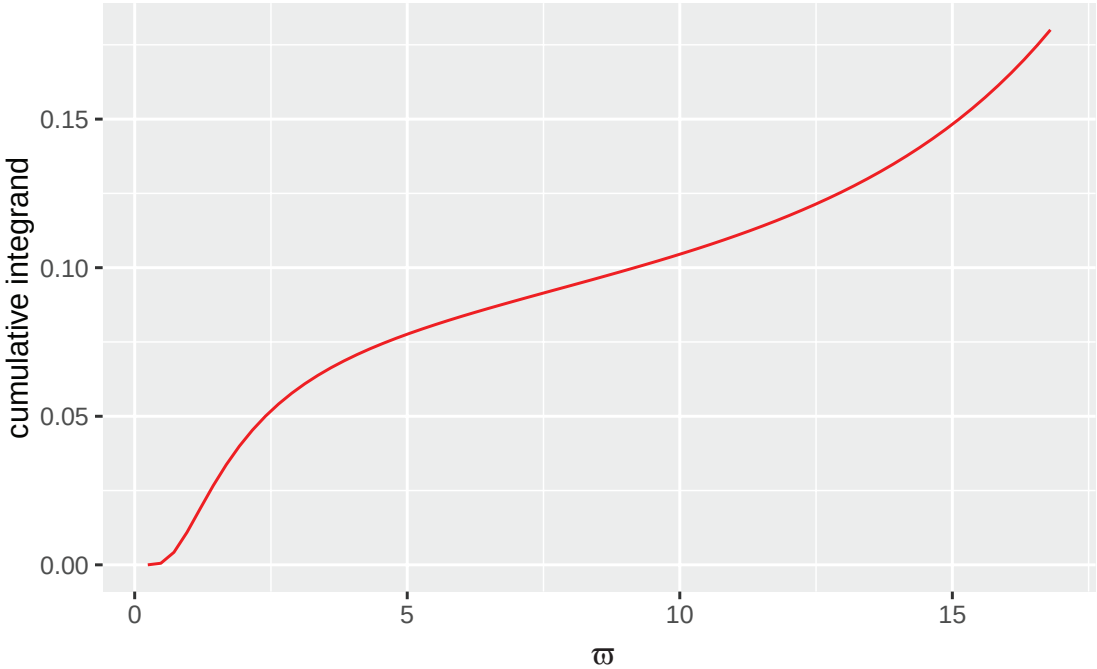


Figure 4: Posterior density profile (up to scale factor) as function of last DP variance.

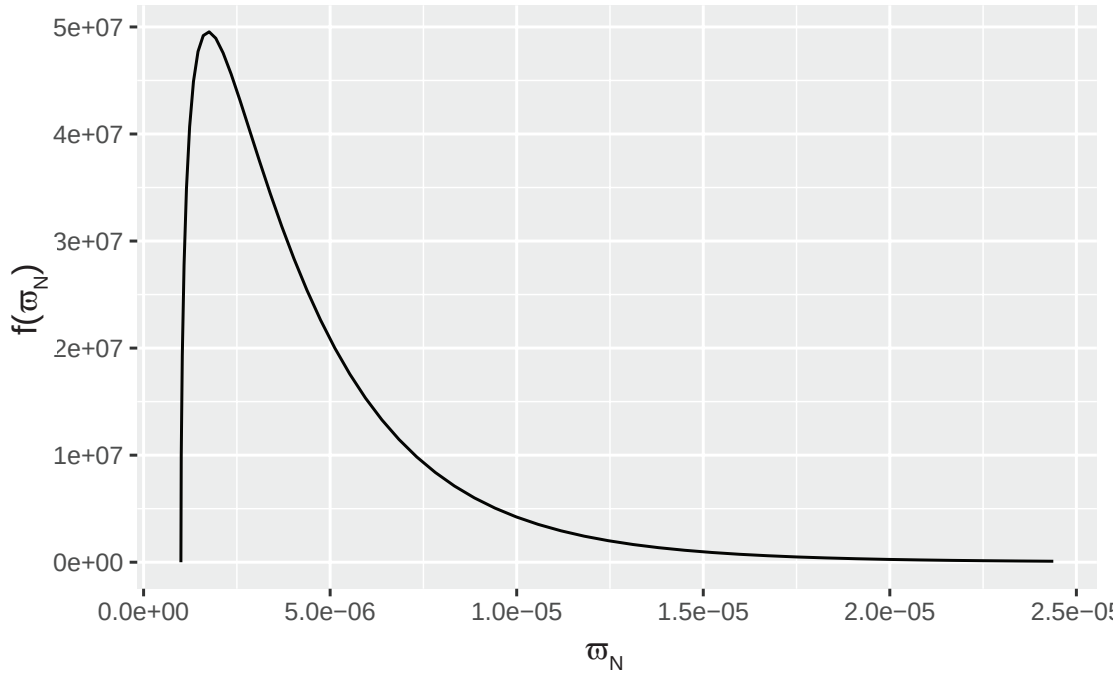


Figure 5: Contribution to predictive mean ultimate loss.

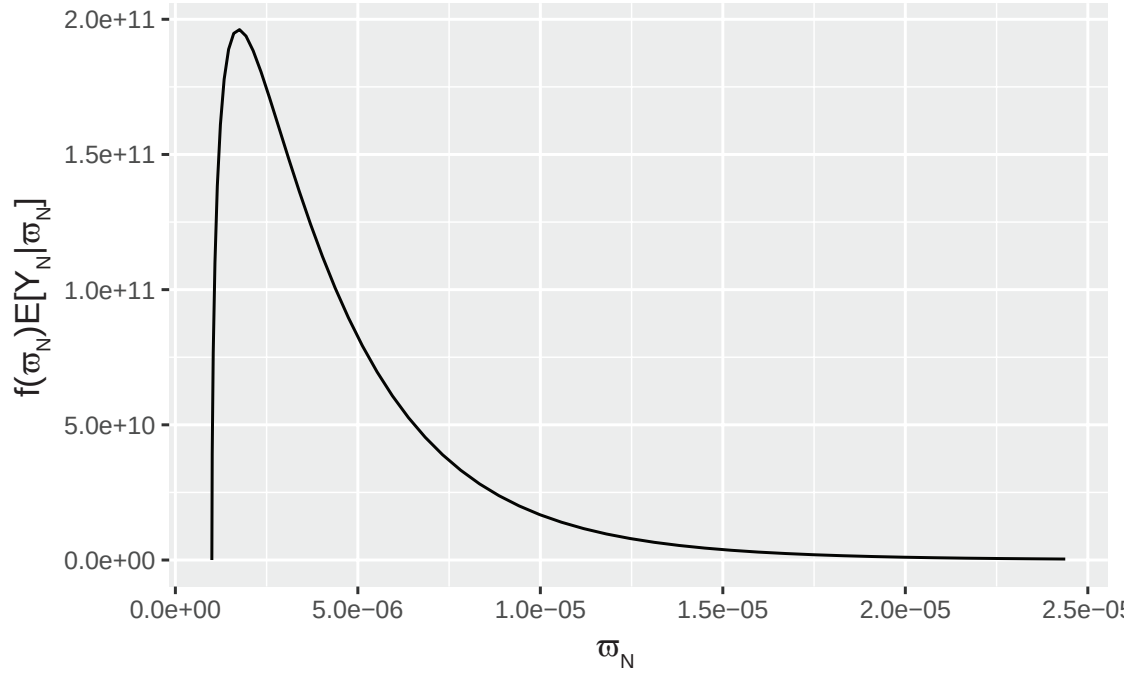
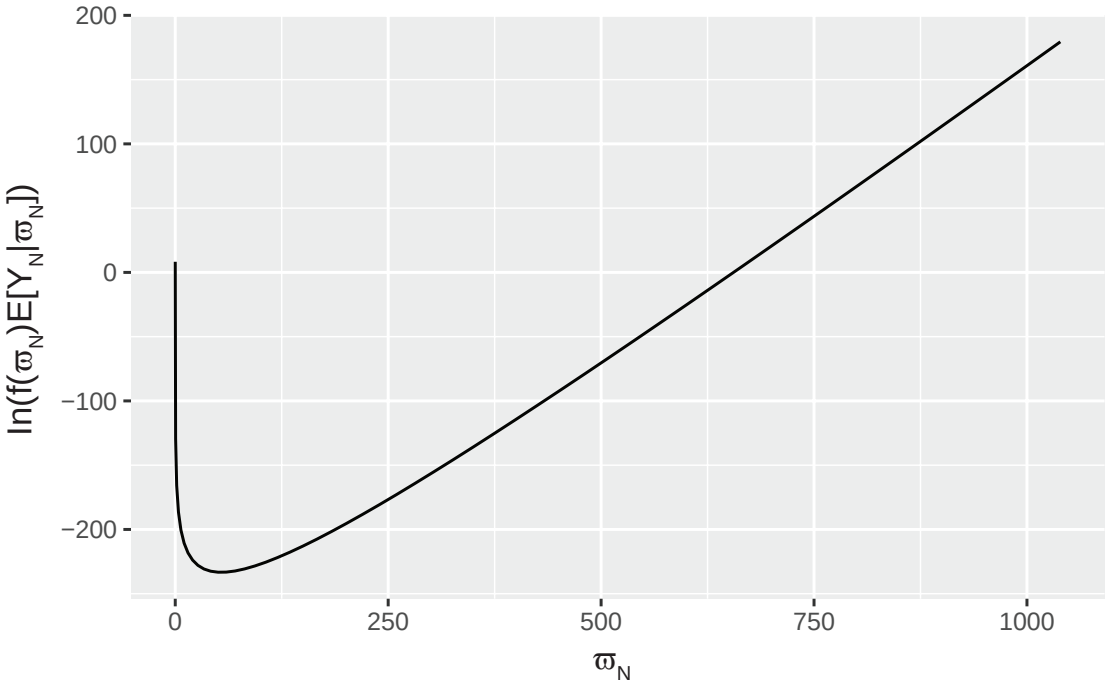


Figure 6: Log contribution to predictive mean ultimate loss.



This graph is nearly isomorphic to Figure 4 because the conditional expected loss only varies from $3959.63 to $3959.68 over the range shown.

When the scale is taken out to ϖ = 1000, an absurdly improbable value, the divergence of the predictive mean can be seen. This is shown in Figure 6, with the y-axis rendered as the log integrand.

If ϖ were not capped and the predictive mean were computed by integrating over the full (all-parameters) posterior, the calculation would indeed diverge. However, it is unlikely that any MCMC application would ever reach the extreme, and extremely improbable, ϖ values required. The dragons live in unexplored territory.

Unlike the behavior seen in Figure 3, there is no material difference here between bounding ϖ at 0.01, 1, or even 500. The contribution to the predictive mean consists of a small pond at ϖ < .00003 and an infinite ocean at ϖ > 500. This suggests that when capping ϖ by design, the choice of limit is not material — in this case. Lack of materiality is true of the particular example in Meyers' monograph. We can't know a priori how other triangle data might behave.

A Call for Caution

This argues for caution, or at least circumspection, when applying numerical Bayesian methods to problems involving the lognormal. Moments may not exist, or may be made arbitrary by model design choices. Quantiles, on the other hand, should be well-behaved.

I don't mean to pick on the fantastic work of Dr. Meyers; his just happens to be what led me to this line of inquiry. I have seen at least one blog explaining MCMC that went right ahead and calculated the predictive mean of a lognormal without even considering the question of the existence of the target. In a more formal venue, the seminal paper by De Alba [2002] seems to exhibit this same lack of consideration.

The literature on stochastic loss reserving is large and growing, and a significant portion of it addresses Bayesian methods. How many other triangle models out there are affected by this phenomenon? I don't know, but the question is worth addressing.

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Rubinstein, Reuven Y., and Dirk P. Kroese. *Simulation and the Monte Carlo method*. Vol. 707. John Wiley & Sons, 2011.

IN MY OPINION BY GROVER EDIE, *AR* EDITOR IN CHIEF

Practice Run

I have been putting off a task for several weeks. Okay, for several months. Truth said, almost a year. I own two trademarks, and I needed to file a "declaration of use" with the U.S. Patent and Trademark Office. When I first read the materials online, I got discouraged. I thought insurance contracts were difficult to read, but this was at another level of obfuscation.

Throughout the duration of this lingering task, I got several solicitations from firms who could file the forms for me. Their fee (in the neighborhood of $600 apiece) not only went against my frugal nature but also my "I should be able to do this myself" attitude. Initially, I had nearly a year in which to comply, but time was running short — I had to complete the reporting in January 2017.

The instructions and forms on the government website were confusing to me. So I did what I often do when confounded with something — I ordered a book on the topic. Normally, that would allow me a few weeks' respite, but modern book ordering meant I got it within a few days. No loitering for me; now I had a book to read.

The book didn't help much — I was still confused, but now I was discouraged and $44.99 poorer. So I tried another tried-and-true tactic: I asked my wife to read the instructions and let me know whether we should try to fill in the forms together. She read them, didn't think they were too bad and recommended I go ahead and give it a shot. I was hoping for her to say, "It's too complicated; hire an attorney." No such luck.

Now the gauntlet was thrown down. Never mind that she used to be a claims adjuster in New York City and reads insurance contracts for entertainment, I was challenged.

A few weeks passed and I started to panic. For whatever reason, I was still frightened about filling in the forms and doing it wrong. But now I was panicked about getting it done in time. The multiple admonitions on the website didn't help: "If you don't do it right, there is no refund. You'll have to re-file and pay the fee again." "You only have 60 minutes in which to fill in the form. If you go over 60 minutes, your session will time out and you will have to begin the entire process again." In particular, the warning "Failure to file this document will result in cancellation/expiration of the registration" fueled my panic.

The warning "Failure to file this document will result in cancellation/expiration of the registration" fueled my panic.

This was certainly daunting. I was intimidated.

Finally, I decided to just "do a practice run": Fill in the website form as best as I could, with no intention of finalizing it and paying the fee.

This seemed safe — at least I would be doing something towards getting it done.

It worked better than I thought. I filled in the form and felt good enough about it to submit it and pay the $100 fee. Considering the estimates that I received from various firms offering their services, I figured that I could goof it up five times before submitting a correct form and break even with the cost.

I felt so good that I did it for the second trademark as well.

So, in my opinion, things that seem insurmountable sometimes just need a "practice run."

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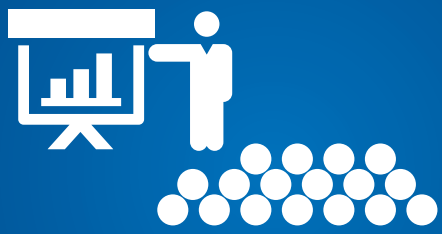

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IT'S A PUZZLEMENT BY JON EVANS

A Simple Equation to Solve

Given the simple equation below, where the pattern of nested operations on the right-hand side continues ad infinitum, what is the exact value of x?

$$\pi^{2/3}+e^{1/2}=\sqrt{1+x\sqrt{1+(x+1)\sqrt{1+(x+2)\sqrt{1+\ldots}}}}$$

Competition Between Widget Manufacturers

In this puzzle, two widget companies, General Widget Makers (GWM) and United Widget Alliance (UWA), compete. Every day each company can choose to either raise or lower its price; the price cannot be unchanged; the price change must be fixed for the day. The companies cannot collude or cooperate or share knowledge before they announce their daily price changes. Neither company will ever exit the market, as shutdown costs more than any possible loss. The profit to GWM (equivalently the loss to UWA) for any day is as follows:

		UWA	
		Lower Price	Raise Price
GWM	Lower Price	-$30,000	$50,000
	Raise Price	$10,000	-$100,000

The question was, what should each company be advised to do?

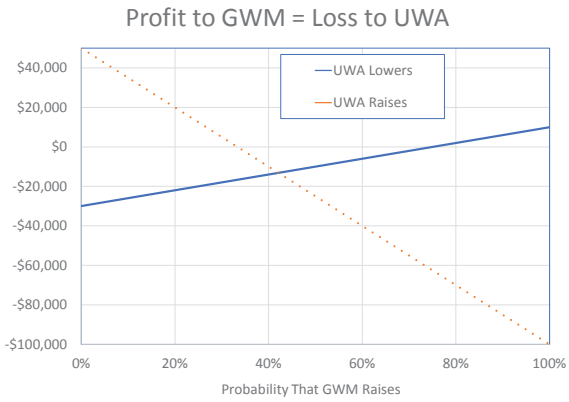
This is a zero-sum game without a min-max saddle point. Such a saddle point would exist if each company could pick its own single, fixed strategy, always lowering or always raising prices, and these strategies would simultaneously minimize the maximum loss for each company. But each company can pursue a random mixed strategy, lowering p% of the time and raising 100% - p% of the time, that is stable in the min-max sense. If p is the probability that GWM will raise and G is GWM's profit in $1,000s, then if UWA raises then $G = -100p + 50(1-p) = 50 - 150p$ and if UWA lowers then $G = 10p - 30(1-p) = -30 + 40p$. This is shown in the chart, top right.

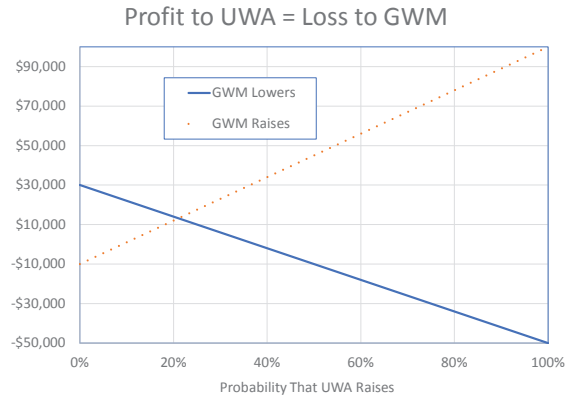
Obviously, GWM will minimize its maximum loss, independent of what UWA does, when $50 - 150p = -30 + 40p$ that is when $p = 8/19$, leading to $G = -13.1579$

If q is the probability that UWA raises and U is the profit to UWA in $1,000s, then if GWM raises $U = 100q - 10(1-q)$ and if GWM lowers $U = -50q + 30(1-q)$. The corresponding chart is shown bottom, right.

UWA minimizes its maximum loss, regardless of what GWM does, when $100q - 10(1-q) = -50q + 30(1-q)$ that is when $q = 4/19$, leading to $U = 13.1579$. So, if $p = 8/19$ and $q = 4/19$ then $G = -U$ and neither company can change anything to decrease its maximum expected loss.

Solutions were also submitted by Bob Conger, Rob Kahn and Gregory Scruton.





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Commercial lines underwriter or reinsurance underwriter or broker or enterprise risk management consultant sought by our Los Angeles client for Position 74369. Requires 4 to 15 years of industry experience. This is a unique client management and client development role with a very specialized, growing, niche company. Role open due to anticipated revenue growth and company growth.

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