

# actuarial REVIEW

VOL 47 / NO 5 / SEPTEMBER-OCTOBER 2020

PUBLISHED BY THE CASUALTY ACTUARIAL SOCIETY 



*PERILOUS  
TIMES*

COVID-19 & Commercial  
Property's Vexing Variables

Steven Armstrong on the Pipeline  
of CAS Members and Candidates



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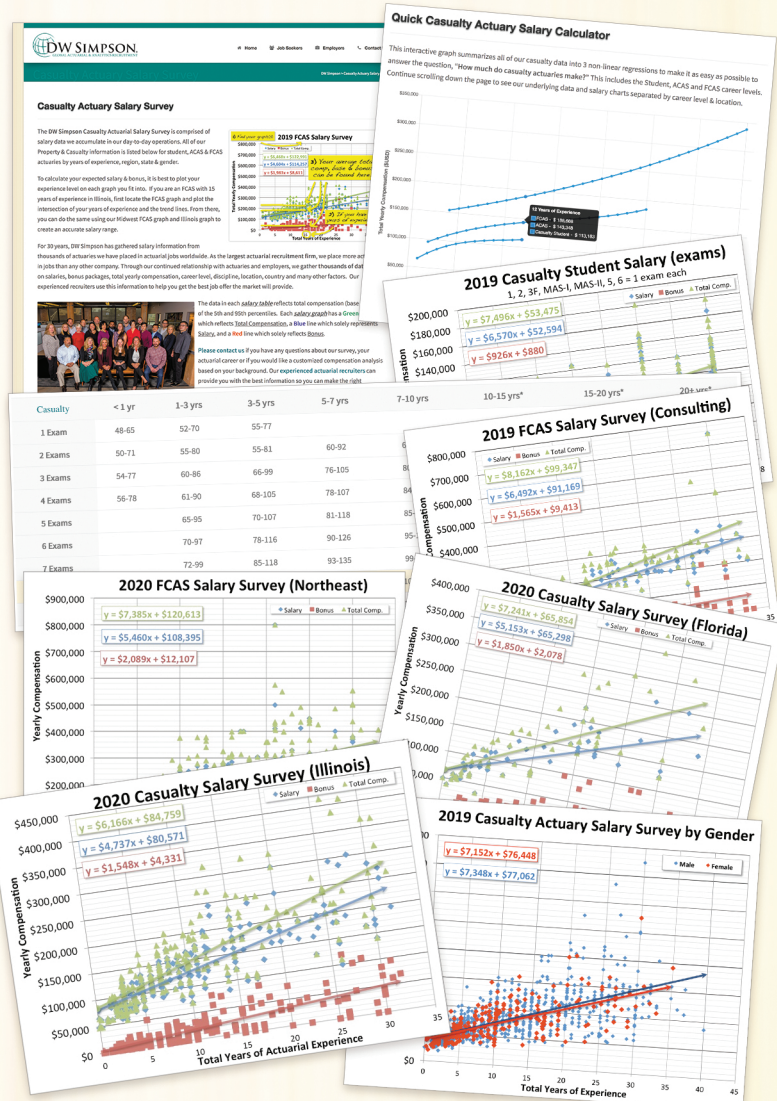
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## departments

### 4 EDITOR'S NOTE

- A Full Issue

### 6 PRESIDENT'S MESSAGE

- Actuarial Science Majors Dominate the Current CAS Pipeline for Candidates and Members ... is this a Good or Bad Thing?

### 10 MEMBER NEWS

- Comings and Goings
- CAS Staff Spotlight
- Calendar of Events
- In Memoriam
- CAS Earns Nine Industry Awards
- Thank You to 2019-2020 Society Partners
- Downtime

### 28 PROFESSIONAL INSIGHT

- CAA & CAS Bootcamp: A Journey With Prospective Actuaries
- Finding Insight In A "Bag Of Words"

### 30 ACTUARIAL EXPERTISE

- Explorations
- Reliably Quantifying Cyberrisk Exposure

### 38 VIEWPOINT

- In My Opinion

### 40 SOLVE THIS

- It's a Puzzlement



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LOGO



## on the cover

### Perilous Times: COVID-19 & Commercial Property's Vexing Variables

17

By ANNMARIE GEDDES BARIBEAU

Commercial property insurance was already facing its hardest market in 35 years. Then COVID-19 entered the scene.

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**Managing Editor and  
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**editor's**NOTE By GROVER EDIE, AR EDITOR IN CHIEF

## A Full Issue

COVID-19 is wrecking a lot of things. Cover story author Annmarie Geddes Baribeau gave us the big picture in “Gamechanger” from *AR* May-June 2020, and now she gets more product-specific. She describes how COVID-19 is affecting an already hard market for commercial structures and associated liabilities.

In his “President’s Message,” Steve Armstrong notes that a majority of CAS candidates are coming from North American universities that have formal actuarial science degrees. This is a good thing, right? Armstrong wonders if the CAS is narrowing its educational focus at a time we are trying to broaden our market. I encourage you to weigh in and let him know your thoughts.

Now for some good news: The CAS won nine awards for exemplary work in 2019! This report is a fine reflection on the work of the CAS Staff and volunteers. Congratulations to all those involved!

In the midst of the pandemic, the China Association of Actuaries and the CAS safely conducted an actuarial bootcamp. Reported on by Ran Guo, CAS director of international relations, this type of program may usher in new kinds of learning processes.

Have you ever wondered how data mining works? Jim Lynch’s “Finding Insight in a ‘Bag of Words’” takes some of the mystery out of data mining text. Even if you don’t use the technique, being familiar with it might prove useful in the future.

I missed the latest CAS Research Paper on cyber exposures until I read about in this *AR*. “Reliability Quantifying Cyberrisk Exposure” encouraged me to read the paper. I hope you do the same.

Cape Cod might not be on your list of places to go, but “Revisiting Cape Cod” can be done from your armchair, with Glenn Myers as your Explorations column guide.

On a lighter side, Downtime column author Laurie McClellan profiles CAS Fellow Jerry Miccolis, who chronicles his involvement with a rag-tag group of senior softballers in his latest book, *The Boys of Late Summer*. I hope to have more Downtime profiles in upcoming issues. Drop us a line at [ar@casact.org](mailto:ar@casact.org), if you have an idea for a story on how you or a member spends their time away from work.

That’s it for my notes — I am off to work on “It’s a Puzzlement.” ●

*Actuarial Review* 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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## Actuarial Science Majors Dominate the Current CAS Pipeline for Candidates and Members ... is this a Good or Bad Thing?

Throughout the summer, the CAS has been poring over data to try and explain where our 8% annual growth rate of new members is coming from and what commonalities there may be amongst our new members.

In terms of CAS members (defined as ACAS or FCAS), what we found was that approximately 10% to 20% of all members who graduated in the 80s, 90s and 00s had self-reported as actuarial science majors. Over the last decade, this number has jumped to 40% for those who graduated in the early part of the 2010s and is now closer to 55% for those newest members.

We see a similar trend occurring with our candidate population, where the majority of our candidates are coming from North American universities (United States and Canada) that have formal actuarial science degree programs.

In almost all cases, the biggest shift, not surprisingly, is a reduction in math and statistics majors over the decades as our candidates and members instead gravitate to actuarial science majors.

So, why is this shift happening and what do we believe the impacts could be in the long term for the CAS?

Let's address the first question: Why do we think this trend is occurring? I'll highlight a few possible reasons:

- In 1988, the actuarial profession garnered an unexpected spotlight when the *Jobs-Rated Almanac* named "actuary" as the best job out of 250 entries. This alone would

have sparked interest for those who saw the article, including university officials and faculty at the time who did not have a focus on actuarial science (for full transparency, I saw this article, switched my major to actuarial science in 1990, and graduated from the University of Illinois with an actuarial science degree when few of these majors existed back then).

- Over time, more and more universities began offering formal actuarial science majors or offering classes to augment math majors with actuarial science as part of their curriculum.
- Throughout the same time, as employers had a need for increased actuarial talent in their companies, one of the easier ways to recruit for talent was to go to universities with actuarial science majors and filter candidates on GPA, the number of exams they had passed, and the existence or non-existence of an actuarial internship. This rubric for recruiting became successful, and it likely became a source of "geographical bias" in the industry as companies looked for actuarial talent in the most efficient and effective manner possible. For more on this, see CAS Board Director Kuda Chibanda's article "False Positives: Avoiding Pitfalls in Your Diversity Hiring," in the March-April 2020 *Actuarial Review*.
- Over 20 years ago, the CAS launched a campaign to develop

the current CAS University Liaison model, and we now have dedicated volunteers on over 300 campuses who spread the word on property-casualty insurance and the benefits of the CAS. Our data would show that we are likely over-proportioned to having university liaisons in schools with actuarial science majors, and our CAS Student Central database shows that those who are members of such are likely to be studying actuarial science.

- Throughout much of the last decade, both the media and employers have shifted their impressions of actuarial science. For the media, "actuary" is no longer the darling of the top-rated jobs, with "data scientist" seemingly taking its place. And employers are now seeking the best data and analytics talent to join their companies, which has caused more like-minded analytical types to steer away from actuarial science.
- Recent testimonials have revealed how challenging it may be for someone wanting to become an actuary but not pursuing an actuarial science degree. These types of candidates are finding it challenging to sell their skills appropriately amongst a crowded set of resumes, and employers are balancing recruitment dollars to most efficiently find the best talent for their organizations. As for career changers, they

*President's Message, page 10*



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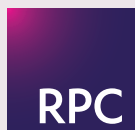
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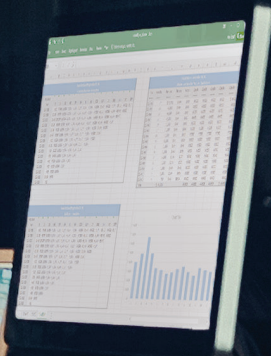
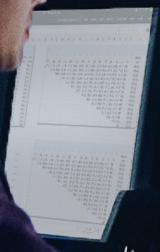
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**President's Message**

from page 6

may face the biggest challenges yet as a significant amount of recruitment happens at the university level or because employers are looking for those with actual P&C actuarial experience.

There may be other reasons for these trends, but they paint a realistic picture of what is happening to our profession. They compel us to consider what the unintended consequences may be on the CAS and our community going forward.

The biggest consequence can be boiled down to one topic: a potential lack of diversity in our community. Looking through the lens of race and gender, we are aware that the CAS and other actuarial organizations need concrete efforts to address diversity, but we may also be victim to a lack of diversity of thought. In our growing membership, more than half of our newest members have gone to universities offering actuarial science degrees. We need to attract skills, not necessarily specific majors. Skills for successful actuaries span a multitude of concentrations — actuary is the quintessential multidisciplinary profession, as my former professor Rick Gorvett was fond of saying. These skills do not need to be obtained through actuarial science degrees, or even math and statistics for that matter.

The CAS Board of Directors thinks that diversity of candidates and of thought is something that requires some attention, and they want to develop tactics to draw in more future members from different universities, different majors and different careers. A few tactics that the CAS Staff and Board are cur-

rently considering include the following:

1. Revisiting the CAS University Liaison footprint and identifying new universities to target, both in and outside of North America.
2. Helping students who are in universities without actuarial science majors build skills-based resumes that will resonate with prospective employers in the P&C and risk management space.
3. Shifting the way that we talk about the CAS and the P&C actuarial profession to focus more on skills and the kinds of problems our members solve both today and into the future.

What other ideas might you have to help the CAS consider a more diversified pipeline of future members? Please email Mike Boa at [mboa@casact.org](mailto:mboa@casact.org) with your ideas or comments. ●

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**COMINGS AND GOINGS**

**Shane Barnes, FCAS, CSPA**, has been named a Rising Insurance Star Executive (RISE) winner. The annual RISE Awards showcase the top rising stars in the insurance industry who show leadership in their organization.

CANARY Consulting was recently recognized by the Dayton Area Chamber of Commerce as the 2019 Recipient of Premier Health Workplace Diversity Award. **Kyle Babirad, ACAS, CSPA**, is the owner of CANARY.

Lockton Capital Markets has named **Paul Livingston, FCAS**, as senior advisor. Prior to joining Lockton Capital Markets, Livingston was managing principal of Bear Risk Advisory, LLC.

**Xiaohan Fang, FCAS**, has joined Coverys as an underwriter. Prior to joining Coverys, he most recently served as senior pricing actuary at Renaissance Re.

Pinnacle Actuarial Resources announced the appointments of consultants **Kendra Letang, ACAS**, and **Christina Negley, ACAS**. Letang joins Pinnacle from Uber Technologies and Negley, who joined Pinnacle in 2015, previously served as associate actuary. ●

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## CAS STAFF SPOTLIGHT

### Meet Katrina Evans

**W**elcome to the CAS Staff Spotlight, a column featuring members of the CAS staff. For this spotlight, we are proud to introduce you to Katrina Evans, Professional Education and Research Coordinator.

- **What do you do at the CAS?**

I provide support for a variety of professional education programs designed to inform and educate CAS members and other interested parties. Also, I spend part of my work duties helping with promoting research activities for the organization.

- **What do you enjoy most about your job?**

Working with member volunteers who are passionate about their profession.

- **Where's your hometown?**

I grew up in a region called the Inland Empire in California.

- **Where'd you go to college and what's your degree?**

I went to California State University, Northridge, for my undergraduate degree and University of Las Vegas, Nevada (UNLV), for my graduate degree. Both degrees are in sociology.

- **What was your first job out of college?**

After I graduated with my B.A., I worked as a teaching and research assistant at UNLV.



*Katrina Evans*

- **Describe yourself in three words.**

Introverted. Creative. Quirky.

- **What's your favorite weekend activity?**

Driving to nowhere in particular while listening to music.

- **Where's your favorite travel destination?**

Las Vegas! It's the reason why I applied for graduate school there.

- **Name one interesting or fun fact about you.**

I participated in a NASA research study with my identical twin sister. It was a bed rest study where we had to spend 30 days in tilted beds in a head-down position to simulate the weightlessness astronauts experience in space travel. We had to eat, exercise and even shower in this position. However, only one twin could exercise, and the other twin was the control subject. I was the one chosen to exercise. ●

## CALENDAR OF EVENTS

### October 20-22, 2020

In Focus Virtual Seminar

### November 9-12, 2020

Annual Meeting

Online Event

November 9 — Free event

November 9-12 — Registration fee

### May 23-26, 2021

Spring Meeting

Disney's Coronado Springs Resort

Orlando, FL

### May 25-28, 2021

2021 Actuarial Colloquia

(hosted by the CAS)

Disney's Coronado Springs Resort

Orlando, FL

## IN MEMORIAM

Nassar Hadidi (FCAS 1997)  
1942-2020

Allan A. Kerin, (FCAS 1990)  
1955-2020

Anthony Iafrate (FCAS 1995)  
1960-2020

## CAS Earns Nine Industry Awards By JESSICA WHELAN, CAS PUBLIC RELATIONS COORDINATOR

The Casualty Actuarial Society (CAS) has received nine awards from three association award programs for exemplary work completed in 2019. The three award programs include the EXCEL Awards, TRENDY Awards and Communicator Awards. “The CAS is exceptionally proud to be recognized for our creativity, innovation and differentiation by receiving these nine industry awards,” said CAS CEO Victor Carter-Bey. The following includes the complete listing of awards.

### Student Central Infographic

This revamped infographic was created to show the rich resources that CAS Student Central offers its members. Through engaging graphics and compelling statistics, this piece positions Student Central as *the* place for students to find all of the latest news, information and advice as they embark on the path to becoming property-casualty actuaries. The infographic was awarded the following:

- Communicator Award of Distinction
- Silver EXCEL Award from Association Media and Publishing for Advertisement Single Piece (Membership)
- Silver EXCEL Award from Association Media and Publishing for Advertisement Single Piece (Other)
- Silver EXCEL Award from Association Media and Publishing for Infographic



### #ActuariesinMUSIC

This month-long campaign used the hashtag #ActuariesinMUSIC to share stories from myriad CAS members who are talented musicians. The content was delivered on our social media platforms and used customized moving and static graphics. The campaign was awarded the following:

- Communicator Award of Distinction
- Silver EXCEL Award from Association Media and Publishing for Social Media Campaign (Other)

### Student Central Website

In 2019 the CAS relaunched the online hub for our student membership program, CASstudentcentral.org. The website for university students now has a modern design and improved navigation tools, making it more user-friendly than ever for the 8,000+ CAS Student Central members.

The website was awarded:

- Bronze EXCEL Award from Association Media and Publishing for Website (Redesign)



### In Focus Virtual Seminar

The 2019 In Focus seminar, the first fully virtual seminar put on by the CAS,



spanned three days and consisted of nine 90-minute webinar-style sessions. In Focus included chat rooms, an exhibit hall, a badge game and a trivia room. The virtual seminar was awarded the following:

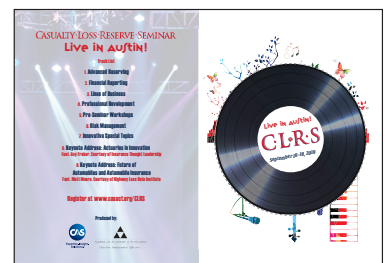
- Gold TRENDY Award from Association TRENDS for e-Learning and Live Training

### Casualty Loss Reserve Seminar Brochure

The marketing campaign for the 2019 Casualty Loss Reserve Seminar in Austin, Texas, featured an innovative new direct mailing piece designed to increase registration and attendance and to evoke the musical and artistic history of Austin. The brochure features a removable coaster in the shape and design of a vinyl record. The piece was awarded the following:

- Bronze TRENDY Award from Association TRENDS for Direct Marketing Piece/Promotion

The CAS dedicates the award for the CLRS marketing piece to our friend and colleague, the late Vincent Edwards, who was the staff liaison for the Casualty Loss Reserve Seminar. ●





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The CAS appreciates the support of the 2019-2020 Society Partners.

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## BRONZE PARTNERS



## DOWNTIME By LAURIE MCCLELLAN

## The Boys of Late Summer

The crack of a bat ... the leathery smell of a baseball glove ... the taunting chatter from the infielders. *The Boys of Late Summer*, by retired actuary Jerry Miccolis, is filled with the sights and sounds that baseball fans love, even if the topic is technically senior softball.

The memoir recounts how the author hand-picked a team of senior softball players in his home state of New Jersey and took them to face off against 60 of the best teams from the U.S., Canada and Cuba in the 24th annual Cape Cod Classic. A tale of underdogs testing themselves against a sport, the book captures the love of the game and the twists and turns of competition — even if the vibe is a little more *Bad News Bears* than *Chariots of Fire*.

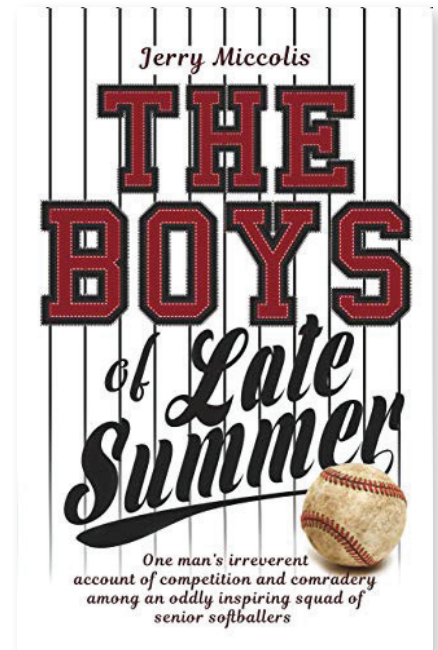
Miccolis lists his current occupation as writer and *cruciverbalist* (a person skilled at creating and solving crossword puzzles). Since he retired, Miccolis's puzzles have appeared in both the *New York Times* and the *Wall Street Journal*. Yet his interest in writing dates back much further. While an actuary at Towers Perrin, where Miccolis eventually headed up the global enterprise risk management practice, he literally wrote the book on the topic in 2001 (*Enterprise Risk Management: Trends and Emerging Practice*). After leaving that position to work in investment management, Miccolis wrote a less technical book, *Asset Allocation for Dummies*, published in 2009. When he retired for good in 2016, he finally had time to tackle a different

kind of writing project.

"I wanted to try my hand at something accessible to the general public," Miccolis says, "to see if I could." While mulling over ideas — a thriller about corporate intrigue crossed his mind — he traveled to the Cape Cod Classic with his team, Jersey Boys. After the tournament, the writer says, "I was talking to my wife, and I said, 'I've never played worse, and I've never had such a great time — what's up with that?' It seemed to make sense to really explore that paradox."

Like the movie *The Commitments*, in which a group of hardscrabble Irish musicians try to reach the big time playing the blues, Miccolis's story begins with the process of getting his group together. He joins forces with bear-like catcher, manager and full-time gospel minister John Esposito to pore over the vital stats of New Jersey's finest age 65-plus softballers. The two then must persuade each man to sign up. The team grows to include a DJ, a former professional mime, a shortstop with a magnificent mustache "not easily categorized as a Fu Manchu, horseshoe, walrus, or biker model," and a research chemist once approached by "a Mafia operative with an offer to make drugs for the Mob." (The outfielder declined; his company had a better retirement plan.)

Can this motley group that's never even practiced together trounce the best senior softball teams in the country? As the answer unfolds, Miccolis intersperses the tournament action with the story



of his own road to the championships. It began on his 50th birthday, when his wife Marcella gave him a bat, a pair of spikes and a season schedule for a senior softball team — a gift that he credits with changing his life.

Miccolis suffered a run of injuries on his first team, tearing first his right quadriceps, then his left one, and discovering that "there are few things quite so humbling as being pinch-run for by someone 20 years older." Despite this, he persevered. The writer learned that his new ballplaying friends also refused to give up, returning to the game after cancer treatments and even open-heart surgery. He writes, "They simply decline to be diminished by the inevitable ravages of time. They absolutely refuse to let advanced age and ailments get the better of them." He sticks with the game too, playing first in New Jersey leagues during the summer, then in Hawaii leagues during the winter, and eventually competing in tournaments including the Cape Cod Classic.

Writing the memoir proved as to be as challenging as playing in the games. “It was a stretch to write something for the general public,” says Miccolis, “and then yet another stretch to make it so personal.” He started the project by running the idea past his teammates, all of whom agreed to participate and sit down for interviews. In the end, Miccolis gathered over 30 hours of recorded material. He also used the stats and records for each game to supplement his own memory.

The first draft was far from a home run. “I ran some early drafts past some fellow ball players who have also been published,” says Miccolis, “and got some brutal, brutal feedback. That part wasn’t all that much fun. But it was very useful.”

Struggling to find a way to organize his material, Miccolis learned about a format called the competition documentary. In books and movies that follow this classic formula, “the structure of the story is identical,” he says. “You’re cutting in and out of the game with the very personal stories of key competitors, and the game action’s almost incidental.” For research, the writer sat down to watch documentaries about unusual competitions, including *Spellbound*, a behind-the-scenes look at a spelling bee, and *Wordplay*, a film about a crossword puzzle competition. Miccolis also read *Wilt, 1962*, a book about the legendary 1962 game in which Wilt Chamberlain scored 100 points for the Philadelphia Warriors against the New York Knicks.

As he began to rewrite the book as a competition documentary, the story started falling into place. But there was one major obstacle: too many characters. While the movies he watched focused on one, or just a few, competitors, Miccolis says, “I just couldn’t bring

**Although he was delighted to win the contract for the *Dummies* series book in early 2008, Miccolis was only halfway through the manuscript that fall when the financial markets began to implode during the Great Recession. Even worse, he was working as an investment manager at the time.**

myself to eliminate half of my teammates. So, I said, ‘what the hell, I’m going to try to include all twelve. And if certain key characters emerge above the rest, so be it.’” Miccolis found the story of outfielder Chris O’Rear, who grew up in an orphanage but went on to start his own construction company, to be the most compelling of all. (The enterprising O’Rear also stands out for being the only player to learn how to play softball by watching online tutorials.)

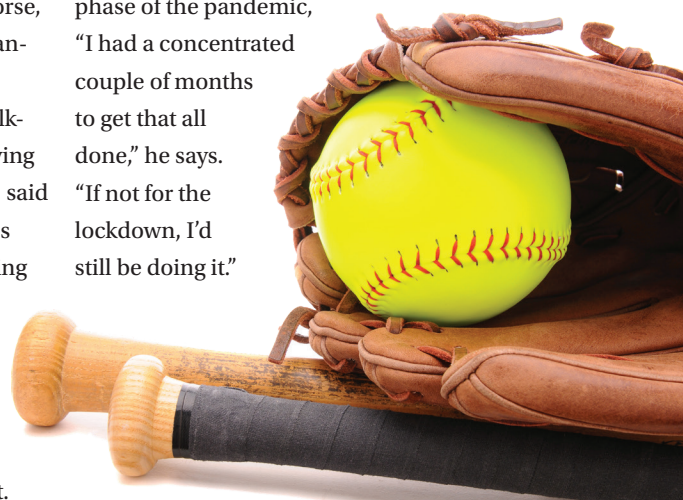
The manuscript was shaping up, but Miccolis says that after writing his book, *Asset Allocation for Dummies*, “I promised myself if I ever wrote another book, it would be on my own schedule.” Although he was delighted to win the contract for the *Dummies* series book in early 2008, Miccolis was only halfway through the manuscript that fall when the financial markets began to implode during the Great Recession. Even worse, he was working as an investment manager at the time.

“I spent all my waking hours talking clients off a ledge, while I was trying to find time to solve their problems,” said Miccolis. At the same time, deadlines were firm. “The publisher was insisting on a chapter a week. There was no slack. I said, ‘This is kind of a historic event, I really need to devote time to my clients, can we build a little slack into the schedule?’ And they said, ‘Hey, you’ve got a contract.

If after a week you can’t deliver, we’ll find somebody else.’”

Miccolis finished *The Boys of Late Summer* manuscript in January 2019. He considered looking for an agent and publisher, but describes that process as “a very, very long road. And the self-publishing road came to fruition sooner. So that’s what I ended up doing.”

This time, publishing the book coincided with another historic event: the coronavirus pandemic. In order to self-publish it, Miccolis had to oversee every step from copy editing and proofreading to creating cover art and designing the book’s layout. “Exploring who does it, who’s good at it, who can do it within my budget, interviewing them, vetting their work product, for each of a half a dozen different steps, that took months,” remembers Miccolis. But because the work corresponded with the lockdown phase of the pandemic, “I had a concentrated couple of months to get that all done,” he says. “If not for the lockdown, I’d still be doing it.”





**“It’s about doing something meaningful with the last third of your life,” Miccolis says, “and pursuing all the passions you had to put aside while you were working for a living.”**

Miccolis pulled the project together and published *The Boys of Late Summer* on the Amazon Kindle direct publishing platform, where it came out in May. The book is available for either e-reader or as a print-on-demand paperback.

Self-publishing means that the job of promoting the book, and getting it into readers’ hands, falls to the author as well. “The timing is awkward,” says Miccolis. “On the one hand, I think [for] providing something for people to read, the timing couldn’t be better. On the other hand, all the traditional things you would do to promote a book — book signings, book tours — they’re just out of the question at the moment.” Miccolis promoted the book with an email blast to his contacts. The local paper in Kauai, Hawaii, where he and wife live in the winter, ran a feature story. Miccolis also had a banner printed up that he can hang at future softball games, where he plans to sell the memoir to baseball fans who show up at the park.

In a classic sports story, sometimes the hero wins the day — like the moment in *The Natural* when Roy Hobbs, played by Robert Redford, hits the pennant-winning home run right into

the stadium lights and rounds the bases under a ticker tape of exploding sparks. In others, the hero loses, but ends up gaining something more important than a victory. Miccolis doesn’t want to reveal the end of his story ahead of time, but it’s not a spoiler to mention that, for him, softball and sports are not the true focus of the book. “It’s about doing something meaningful with the last third of your life,” Miccolis says, “and pursuing all the passions you had to put aside while you were working for a living.”

Now that the book is available to readers, Miccolis is surprised by some of the reactions he’s gotten, stating, “I’ve heard from people I haven’t heard from in 30 years, saying, I haven’t talked to you in 30 years, but I can hear you talking through those pages. That was clearly your voice, I could hear you talking as if I were sitting across the table from you.” Another old friend said that Miccolis had inspired him to start working on a book he’d been meaning to write about his family, saying that the story deserved to be told, and he didn’t want it to die with his generation. Miccolis finds that the feedback “is gratifying on a level I didn’t expect.”

Will the book appeal to actuaries? “As an athlete, I’m a weekend warrior,” Miccolis points out. “I’m not even a very good amateur athlete. I’m still at heart a nerd and a numbers geek, so I had to include in the book some geeky stuff, like the math and physics of softball.”

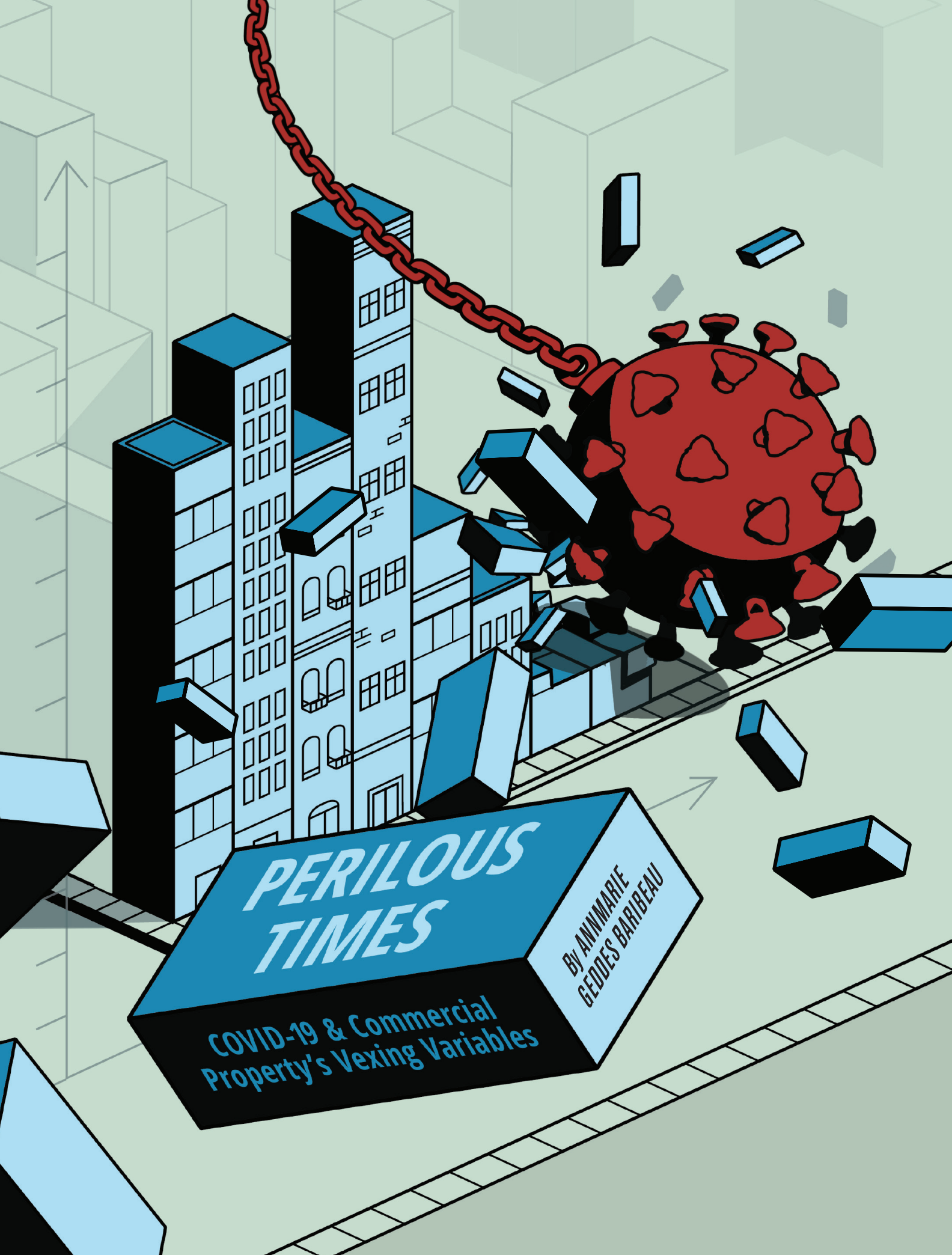
The retired actuary would like to write another book, but he’s not sure yet what form it will take. He’ll also have to fit the work into his already packed schedule of creating crosswords for publications, building sets for theaters in New Jersey, and helping kids with math and science literacy.

Miccolis surprised himself recently, when one of the theaters he builds sets for issued a call for short plays. Even though he’d never written a play before — or even thought about it — Miccolis decided to enter the competition. He had 48 hours to write a 12-page play that included a trumpet, unexpected money, a porch, a dance break and a secret (with extra credit for working in the Devil). It’s possible his next project will be as unexpected as his softball memoir. But one thing he knows for sure: If it’s summertime, then somewhere outside, hot dogs are roasting, fans are cheering, and third base is calling — and writing might have to wait. ●

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*Laurie McClellan is a freelance writer and photographer living in Arlington, Virginia.*



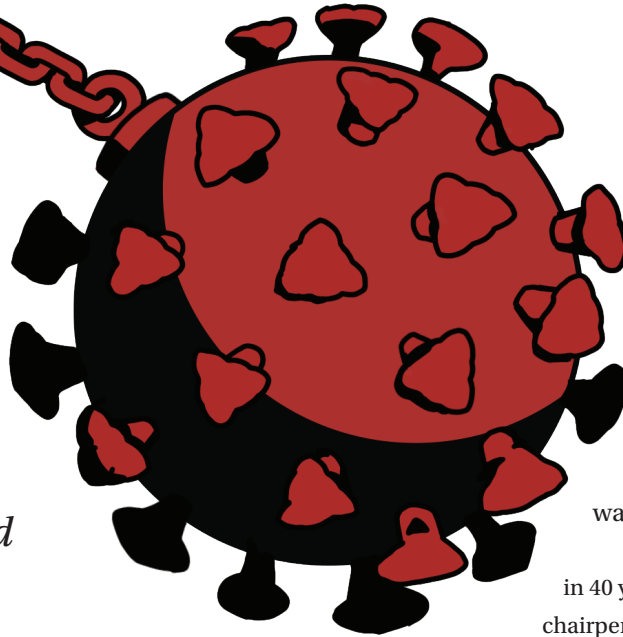


# *PERILOUS TIMES*

COVID-19 & Commercial  
Property's Vexing Variables

By ANNMARIE  
GEDDES BARIBEAU

*Commercial property insurance was already facing its hardest market in 35 years. Then COVID-19 entered the scene.*



**T**he commercial property insurance line rang in the year 2020 in a precarious position. With rates increasing around 20% quarterly for large customers and predictions of yet another perilous year, the business of covering commercial structures and associated liabilities was already fraught with peril.

“It is as hard a market as I have seen in 40 years,” observes Gary Marchitello, chairperson of Willis Towers Watson’s North American property team. “I would have to go back to

1985 or 1986. It is that bad with no end in sight, and God forbid we have a big hurricane or two this year.”

Then came the novel coronavirus (COVID-19). Originally not expected to have much impact on the property-casualty insurance industry, it is spurring, in the words of Evan Greenberg, chairman and chief executive officer of Chubb Ltd. and Chubb Group, “the largest single loss in insurance industry history.”

The response to the pandemic turned business-as-usual upside-down, pressuring unemployment to the highest levels since the Great Depression. Besides challenging industry-understood policy language for business interruption coverage, tele-everything — whether for working, shopping or meeting — has at least temporarily reduced commercial property use.

From downtown’s towering office buildings to exurban strip malls, vacant and unmonitored structures mean greater physical risk, especially when civil unrest not seen since the 1960s continues amid an unconventional U.S. presidential election year.

And though weather-related losses usually make up the largest piece of property coverage losses, the struggling U.S. economy is exacerbating the financial pressures facing commercial property insurers. For instance, the historic 33% drop in the nation’s gross domestic product (GDP) during the second quarter of 2020 is hurting exposure growth in many key lines, while the Federal Reserve’s aggressive rate reductions are cutting into much-needed investment income.

The multi-fold developments this year call for property actuaries to recognize



both positive and negative effects on commercial property insurance and to begin “thinking about risk and characteristics in light of the changes we have seen,” says David Bassi, managing director for Guy Carpenter.

### A Collection of Coverage

Although commercial property is referred to as an insurance line, it is actually a collection of coverages bundled together as reflected in insurers’ statutory financial statements. Actual physical property damage can be covered under businessowners policies (BOP), commercial multi-peril policies or monoline property coverages such as fire and allied lines.

In the marketplace, commercial property insurance rates

**The response to the pandemic turned business-as-usual upside down, pressuring unemployment to the highest levels since the Great Depression.**

this pace for the rest of the year, Marchitello predicts.

Even more strikingly, businesses with non-catastrophe

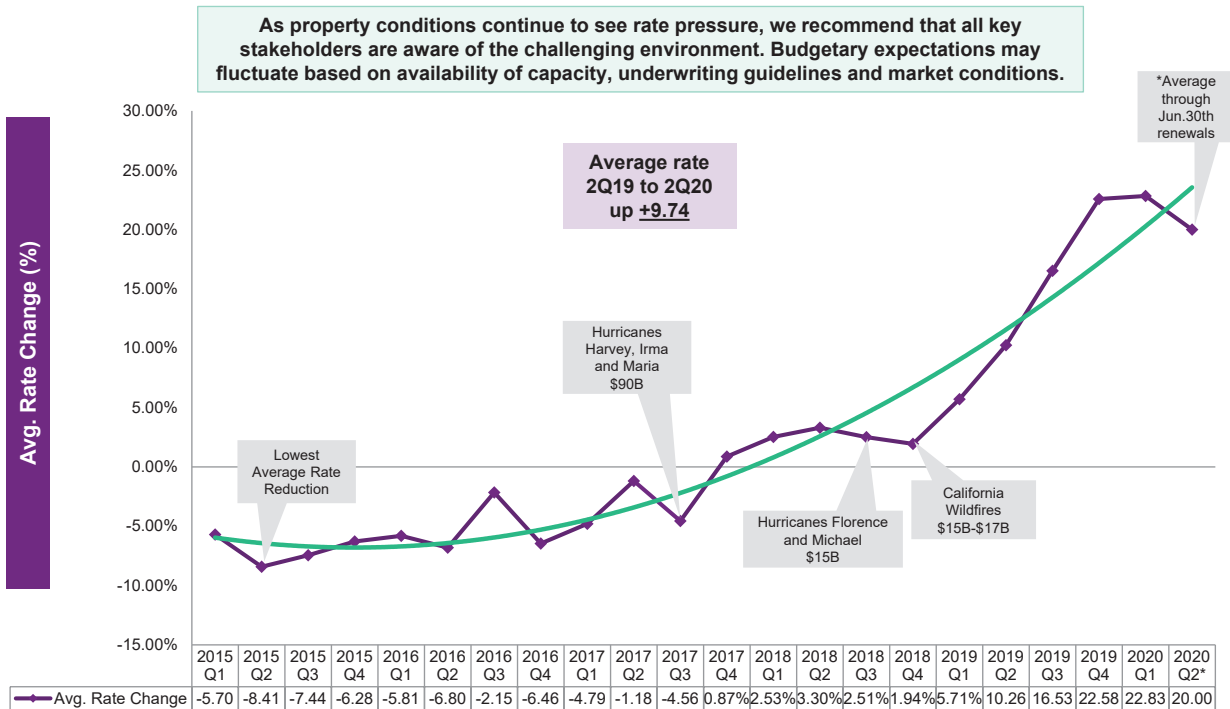
have been rising similarly to most other commercial lines. After reductions from 2015 through 2017, rates experienced 2% to 3% year-over-year increases in 2018 for Willis Towers Watson’s upper-middle to large and complex accounts, according to data the risk management and brokerage firm provided to *Actuarial Review* (see Chart 1).

Then, in the second quarter of 2019, rates increased by approximately 10%, and by 22% for customers buying coverage during the fourth quarter. Since then, rates have risen 20% to 22% during the first two quarters of 2020 and are expected to continue increasing at

Chart 1

## State of the Property Market – Average Rate Change

Historical average rates by quarter as of July 1, 2020



# 7 Reasons to ditch link ratios

- ▶ Link ratios cannot measure calendar year social inflation
- ▶ The assumptions are rarely met by the data
- ▶ No insight into trends in the business
- ▶ Too slow to review
- ▶ No connection to the risk characteristics of the data
- ▶ No early warning system
- ▶ No way to determine whether an answer is good, bad, or ugly

The Mack method is a regression formulation of volume weighted average link ratios (chain ladder). The regression formulation means the method can be tested statistically. Other method variants can be included such as different weights, an intercept (Murphy) and an accident year trend for each development year. All these methods are included in the Extended Link Ratio Family (ELRF) modeling framework.

In the Probabilistic Trend Family (PTF) modeling framework, we mitigate model specification risk by identifying a parsimonious model describing the trends in the three directions (development, accident, and calendar), along with the volatility about the trend structure.

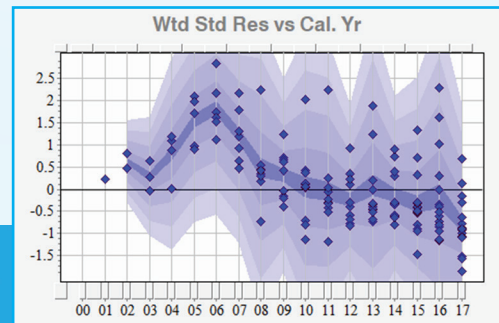


# Link ratio methods residuals trend down: Projections too *high*

Consider anonymized Paid Loss data for an Auto Insurance provider (segment: Bodily Injury). The data can be downloaded from: [icrfs.me/7reasons](http://icrfs.me/7reasons)

The display on the right shows a strong downward trend in the residuals (trend in data minus trend in method) versus calendar year.

This means a link ratio method will grossly overstate the reserve estimates. The Mack method (volume weighted average) gives a total reserve of 902M. The arithmetic average link ratios gives a total reserve of 1.16B.



Incremental		Cumulative		
Accident Period vs Development Period				
	Cal.Per.Total	0	1	2
2015	163,954	9,618	54,613	88,669
	160,899	9,618	75,810	62,653
2016	210,078	15,225	86,451	86,647
	216,417	15,225	68,255	15,012
2017	289,335	13,628	77,383	94,464
	201,780	13,628	11,493	19,398
Fitted/Observed			2018	2019
Cal. Yr Totals	1,629,546		284,355	241,747
	1,625,059		30,270	34,119

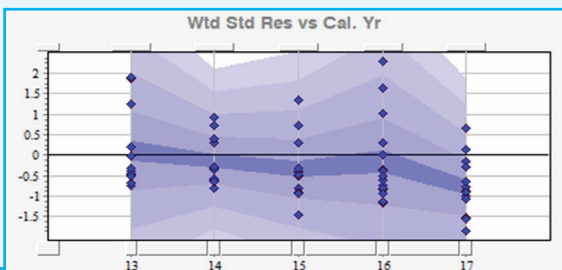
1 Unit = £1,000

Left is the forecast table (incremental version) for the Mack method.

The company just paid 202M GBP in 2017 (blue numbers are observed) but the fitted mean value (black numbers) is much higher at 289M. Further, the method is projecting the company will pay 284M GBP in the next calendar year!

The method clearly provides false indications.

The optimal model identified in the Extended Link Ratio Family (ELRF) modeling framework applied to the last five calendar years has trends, intercepts, and very few ratios (because they have no predictive power). The residuals are much improved (left). The trends in the data are more in line with the trends in the method.



The total reserve mean projected from this identified model is 504M – around half the original Mack method projected mean reserve! This is a much better estimate of the reserve mean, but how do we know it's the best?

## Let's see what is really going on

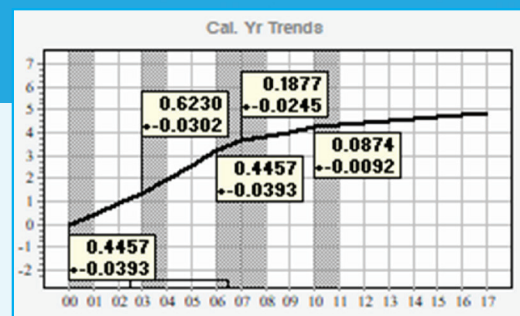
The identified model in the PTF modeling framework has calendar year trends as seen on the right. The calendar year trends are much lower more recently. Trends in other loss types (for instance: Case Reserve Estimates or Number of Claims Closed) can be related to the trends in the paid losses.

The actuary now has a narrative about the data.

Projections from the PTF model are much more realistic. The forecast scenario in PTF, using the 8.7%+ calendar year trend, projects a mean payment of 223M GBP next year – much more in line with the recent history. The total mean reserve is 598M.

The actuary has control over all future trend assumptions in the PTF modeling framework. These can be related directly to the trends (or volatility) observed in the past – including CREs or NCC.

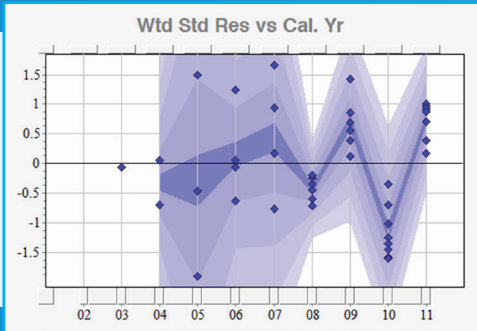
To get in the ballpark of the original forecasts of the Mack method, the future calendar year trend has to increase from the most recent 8.7%+ calendar year trend to more than 25%+ for the entire run-off period!





# Link Ratio Methods residuals around zero: Projections too **low**

Maybe you think using Incurred Losses gives better estimates than Paid Losses? Consider the Incurred Loss data from Best's Schedule P (2011) for Tower Group. The data can be downloaded from: [icrfs.me/7reasons](http://icrfs.me/7reasons)



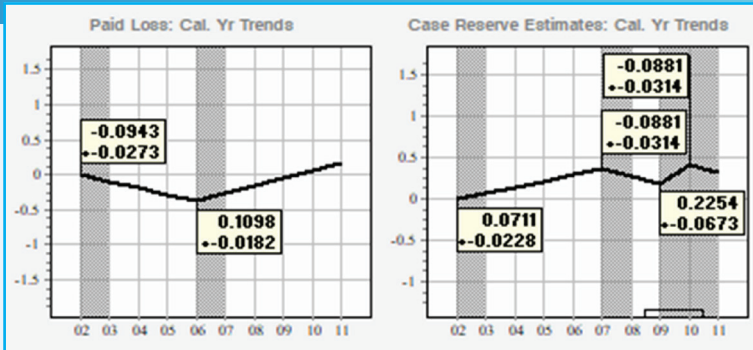
On the left are residuals from the Mack method applied to the Incurred Losses. The zig-zag conflates what is going on.

The total mean reserve projected by the Mack method is: 1.059B. The held reserves by the company as of 2011 were 921.9M. By calculating chain ladder ratios excluding the 'high' calendar years of 2009 and 2011, the forecasted total reserve drops to 950M.

The held reserves were supported by link ratio methods.

In the PTF modeling framework, Paid Losses and Case Reserves are modeled separately. Note the calendar year trends are not the same in the Paid Losses (left) and Case Reserves (right).

In order to reach the reserves held, the calendar year trend for the future has to change from +11%+ to -16.85%+ - a total difference in trend of nearly 28%!! This is impossible!



Without access to the PTF modeling framework, how would you know whether your projections are meaningful?

- Since 2006 the paid losses have been increasing 11%+ faster than Earned Premium. This is high social inflation. This leads to increases in loss ratios (not reflected in the company's held ultimates).
- Since 2007 the Case Reserve Estimates have been fluctuating (thus the masking of trends in the Incurred Losses).

Accident Period vs Development Period						
	Cal. Per. Total	0	1	2	3	4
2007	219,293	111,061	80,663	58,661	54,577	40,347
	221,653	115,284	89,880	56,719	25,047	34,904
2008	316,836	152,248	110,608	80,460	74,870	55,355
	324,522	143,386	121,849	38,678	67,792	14,165
2009	432,067	194,065	141,026	102,614	95,502	70,616
	427,253	181,575	108,336	95,660	13,288	18,302
2010	523,492	197,170	143,320	104,312	97,099	71,803
	393,802	209,186	140,943	14,492	14,224	18,940
2011	675,179	277,671	201,890	148,980	138,840	101,201
	694,364	319,844	27,323	21,663	21,305	27,286
	Fitted/Actual		2012	2013	2014	2015
Cal. Per.	2,645,737		512,550	394,896	317,782	232,166
Total	2,526,865		45,323	41,549	39,884	38,057

1 Unit = \$1,000; Forecast Scenario: Data trend: 11%+ \_

Accident Period vs Development Period						
	Cal. Per. Total	0	1	2	3	4
2007	219,293	111,061	80,663	58,661	54,577	40,347
	221,653	115,284	89,880	56,719	25,047	34,904
2008	316,836	152,248	110,608	80,460	74,870	41,909
	324,522	143,386	121,849	38,678	67,792	10,725
2009	432,067	194,065	141,026	102,614	72,304	40,476
	427,253	181,575	108,336	95,660	10,060	10,491
2010	523,492	197,170	143,320	78,973	55,656	31,159
	393,802	209,186	140,943	10,972	8,153	8,219
2011	675,179	277,671	152,849	84,246	59,382	33,249
	694,364	319,844	20,686	12,417	9,245	8,965
	Fitted/Actual		2012	2013	2014	2015
Cal. Per.	2,645,737		388,046	226,348	137,902	76,276
Total	2,526,865		34,314	23,815	17,308	12,503

1 Unit = \$1,000; Forecast Scenario: Reserves held: -16.85%+ \_

The forecast table on the left assumes the 11%+ trend continues. The projections are increasing down the accident periods (eg: dev 4) just like the observed paid losses (blue numbers) in dev 0.

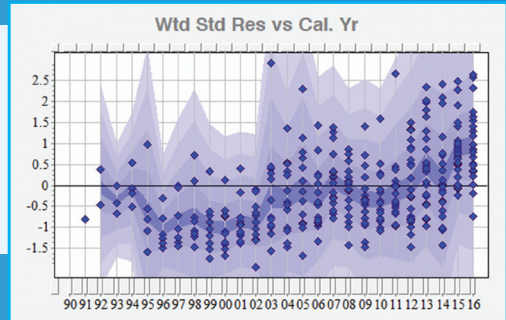
On the right is the forecast where the assumed future trend is set to -16.85%. Projected payments are decreasing down the accident periods (dev 4) despite the significant increases in observed paid losses and Earned Premium. (Tower Group went into administration in the fourth quarter 2013).

# Link Ratio Methods residuals trend up: Projections too **low**

Consider anonymized Paid Loss data for a large Worker's Comp provider. The data can be downloaded from: [icrfs.me/7reasons](http://icrfs.me/7reasons)

The display on the right shows a strong upward trend in the residuals (trend in data minus trend in method) versus calendar year.

Any link ratio method will grossly understate the reserves – the trend in the method is less than the trend in the data. Using the Mack method (volume weighted average), the total reserve is 839M.



Incremental		Cumulative		
Accident Period vs Development Period				
	Cal.Per.Total.	0	1	2
2014	162,300	228	10,944	18,627
	179,707	228	14,998	27,366
2015	151,130	275	13,200	19,782
	181,395	275	15,895	3,810
2016	147,829	400	19,200	23,979
	188,415	400	3,537	6,058
	Fitted/Observed		2017	2018
Cal. Yr Totals	2,916,318		152,317	129,915
	2,732,505		9,023	9,309

1 Unit = \$1,000

The company just paid 188M USD in 2016 (blue numbers are observed) and the method is projecting the company will pay 152M USD in the next calendar year (black numbers are fitted means).

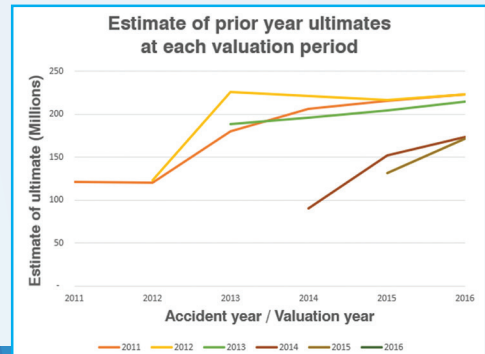
The method clearly provides false indications.

If every successive year you take weighted average link ratios of the last four years, each year the estimates of the prior year ultimates will increase, and projections of the paid losses for the next year will be too low.

To illustrate this, estimate the four year weighted average each valuation period from 2011 through to 2016 and plot the prior year ultimates.

Assuming the same link ratio method is applied in each of the four years, the company is in catch up mode.

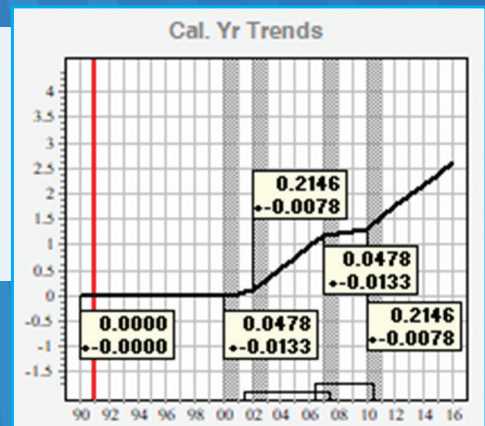
For this particular portfolio, the social inflation is very high.



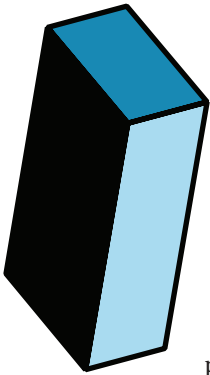
The optimal PTF model, whose calendar year trends are displayed on the right, projects a total mean reserve of 1.309B if the trend of 21.46%+ continues for several years.

Link ratio type methods cannot measure social inflation.

The PTF modeling framework enables you to mitigate model specification risk and extract maximum information from the data.



ENOUGH WITH THIS QUACKERY.  
GET YOUR TEAM USING PTF AND PUT THE ODDS BACK IN YOUR FAVOUR!



(CAT) exposure are expected to see rate increases of 10% to 20% and those with CAT exposure of 15% to 25%, according to Willis Towers Watson's "Insurance Marketplace Realities 2020 Spring Update-Property" report released in May.

Moreover, for companies with CAT exposure and losses, rate increases can be 30% or more, the report notes. In some "micro" markets with CAT exposures and losses, such as manufacturing, life sciences and retail, rates could skyrocket by as much as 50% to 300% or more.

Not surprisingly, underwriters are becoming more risk-selective, requiring greater loss mitigation investment as customers experience higher deductibles, according to Willis Towers Watson's report. Shared and layered placements are also increasing, creating more complicated and longer renewal negotiations.

## Loss Causes

Extreme weather events are a significant cause of commercial property losses. The year 2020 has a greater chance of large natural disasters, warns Robert Muir-Wood, chief research officer of Risk Management Solutions, Inc. (RMS). "Sea surface temperatures are high, and without an El Niño, we could expect more Atlantic hurricanes, as well as more intense storms than average."

Insurance losses in 2017, the most expensive year on record for natural disaster losses in the United States, were \$78 billion, and they were followed by another \$52.3 billion in 2018, according to Munich Re. While 2019 figures have not been finalized, the losses for the first quarter of 2019 amounted to \$25.5 billion before last year's hurricanes and wildfires once again left their mark.

Through the first seven months of 2020, there were already more than 10 separate events with economic losses (combined insured and uninsured losses) exceeding \$1 billion, largely due to severe thunderstorms, tornadoes and hail in the Midwest and the southern portion of the U.S., according to the National Oceanic and Atmospheric Administration's National Centers for Environmental Information. The number of losses with more than \$1 billion in insured and uninsured losses continues to rise. In the past three years, the average is

14.7 per year; for 2015 to 2019, the average is 8.2; since 1980, the average is 6.6.

Although CATs get a lot of attention as property losses, they are not the whole story. "The sentiment expressed by (insurers) is CATs count, but most insurers would ascribe general rate inadequacy more to non-CAT events such as convective storms, fires and explosions," Marchitello says.

There is some good news. Special property coverage, which includes fire, allied lines and inland marine, has been enjoying favorable reserve development for each of the past five years, according to Fitch Ratings' report, "U.S. Commercial Lines Market Update," released in June. Reserving in property insurance is "relatively easy," Marchitello notes, because there is little or no incurred but not reported (IBNR) losses and loss events are reasonably ascertainable. "It is hard to fake reserves in property," he observes.

As for profitability, Fitch's report notes that the combined ratio for special property peaked at 117% in 2017 but dropped to 91% in 2019. However, commercial multi-peril, which includes liability and property exposures, has had a combined ratio above 105% in the years 2017 through 2019.

Another trend affecting property insurance is that the insurance industry is developing greater recognition of the role of climate change in driving loss potential. The year 2017 saw several examples of catastrophic loss events bearing the signature of climate change, Muir-Wood says. "As one example we have the unprecedented rainfall totals and intense flooding of Houston by Hurricane Harvey," he explains. "Then we have the extraordinary 2017 wildfires in California at the end of a record-breaking heatwave, multi-year drought and extended fire season."

In 2019, climate change topped cyberrisk as the most identified emerging risk in the "12th Annual Survey of Emerging Risks" survey of actuaries and risk managers (*Actuarial Review*, March-April 2019) and remained in the top spot for the 2020 survey. The Actuaries Climate Index, introduced in 2016, also contributed to growing awareness. Both the survey and the index are sponsored by the Casualty Actuarial Society, the American Academy of Actuaries and other actuarial organizations.

While climate change is not having a direct impact on rate changes, Marchitello says, it is influencing underwriting and investment activities affecting commercial property insurance. Some insurers, for example, have stopped underwriting and investing in mining and energy companies that extract or use



fossil fuels.

“The effects of climate change on extreme events,” Bassi offers, “are nuanced, often difficult to detect, and in some cases still emerging areas of scientific research. Changes in extreme events act over decadal timescales, which is important from a strategic planning perspective, while on a year-to-year basis, natural variability in extreme events is the dominant mode.”

A key question for actuaries, Muir-Wood says, is “how far we have moved away from the long historical record.” Rather than calibrate a model on 100 years of history, he suggests, “the last 10 to 20 years might be a more relevant baseline.”

### The COVID-19 Surprise

As the commercial property insurance market continued its stubborn hardening into 2020, reports of a China-based novel coronavirus began to surface early in the year (*Actuarial Review* March-April 2020).

While the pathogen was beginning its rapid spread around the world, economic indicators in the United States were (still) looking good. The Dow Jones Industrial Average posted a historic high of 29,551.42 on February 12. Gallup reported that 90% of Americans were satisfied with their personal lives. And the unemployment rate was enjoying the fifth consecutive month of around 3.5% — the lowest in 50 years.

That significantly shifted in mid-March. Lockdowns intended to quell the spread of the coronavirus triggered an economic domino effect, temporarily closing businesses and pressuring April unemployment levels to 14.7%, the highest percentage since the Great Depression in the 1930s.

“Nobody ever expected COVID-19 to affect commercial property,” Marchitello remembers. For actuaries, Bassi says, “COVID is one of those events that is creating challenges with assessing exposure.”

Second quarter 2020 insurance industry earnings provide a clue into losses so far. After tracking second quarter results for about 50 North American public insurers, “incurred losses from COVID total approximately \$7 billion,” offers James Auden, managing director of Fitch Ratings, for the P&C insur-

**Through the first seven months of 2020, there were already more than 10 separate events with economic losses (combined insured and uninsured losses) exceeding \$1 billion ...**

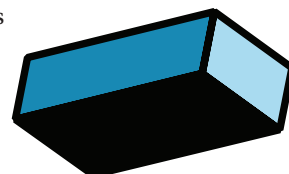
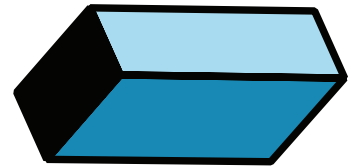
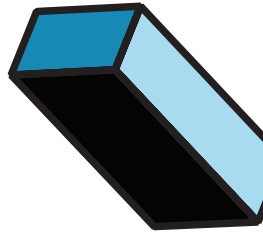
ance industry. Including the losses for Lloyd’s of London, large global insurers and reinsurers brings the worldwide total so far to \$17 billion worldwide, which is “likely to go up in second half of 2020,” he adds.

Part of this will include claims for business interruption coverage even though many policies were not intended to cover pandemics. Since 2006, Insurance Services Office policy forms explicitly limited coverage associated with pathogens, but that has not been tested until now. Policyholders desiring infectious disease coverage can buy it as an endorsement.

Since COVID-19 emerged, however, several bills at state and federal levels have been introduced to change insurance coverage retroactively, but Marchitello says that the possibility of passage appears remote. Meanwhile, the constant stream of lawsuits continue, amounting to more than 1,000 so far. “The doom and gloom commercial property insurers are experiencing is about what could happen,” Marchitello explains. Preliminary rulings favor insurers generally, but it is still early. “We are metaphorically in the top of the third inning,” he adds.

Data concerning the impact of COVID-19 on property risk is sorely needed. Unfortunately, there is not yet enough information for actuaries to apply predictive modeling regarding COVID-19, says Stephen Mildenhall, assistant professor of risk management and insurance and director of insurance data analytics at the school of risk management at St. John’s University. “We don’t have enough data. We are more in the land of scenario testing.”

Property insurers also face another source of losses from historic



civil unrest. When the number of COVID-19 cases had nearly reached its first peak in late May, riots broke out in reaction to the death of George Floyd under restraint by Minneapolis police. Damages from the initial riots are considered a catastrophic loss by Verisk's Property Claims Service because they amounted to more than \$25 million. Minnesota Governor Tim Walz requested \$500 million federal aid for damage to public property.

Civil unrest continued during the next several weeks, spreading to 140 U.S. cities, according to the Insurance Information Institute, which reports an early estimate of \$500 to \$900 million in insurance losses so far. The expense pales in comparison to the estimated \$4 billion of insurer losses from Hurricane Isaias in August estimated by Karen Clark & Company. However, how long riots, theft, and destruction of property will continue before the U.S. presidential election in November is a variable that could make the financial impact even larger.

### **Economic Consequences**

Losses aside, commercial property insurers can be impacted by the economy in several ways. "Insurance premium and exposure growth are tied with growth in GDP," though not perfectly, Auden observes.

One key economic measure is loan delinquency. First, it indicates commercial buildings that might not be protected or maintained, Marchitello says. Beyond the known risks of empty structures, such as unchecked maintenance, vulnerabilities leading to fires and pipe bursts, theft and arson, empty commercial buildings are also a harbinger of a struggling economy.

Mortgage-backed securities, which are bonds "that the industry invests in heavily," are a troubled asset due to the economic strain resulting from the COVID-19 outbreak, Mildenhall says.

In June, the delinquency rate for property loans bundled

into commercial mortgage-backed securities (CMBS) hit a near all-time high of 10.3%, a jump from only 2.8% a year prior, according to "CMBS Delinquency Rate Surges for the Third Month; Nears All-Time High," produced by Trepp, a CMBS data tracker. While hoping that most commercial borrowers have already requested relief, analysts expect the rate to continue increasing.

"The pandemic's impact on the economy could harm insurers more on the asset side than in losses," Mildenhall says. Low investment income has been a struggle for insurers since low interest rates were introduced by the Federal Reserve to spur recovery from the Great Recession about a decade ago. Before 2020 began, Marchitello observes, commercial lines, including property coverage, were suffering from "chronic subpar earnings over the past few years."

Bond market returns, which most insurers rely upon for investment income, have "remained lackluster," according to the Fitch Report. As a result, the industry has not been able to use its investments to offset bad underwriting results, pressuring carriers to adjust rates and coverages as needed to better ensure an underwriting profit.

Declines in commercial property value could also be a sign of future bad news. Since the beginning of COVID-19

lockdowns, values declined in March and April, depending on property type, from 5% to 25%, according to Green Street's Commercial Property Price Index published in August. Transactions have been "quiet," so values have not changed since, the company reports.

The industries with the most loan delinquencies are lodging and retail, according to Trepp. Mildenhall expects that as telecommuting, online shopping and less traveling become more prevalent, the need for office, retail and hotel space will likely decline. Just changing workspaces will make a difference. Morgan Stanley anticipates the working-from-home trend will triple by 2024, according to a post on Alpha-Sense.

**Beyond the known risks of empty structures, such as unchecked maintenance, vulnerabilities leading to fires and pipe bursts, theft and arson, empty commercial buildings are also a harbinger of a struggling economy.**

## Actuarial Considerations

Commercial property actuaries need to combine data from past experiences with new data sources to anticipate the potential of risk evolution, Bassi says. For example, changes in building codes, building materials and claims handling practices can all impact property risk. "I see innovation as key for improving commercial property insurance," he adds.

New technologies can help actuaries gain needed insight into underwriting and claims management. "The ability to remotely access damage post an event allows claims professionals to safely and quickly triage losses, especially in areas that are hard to access, and can help with the mitigation of losses post events," he observes. Automatic water sensors and shutoff valves help proactively manage water damage risks. Bassi adds that evaluating the impact of these devices on claims costs can be an important part of an underwriting assessment.

Besides locating more data sources, actuaries can also benefit from working with other disciplines to see risk from different angles, Bassi says. "Engineers, CAT modelers, geoscientists, legal experts, and others all provide insights into developments that can impact risk quantification," he adds.

## Conclusion

Commercial property insurance was already experiencing an intense hard market before the advent of COVID-19, due to low investment returns and higher losses from weather events.

The steep economic recession that occurred as a result of the COVID-19 pandemic has made underwriting commercial property coverage even more challenging. The uncertainty of past and future liabilities, unsettling investment options and emerging sources of loss will likely mean customers will continue to face rising rates.

But hope remains. Commercial property insurers could start by encouraging risk mitigation and more clearly communicating coverage to their customers. ●

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*Annmarie Geddes Baribeau has been covering insurance and actuarial topics for nearly 30 years. Find her blog at [www.insurancecommunicators.com](http://www.insurancecommunicators.com).*



# CAA & CAS Boot Camp Offers a Glimpse into the World of P&C Actuaries

By RAN GUO, CAS DIRECTOR OF INTERNATIONAL RELATIONS

都说学好精算很累，考试实在让人疲惫。

我说大家还有机会，夏令营让知识一步到位。

都说报考精算很贵，多门考试需要自费。

我说大家不要气馁，尽快考完不再受罪。

奋斗都会伴随痛楚，否则幸运女神她不会眷顾。

坚定踏上精算道路，这样生活才会靠谱

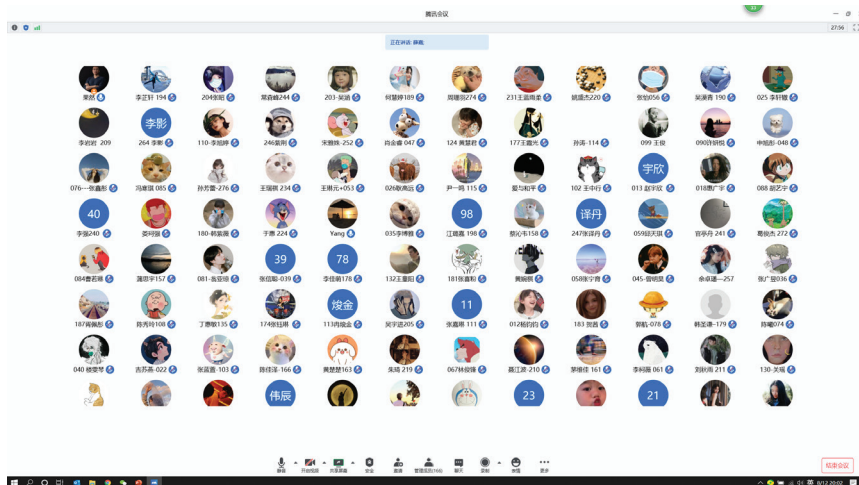
Above is a rap song written by one of the boot campers to promote his group's presentation and to earn the "Distinguished Camper" badge on his graduation certificate.

The lyric roughly translates to the following:

*They say actuarial science is hard  
And exams are tiresome,  
But I know we have a chance  
And the boot camp is making it happen.  
Exams are expensive  
And we are the ones paying for it,  
But I know we have an opportunity.  
Exams will no longer be a concern after  
the great effort.  
It takes tears and sweat to be blessed by  
the Luck Fairy.*

*It takes firm actions to control our lives  
and make our wishes come true.*

The year 2020 was a tough year from many aspects. With the spreading of COVID-19, people's normal routine were disrupted. Many actuarial students suffered as internships were cancelled. The CAS's international team answered to the call made by CAS President Steven Armstrong to fill this void. Thus, the



A screen shot of the class in action.

China Association of Actuaries (CAA) and the CAS Actuarial Boot Camp was established.

I was honored to host the nine-week program. It began on June 22 and covered topics on reserving, pricing, and catastrophe modeling — all delivered online through virtual lectures, discussions and presentations.

The boot camp intent is to give college students a taste of the interesting problems that P&C actuaries solve every day. For each topic, lectures on theoretical concepts were given each week. During the weekend, an office hour was hosted where guests shared their personal experiences working in the field. Each topic was capped off by a presentation day where three groups of boot campers, voted on by their peers, gave presentation on what they had learned or the results of voluntary research work that the lecturers had suggested.

The results of this first-time virtual boot camp far exceeded expectations. In

the first three hours of open registration, the originally budgeted 200 slots were filled. Capacity was then expanded to 250 and then 280 as we approached the audience limit of the platform.

The boot camp brought about many interesting discussions amongst the students. During the office hour for pricing modules, the conversation drifted into the topic of insurtech, provoking some thoughtful discussions, including:

- Assuming that we have complete knowledge of all risks associated with a driver, is it possible to apply precise pricing for each individual? If this is the case, would risk still be insurable?
- As actuaries continue to use tools such as usage-based rating and leverage internet of things to improve the quantification of individual risk levels, it begs the question: Where is the limitation of segmentation? And when does the law of large number fails? and what happens after that?



The boot camp has proven valuable to the attendees. "I really appreciate the opportunity to talk to top actuaries," one participant said, "I have never felt so close to real actuarial practice. It gives me tremendous encouragement to pursue an actuarial profession."

The boot camp has also increased the recognition of the CAS as the premier actuarial organization specializing in property-casualty insurance. For example, before the session, most people were unaware that all of the actuaries in the Swiss Re general insurance department followed the path of the CAS! Thanks to the CAS participating and the boot camp imparting top-quality knowledge, I believe more students wanting to qualify as general insurance actuaries will now consider taking CAS exams.

The boot camp would not have been successful without the work of our volunteers. Kudos to the all the guests who took time out of their busy schedules to talk to the students about being P&C actuaries.

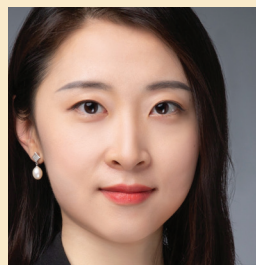
Given this year's success, the boot camp will be developed into an on-going program that we hope will have a great impact on many more students in the future. ●



A presentation cover page from one of the groups.

### CAA & CAS Actuarial Boot Camp Mentors

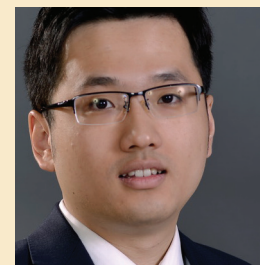
These CAS members volunteered to mentor student participants. Senior people in their companies, the mentors talked to the students about their career paths.



Erica Xue, ACAS  
Risk Management  
Solutions, Inc.



Zhou Jun, FCAS  
Sinosafe General Insurance  
Co. Ltd.



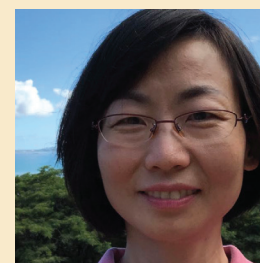
Yang Hou, FCAS  
Swiss Re Beijing



朱园丽 Yuanli Zhu, FCAS  
Pingan Property & Casualty  
Insurance Company of  
China. Ltd.



Zhang Lang, FCAS  
PICC Property and  
Casualty Company Limited



肖婕 Jie Xiao, FCAS  
Guoren P&C Insurance

## Finding Insight In A “Bag Of Words” By JIM LYNCH

It's called text *mining* for a reason. Like the search for precious metal, text mining consists of a tremendous amount of preparatory work: taking random assortments of data, digging through them, sifting and sifting through them, and then refining them until what's left is extremely valuable.

In the physical world, you start with a promising patch of land, and the result is gold or silver, whose value is obvious. In the cyber world, you start with written text that can vary from a claims file to a series of tweets. The result is actionable information and can be just as valuable.

Two actuaries described the mining process at the virtual CAS Ratemaking, Product and Modeling seminar in late July.

Louise Francis, FCAS, CSPA, MAAA, consulting principal for Francis Analytics & Actuarial Data Mining, presented a step-by-step look at the digging and sifting.



Francis

Roosevelt Mosley, FCAS, CSPA, MAAA, a principal and consulting actuary at Pinnacle Actuarial Resources, examined two real-life insurance examples: in one, searching claims files for insight on homeowner claims and in the other, measuring consumer sentiment from a pile of individual Twitter messages.



Mosley

Together, they presented the business case for a skill that seems a logical extension of the traditional actuarial toolkit.

Anyone familiar with data analysis knows the 80/20 rule — creating the data set is a lot of work and takes 80% of the time. Textual analysis is even more lopsided.

“Free-form text is far more challenging than structural data,” Francis said. “There has been no effort to

**Her first example uses the “bag of words” approach, where words are accumulated without retaining the context they held when originally written.**

standardize the text before the analyst digs in.”

Francis described two approaches. Her first example uses the “bag of words” approach, where words are accumulated without retaining the context they held when originally written. Her example uses R statistical language, but Python can also be used to mine text, she said, as well as less common languages such as Perl.

“In ‘bag of words,’ things like semantics and sentence structure don’t matter,” she said.

Her alternative approach is natural language processing, which tries to capture the subtleties of human communication.

The general process is to cull extraneous bits of text like punctuation and to standardize what remains.

Using an example from a dataset of workers’ compensation claims and after some preliminaries, Francis focused on a field where an adjuster describes what

happened. She described the steps she had taken to normalize the text and the R code necessary to do so.

She had to fix misspellings. She removed punctuation, though she noted sometimes an analyst would want to retain it. She culled the spaces surrounding words. She replaced synonyms. She removed stems like “-ing” and “-ed.” She took out stop words like “the,” “is” and “on,” as they carry little meaning.

The process was iterative. At one

point she displayed a list of terms that included “accid,” “accident” and “acciden.” Those were brought together into one term, “accident.”

The data that resulted from the cleaning and preprocessing was converted to a document-term matrix. That’s where exploration and analysis can begin and where Mosley’s presentation picked up.

Mosley described two different analyses. In the first, he looked for severity trends in 14,000 homeowners’ claims comprising 85,000 transactions. As in Francis’ example, he focused on the claim description field. He began by picking out words that appeared frequently, e.g., water, insured, damage, tree, basement.

“You can see how some of the issues may come into play with homeowner claims,” he said.

He ended up with 94 separate terms to analyze.

He began the analysis by looking at



## Clustering verb

klus-ter | \ 'klə-stər

: finding groups of words that tend to appear together and analyzing the claims where they appear.

## Association analysis noun

as-so-ci-a-tion anal-y-sis | \ ə-sō-sē-'ā-shən ə -'nə-lə-səs

: a way of finding words that appear together and determining what other words are likely to appear with them.

claim severity by indicator, though he noted that the result “is not too surprising.” The word “fire” was associated with the largest losses. Claims where the word “stolen” appeared were smaller.

Next, he looked for correlations between pairs of words. “Wind” appeared with “blew” a lot, and “tree” appeared with “fell.” Claim size spiked when the word “flooded” appeared with the word “basement,” more so than when the word “basement” was not accompanied by the term “flooded.”

As the analysis proceeds, “You don’t see the full picture,” Mosley said, “because you are looking only at pairs of words. But the bigger picture is starting to come into focus.”

He showed the results of traditional data mining techniques like clustering — finding groups of words that tend to appear together and analyzing the claims where they appear — and association analysis — a way of finding words that appear together and determining what other words are likely to appear with them.

From there, he said, “You can begin to develop rules that are present in each claim description: Is it water damage? Is it water in the basement? Is it water related to the ceiling? And you begin to decipher key elements that come from some of those particular associations. That lets you refine and understand your claim severities better.”

Mosley’s second example analyzed

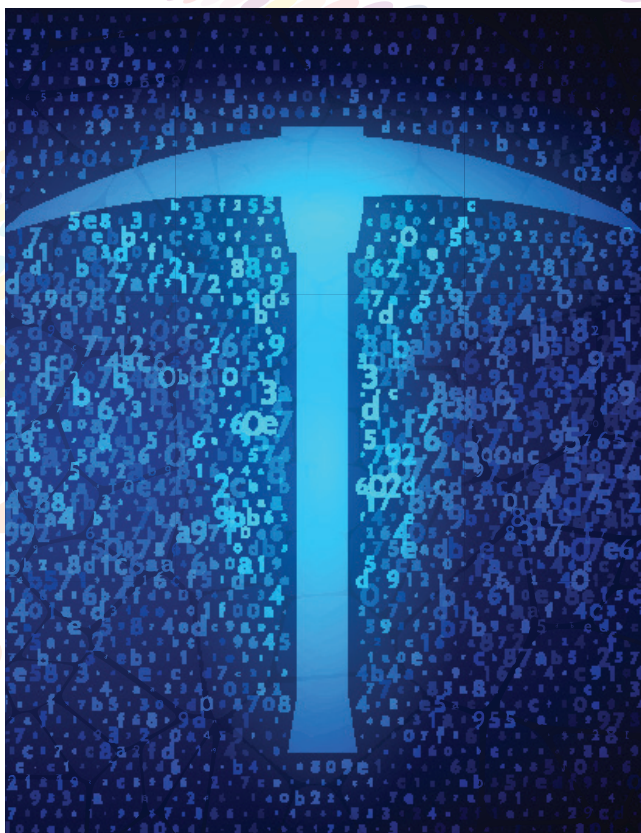
6 million insurance tweets focusing on consumer sentiment toward GEICO. The study looked at engagement with the ads and the effectiveness of marketing. The ads with the camel proclaiming Wednesday as “hump day” were popular, for example, but like many trendy things, quickly faded.

The study looked at people who switched insurers, exploring the sub-

group who saved money and how much. People switching to GEICO saved \$695 on average. People switching away saved \$755.

“You end up having the kind of information you would get from a focus group,” Mosley said, “without having the focus group.”

The analyses showcased the value of actuaries — professionals who perform detailed quantitative analyses to deliver important business insights. ●



*James P. Lynch, FCAS, is chief actuary and vice president of research and education for the Insurance Information Institute. He serves on the CAS Board of Directors.*

EXPLORATIONS By GLENN MEYERS



## Revisiting Cape Cod

The first time I visited Cape Cod was in the summer of 1970. We stayed near the Cape Cod National Seashore, enjoyed the beaches and wandered through the shops in Provincetown. Given that we were on a graduate student budget, we stayed at a campground in a classic 1960s-style umbrella tent, cooking our meals in an old Coleman stove fueled by white gasoline — quite Spartan by today’s standards, but it worked well for us at the time.

Over a decade later, I became familiar with the actuarial Cape Cod. A prominent loss reserve formula dating from the early 1970s was the Born-

huetter-Ferguson method. This method, for paid losses, estimates the unpaid losses for a given accident year  $w$  by

$$\text{Earned Premium}_w \bullet ELR \bullet \text{Expected Unpaid Losses}$$

where:

1. The expected unpaid loss is estimated by a standard loss reserve method, such as the chain ladder method.
2. The expected loss ratio ( $ELR$ ) is to be judgmentally selected by the actuary.

When using the Bornhuetter-Ferguson method, many actuaries have felt the need to back up their judgment with a data-driven estimate of the expected

loss ratio. In response, Hans Bühlmann and James Stanard developed a method to estimate this expected loss ratio in the early 1980s. (See Stanard 1985.) The method was so named as it sprang out of an actuarial conference held on Cape Cod. Over the years, it too has become a prominent loss reserve formula in the P&C actuary’s toolkit.

Starting in 1990, statisticians began developing the statistical model-building methodology now known as Bayesian Markov Chain Monte Carlo (MCMC). Actuaries began looking at it in the early 2000s, and by 2005, the CAS recognized the potential of this methodology for building stochastic loss reserve



models.<sup>1</sup>

It was not long after this that I got involved with stochastic loss reserve modeling with Bayesian MCMC. At first, the going was slow as I had a day job. But when I retired at the end of 2011, I was able to concentrate on it without a lot of other responsibilities.

One benefit of my late entry into the fray was that the MCMC methodology had begun to mature, and there was some terrific software that made it fairly easy to build new MCMC models. As I started modeling the Schedule P loss triangles in the CAS Loss Reserve Database, I quickly found myself building models that were different from the usual models that actuaries were using. This brings up the question: “How do we select which model to use?” The purpose of this article is to show how to select between alternative Bayesian MCMC models. We will look at two of the simpler models in the second edition of my monograph, “Stochastic Loss Reserving Using Bayesian MCMC Models.” These models will describe the cumulative loss,  $C_{wd}$ , for accident year  $w$  and development year  $d$ . The first will be a CRcross-classified model by accident year and development year. The second will be a stochastic version of the actuarial Cape Cod model.

### The CRcross-Classified (CRC) Model

1.  $\logelr \sim \text{Normal}(-0.4, \sqrt{10})$ .
2.  $\alpha_w \sim \text{Normal}(0, \sqrt{10})$  for  $w = 2, \dots, 10$ .  
Set  $\alpha_1 = 0$ .
3.  $\beta_d \sim \text{Normal}(0, \sqrt{10})$  for  $d = 1, \dots, 9$ . Set  $\beta_{10} = 0$ .
4.  $a_i \sim \text{Uniform}(0, 1)$  for  $i = 1, \dots, 10$ .
5. Set  $\sigma_d^2 = \sum_{i=d}^{10} a_i$  for  $d = 1, \dots, 10$ . Note

that this forces  $\sigma_1^2 > \dots > \sigma_{10}^2$ .

6. Set  $\mu_{wd} = \log(\text{Premium}_w) + \logelr + \alpha_w + \beta_d$ .
7. Then  $C_{wd} \sim \text{lognormal}(\mu_{wd}, \sigma_d)$ .

### The Stochastic Cape Cod (SCC) Model

1.  $\logelr \sim \text{Normal}(-0.4, \sqrt{10})$ .
2.  $\beta_d \sim \text{Normal}(1, \sqrt{10})$  for  $d = 1, \dots, 9$ . Set  $\beta_{10} = 0$ .
3.  $a_i \sim \text{Uniform}(0, 1)$  for  $i = 1, \dots, 10$ .
4. Set  $\sigma_d^2 = \sum_{i=d}^{10} a_i$  for  $d = 1, \dots, 10$ . Note that this forces  $\sigma_1^2 > \dots > \sigma_{10}^2$ .
5. Set  $\mu_{wd} = \log(\text{Premium}_w) + \logelr + \beta_d$ .
6. Then  $C_{wd} \sim \text{Lognormal}(\mu_{wd}, \sigma_d)$ .

The difference between the two models is that while the SCC model forces a common expected loss ratio on all accident years, the CRC model allows the expected loss ratio to vary by accident year. As the prior distributions are fairly wide, the expected loss ratios are governed mainly by the data for both models.

The numerical examples in Table 1 in this article are identical to the numerical examples in my monograph, Meyers (2019), using the illustrative paid loss triangle from the commercial auto line of business.<sup>2</sup> The posterior means of the parameters for each model are in Table 1.

Some observations on the parameters:

- There are jumps in the  $\{\alpha_w\}$  parameters for the CRC model. This indicates that loss ratios are varying significantly by accident year parameters.
- The  $\{\beta_d\}$  parameters for the SCC model do not gradually increase toward zero as the accident year

**Table 1. Posterior Means of**

### Parameters

Parameter	CRC	SCC
$\logelr$	-0.3965	-0.4033
$\alpha_1$	0.0000	
$\alpha_2$	-0.2541	
$\alpha_3$	0.1217	
$\alpha_4$	0.2152	
$\alpha_5$	0.0149	
$\alpha_6$	-0.0343	
$\alpha_7$	0.4354	
$\alpha_8$	-0.0199	
$\alpha_9$	0.2060	
$\alpha_{10}$	0.3435	
$\beta_1$	-1.1999	-1.0897
$\beta_2$	-0.5751	-0.4926
$\beta_3$	-0.2825	-0.2155
$\beta_4$	-0.0954	-0.0170
$\beta_5$	-0.0628	-0.0439
$\beta_6$	-0.0170	0.0109
$\beta_7$	-0.0060	0.0214
$\beta_8$	-0.0038	-0.0418
$\beta_9$	-0.0056	-0.1251
$\beta_{10}$	0.0000	0.0000
$\sigma_1$	0.2965	0.4608
$\sigma_2$	0.2073	0.3691
$\sigma_3$	0.1334	0.3183
$\sigma_4$	0.0946	0.2853
$\sigma_5$	0.0730	0.2579
$\sigma_6$	0.0576	0.2351
$\sigma_7$	0.0472	0.2132
$\sigma_8$	0.0384	0.1887
$\sigma_9$	0.0300	0.1572
$\sigma_{10}$	0.0202	0.1051

matures. For a line of business like commercial auto, one would expect the upward development of the paid losses to gradually approach the ultimate loss.

- The  $\{\sigma_d\}$  parameters are noticeably

<sup>1</sup> See Section 3.2.4 of the report of the CAS Working Party on Quantifying Variability in Reserve Estimates (2005).

<sup>2</sup> Additional model outputs that are not germane to this article are in the monograph.

larger for the SCC model. There remains a fair amount of uncertainty in the parameter estimates for the later development years in that model.

These observations highlight the fact that the SCC model is not simply a Bayesian MCMC version of the actuarial Cape Cod model. The principle difference is that the actuarial Cape Cod model first estimates the loss development factors (which are subject to the actuary’s sense of being “reasonable.”) The model then estimates the expected loss ratio. This is in contrast to the SCC which estimates all the parameters simultaneously. But as both models have a single parameter for the expected loss and the same number of development year parameters, one should expect the less constrained SCC model to have a better “fit.”

So now let’s consider our measure of fit. To shorten our notation, let

$$\{\theta^j\} = \{\log e l r^j, \alpha_{2:10}^j, \beta_{1:9}^j, \sigma_{1:10}^j\}$$

denote the parameter set from the sample of size  $J$  from the posterior distribution of the CRC model. For the SCC model, drop the  $\{\alpha_{2:10}^j\}$  from the  $\{\theta^j\}$ .

Given that we now have two models, we now discuss how we compare models using only the upper triangle data. Let’s start the discussion with a review of the Akaike Information Criteria (AIC).

Suppose that we have a model with a data vector,  $\mathbf{x} = \{x_i\}_{i=1}^N$ , and a parameter vector  $\theta$ , with  $p$  parameters. Let  $\hat{\theta}$  be the parameter value that maximizes the log-likelihood,  $L$ , of the data,  $\mathbf{x}$ . Then the AIC is defined as

$$AIC = 2 \cdot p - 2 \cdot L(\mathbf{x} | \hat{\theta}) \quad (1)$$

Given a choice of models, the model with the lowest AIC is to be preferred.

This statistic rewards a model for having a high log-likelihood, but it penalizes the model for having more parameters.

There are problems with the AIC in a Bayesian environment. Instead of a single maximum likelihood estimate of the parameter vector, there is an entire sample of parameter vectors taken from the model’s posterior distribution. There is also the sense that the penalty for the number of parameters should not be as great in the presence of strong prior information. To address these concerns, Gelman et al. (2014, Chapter 7) describe statistics that generalize the AIC in a way that is appropriate for Bayesian MCMC models. Here is a brief overview of one of these statistics.

First, given a stochastic model,  $p(\mathbf{x} | \theta)$ , define the expected log predictive density as

$$elpd = \sum_{i=1}^I \log \left( \int p(x_i | \theta) \cdot f(\theta) d\theta \right) \quad (2)$$

where  $f$  is the unknown density of  $\theta$ .

If  $\{\theta_{j=1}^J\}$  is a random sample from the posterior distribution of  $\theta$ , define the computed log predicted density as

$$\widehat{lpd} = \sum_{i=1}^I \log \left( \frac{1}{J} \sum_{j=1}^J p(x_i | \theta^j) \right) \quad (3)$$

Note that if we replace  $\{\theta_{j=1}^J\}$  with the maximum likelihood estimate,  $\hat{\theta}$ ,  $\widehat{lpd}$  is equal to  $L(\mathbf{x} | \hat{\theta})$  in Equation 1.

If the data vector,  $\mathbf{x}$ , comes from a holdout sample — i.e.,  $\mathbf{x}$  was not used to generate the parameters,  $\{\theta_{j=1}^J\}$  — then the  $\widehat{lpd}$  is an unbiased estimate of  $elpd$ . But if the data vector,  $\mathbf{x}$ , comes from the training sample, i.e.,  $\mathbf{x}$  was used to generate the parameters,  $\{\theta_{j=1}^J\}$ , then we expect  $\widehat{lpd}$  to be higher than  $elpd$ .

The amount of that bias is called the “effective number of parameters” which

we denote by  $p$ .

Now let’s consider what is called “leave one out cross validation” or “loo” for short. For the data point,  $x_p$ , one might obtain a sample of parameters  $\{\theta_{(-p)}\}$  by an MCMC sample using all values of  $\mathbf{x}$  except  $x_p$ . After doing this calculation for all observed data points in  $\mathbf{x}$ , one can then use Equation 3 to calculate an unbiased estimate of the  $elpd$ .

$$\widehat{elpd}_{loo} = \sum_{i=1}^I \log \left( \frac{1}{J} \sum_{j=1}^J p(x_i | \theta_{(-i)}^j) \right) \quad (4)$$

Methods to efficiently estimate  $\widehat{elpd}_{loo}$  have been developed. Vehtari et al. (2017) provide the most up-to-date approaches that are incorporated in the R “loo” package.

When comparing two models, the model with the highest  $\widehat{elpd}_{loo}$  should be preferred. For historical reasons, many prefer to state the results on the deviance scale, which similar to that of the AIC in Equation 1. This is done by writing:

$$LOOIC \equiv -2 \cdot \widehat{elpd}_{loo} = 2 \cdot p_{loo} - 2 \cdot \widehat{lpd} \quad (5)$$

Table 2 provides the model comparison statistics for the illustrative triangle. These statistics strongly favor the CRC model. Moreover, when comparing the statistics for the models applied to the 50 commercial auto loss triangles in Meyers (2019), the CRC model is strongly favored for all 50 triangles.

**Table 2: Model Comparison Statistics**

Model	$\widehat{elpd}_{loo}$	$p_{loo}$	LOOIC
CRC	47.80	14.97	-95.60
SCC	-5.14	8.75	10.28

An underlying assumption in the Bornhuetter-Ferguson and the Cape

Cod models is that the expected loss for each year is proportional to that accident year's premium. However, if that is known not to be the case, an actuary can adjust the premium to the level appropriate for that accident year. A near-perfect way to do this is to first run the CRC model and then multiply the premium for accident year  $w$  by  $\exp(\bar{\alpha}_w)$ , where  $\bar{\alpha}_w$  is the posterior mean of the  $\{\alpha_w\}$  parameters obtained by fitting the CRC model.

The model comparison statistics for the illustrative triangle with this adjustment are in the first row of Table 3. They indicate that the adjustment leads to a strongly better fit. This is also true for the other 49 commercial auto triangles in the monograph. However, note that the adjustment came from the same data that we are fitting. A one-word description of this practice is "cheating!" What this exercise shows is that it is theoretically possible to adjust the premium so that the SCC obtains a better fit.

So what about in practice? A common rationale for adjusting the premium is the so-called underwriting cycle. There are 50 commercial auto triangles in the data used in my monograph. For each commercial auto loss triangle, I adjusted the premium using an average  $\bar{\alpha}_w$  where the average was taken from the remaining 49 loss triangles in our data. The model comparison statistics for the illustrative triangle with this second adjustment are in the second row of Table 3. They indicate that the unadjusted SCC model provides a better fit. When applied to the other commercial auto triangles in my monograph, I found that the unadjusted SCC fit better than the second adjusted SCC for 32 of the 50 loss triangles.

**Table 3: Model Comparison**

Model	$\widehat{elpd}_{loo}$	$p_{loo}$	LOOIC
SCC-Adj-1	67.09	9.59	-134.99
SCC-Adj-2	-7.73	9.25	15.45

My takeaway from this exercise is that while it is theoretically possible that some premium adjustment may save the stochastic Cape Cod, in practice it is going to be difficult. To any actuary considering a SCC-like model, I suggest also considering a CRC-like model. And, as I show in my monograph, there may be even better models.

When revisiting the actuarial Cape Cod model, I brought with me some very powerful tools that allowed this significantly improved fit. My laptop computer is, by several orders of magnitude, more powerful than the computers available to those who developed the original Cape Cod model. This computer power led to the development of the Bayesian MCMC technology, which produces the 29 x 10,000 array of parameters that computes our predictive distribution of ultimate losses. It also needs a 55 x 10,000 array of log-likelihoods that we use to evaluate the fit of the Bayesian model. With all this technology, one would hope we could improve our loss reserving methodology, and I think we have done so.

In spite of the powerful technology I used above, I found myself wondering why, with such an overwhelming difference, the actuarial profession had not noticed this problem before. Well, I have just attended the CLRS and found out that the problem has been noticed. See Spencer Gluck (1997). This paper allowed the estimated expected loss ratio to vary by accident year as a weighted

average of the loss ratios for nearby accident years. The "generalized Cape Cod" model put forth in that paper formed the basis of a session by Jon Sappington and Enbo Jiang. This session showed how to use bootstrapping to calculate the variability of the estimates for the generalized Cape Cod model.

I have not been back to the geographic Cape Cod since our original visit 50 years ago. If I do revisit Cape Cod, I will insist on today's modern conveniences. It would be a nice hotel with a swimming pool, cable TV, fine dining at restaurants and, of course, free Wi-Fi.

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## Reliably Quantifying Cyberrisk Exposure By ANNMARIE GEDDES BARIBEAU

Since the multiplicity of vulnerabilities, events and damages constantly change, nailing down reliable factors for pricing and reserving cyber coverage has been elusive.

The CAS Research Paper, “Exposure Measures for Pricing and Analyzing the Risks in Cyber Insurance,” demystifies the complex nature of assessing potential cyber variabilities to adequately cover insurers’ customers. Written by Michael A. Bean, FCAS, CERA, FCIA, FSA, Ph.D., the paper also walks readers through the nature and types of cyber-related exposures and describes how to measure some of them.

While published within the actuarial community, Bean’s work is critical for underwriters, as well as agents and brokers, who play an active role in pricing, risk selection and sales of cyber insurance. In truth, cyber insurance remains somewhat nebulous to the buyer and seller alike. Compared to other commercial insurance lines, cyber insurance is still in its adolescence; Its cover insurance policies and language remain largely unstandardized. Cyber insurance is sold as part of a commercial package with either a stand-alone product or as an endorsement, depending on the insurer’s cyber risk appetite and customer need and affordability.

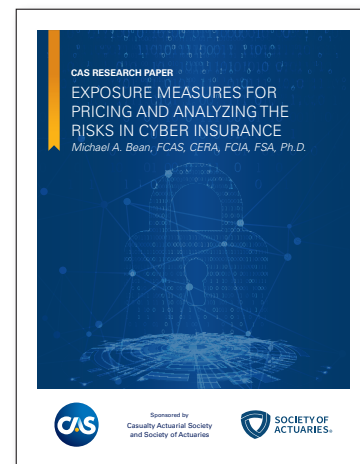
Originally, cyber insurance was offered as policy language for businesses some 20-plus years ago to cover notifications when individuals’ personal data was been breached or stolen, also known as privacy liability. However, the expense of complying with state regulations, notifying affected individuals and paying for protection of personally iden-

tifiable information was not enough to cover the expanding extent of cyber risk.

As cyber risk became better understood, and its extent expanded to include cyber ransom and internet-of-things-related process stoppages, insurers added new products. Such coverages include network security liability; cyber event response; network interruption; digital asset recovery and restoration; regulatory actions; and payment card industry assessments. Insurers also offer supplementary coverages for cyber extortion; cybercrime; media content liability; technology errors and omissions; third-party bodily injury and property damage; enhanced business interruption; and reputation protection.

The first challenge in accessing risk is always obtaining reliable data. Besides gleaning information from customers, there is some publicly available data regarding cyber events, but it is limited in amount and reliability. As a result, identifying exposures is conceptual rather than empirical, Bean explains. Allowing for the caveat, he identifies potential exposures deserving of attention when assessing each potential customer by the coverage types mentioned above.

For example, when considering candidate exposure measures for network security liability coverage, which covers losses from damage and defense costs related to the claims of third-party computer systems or networks, he recommends using the number of user IDs or endpoints (such as desktops, laptops or mobile devices) as a “reasonable measure.” Lacking this information, he warns, is indicative of poor system management or security practices that “should give pause” to the underwriter.



With the goal of determining potential measures that are simple, auditable and stable as well as legally determinable and have a strong relationship with losses, Bean emphasizes that whatever exposure measure is used for a coverage should be “scaled appropriately” based on context.

With this in mind, he offers three basic measures depending on the coverage. Insurance products that offer protection for exposures affecting people, such as privacy liability or cyber event response coverage, could be based on the number of employees or customers, whichever is highest, presuming a headcount is available.

When losses primarily involve exposure to computer systems hardware or software, the recommended exposure measure is number of endpoints. These endpoints can be desktops, laptops or mobile devices, or the number of distinct user IDs, whichever is easiest.

For all other coverages, such as network interruption coverage, regulatory actions, fines and penalties coverage, Bean recommends an exposure measure of revenue or sales over a specified period. ●



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

## To Do or Not To Do It Myself

*“Give me the things we can both do, so you can do the things only you can do.”*

—Denita Willis, GMAC Insurance, administrative assistant

*“I should stop doing those things others can do, so I can do those things only I can do.”*

—Grover’s interpretation of Denita’s advice

**D**enita Willis was a super administrative assistant, who worked for me when I was at General Motors/GMAC. She sometimes caught me doing something she could do, and scolded me for it. I would say it would take her twice as much time as I was spending to get it done, to which she would reply “Give it to me so you can do the things

only you can do.” It took a few times, but I finally got it.

I have always been a do-it-yourself kind of person. I was raised in a small town in Kansas, long before big-box stores and online ordering. My father had his own business and wasn’t around the house much, so as the oldest boy, I was often the handyman. I usually built or repaired what was needed with the resources I had. Rarely was something replaced.

Now that I can find an online video to show me how to do almost anything, I have been inclined to attempt to fix or do anything and everything around our house.

I like to tinker with things and love to learn new things. I tend to be persistent. (I assume most of you who

are reading this have this tendency.) I have a long string of successes doing things that I had never done before, from new tasks in the insurance and actuarial profession to installing a dishwasher and a stovetop. I used to change the oil in my automobile, but once I realized I could do it, the challenge was gone and so was the desire to do it. Also the fact that it was messy and dirty helped me decide to pay someone else to do it.

It has taken me a long time, but I am finally admitting I cannot do everything. More importantly, there are a lot of things I should not do.

For instance, I found a clothes dryer repair video on how to replace a failed part. The part was only \$31 on the web, and the expert on the video changed it in under 10 minutes. Simple, right? After analyzing the situation, I then figured that it would take me all day to replace this part. So, we called the repairman.

When a woodpecker “remodeled” the wood near the top of our chimney, we decided that someone else can get 35 feet off the ground to replace the board that was all chewed up.

You may recall from my last column, that my wife and I hired our grandchildren to help with some tasks. They did some yardwork that got done a lot faster, much to my wife’s delight. It was a win-win, with the grands learning some lessons about chores and my wife and I freed up to do other things.

After all my “research,” I came up with a set of new rules for whether to do or not to do it myself, as follows:



**If it's an easy fix, do it myself.**

Sometimes, it's a quick and easy fix. But I also realize that the time it will take me to fix something is often worth more than the cost of a new one — in those cases I just buy a new one.

**If the previous work done by a professional is below my standards and my skills are proficient, do it myself.** I am re-staining the deck this summer for just that reason. And, I have to add that, because of time constraints, we couldn't get anyone out to stain the deck. So, the task fell to me because we want to enjoy the deck this summer.

**If I don't have the required skills or if it is dangerous or if I don't have the equipment or tools, hire someone**

**to do it.** When we wanted to change the outdoor light fixtures that are on the second floor, we hired an electrician. I can do wiring, but I won't do it on an extension ladder. It's not hard for me to determine that I'm not going to give my house a new roof, even though it has happened several times following a hailstorm. But what about an appliance repair? See above.

**If I am short on time or have too much "on my plate," hire someone to do it.** How soon does it need to be done? If I need it done quickly, then find someone to do the task. If I am overwhelmed with my to do list, I need to hire others to pare that list down. There is one caveat, however: In today's COVID environ-

ment, it is difficult to get others to do things soon.

**If the task is fun, do it myself.** If the task is more likely to be enjoyable, I'll do it. If there is a better use of my time than to do the task in question, I will let someone else do it. I recently organized the garage with my grandchildren, and the time spent with them was priceless.

**Finally, sometimes I just have too much to do.** Hiring someone who can do something, like we did with the grandchildren, gets things done and me back on schedule. One way of coping with the all the extra work presented by the COVID situation is to hire out some of the tasks I could otherwise handle under a "normal" schedule. ●

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IT'S A PUZZLEMENT By JON EVANS

## The Logic of Psychiatry

Abby is a professor of psychiatry who specializes in a condition she calls *duosis*. Abby is always correct and truthful. Duotic patients, those with duosis, each belong to only one of two types. Patients of the Morning type are perfectly right about everything when the time is in the AM hours and completely wrong about everything when the time is in the PM hours. Evening types are the same except with AM and PM reversed.

Abby briefs a student, S1, about a duotic patient, A. She tells S1 that A believes at a particular time,  $T$ , that he is both Evening type and  $T$  is in the PM hours. S1 asks Abby whether it would be possible to determine if  $T$  was in the AM or PM if Abby let him know A's type. Abby answered that question, but it was still impossible for S1 to determine A's type.

Abby also tells student S2 about A being duotic and believing himself to be both Evening type and in the PM hours at time  $T$ , but nothing else. S2 asks whether it would be possible to determine A's type if she told him whether  $T$  was AM or PM. Abby answered that question, but it was still impossible for S2 to determine A's type.

You now have enough information to determine what type is A. What type is A?



### Straightedge and Compass Geometry

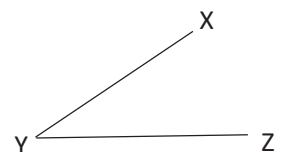
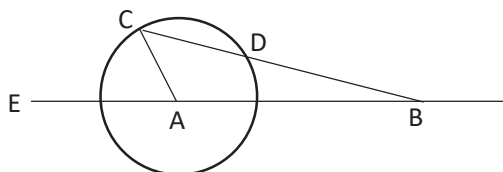
Bob Conger has once again submitted a thorough solution and discussion to this problem that can be found online at [ar.casact.org/the-logic-of-psychiatry/](http://ar.casact.org/the-logic-of-psychiatry/). The short answers are:

1. The ratio  $r$  of angle  $\angle ABC$  to angle  $\angle EAC$  is one third.
2. Using only a straight edge and compass, in only the traditionally accepted ways of Euclidean geometry, it is not possible in a finite number of constructive steps to construct a new angle  $\angle \theta$  whose ratio to angle  $\angle XYZ$  is  $r$ . This type

of angle trisection construction was proven impossible by French mathematician Pierre Wantzel in 1837. This impossibility is also a corollary of Galois theory, developed around the same time. However, Archimedes (circa 287-212 B.C.) had long before shown that if a marked ruler is also allowed, it is possible to trisect angles in a technique called "neusis construction."

Solutions were also submitted by Andrea Altomani, Andrew Bower, Jim Muza, John Noble, Dave Oakden and Jonathan Robinson. ●

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