actuarial REVIEW

VOL 48 / NO 4 / JULY-AUGUST 2021

PUBLISHED BY THE **CASUALTY ACTUARIAL SOCIETY**

CYBER CHALLENGES

> Covering cyberattacks was profitable business for insurers — until ransomware grew out of control.

CAS 2021 Elections &
Constitution and Bylaws Amendments

July-August 2021

actuarialREVIEW

departments

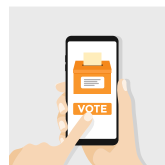
FSC LOGO

on the cover

By ANNMARIE GEDDES BARIBEAU

Covering cyberattacks was profitable business for insurers — until ransomware grew out of control.

Meet the candidates for president-elect and board directors and learn about proposed changes to the CAS Constitution and Bylaws. Polls open on August 2.



Actuarial Review (ISSN 10465081) is published bimonthly by the Casualty Actuarial Society, 4350 North Fairfax Drive, Suite 250, Arlington, VA 22203. Telephone: (703) 276-3100; Fax: (703) 276-3108; Email: ar@casact.org. Presorted standard postage is paid in Lutherville, MD. Publications Mail Agreement No. 40035891. Return Undeliverable Canadian Addresses to PO Box 503, RPO West Beaver Creek, Richmond Hill, ON L4B 4R6.

The amount of dues applied toward each subscription of *Actuarial Review* is $10. Subscriptions to nonmembers are $30 per year. Postmaster: Send address changes to *Actuarial Review*, 4350 North Fairfax Drive, Suite 250, Arlington, Virginia 22203.

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

Be Informed

This *Actuarial Review* issue has as an important article that every FCAS should read. The CAS Board has proposed sweeping changes to the CAS Constitution and Bylaws described on page 22. To quote the article: "With accountability for CAS operations assigned to the CEO, the Executive Council governance layer is no longer required by the board. Oversight of committee operations will be the responsibility of senior staff executives … ."

The CAS Board is proposing a fundamental transfer of power from the members to the executive staff.

The proposal is to move our organization from a member-driven to a staff-directed one. I strongly encourage you to study the proposed changes and think about the direction of the CAS. Be certain to vote, or a minority of the voters will be making a decision that could impact our Society forever.

While you are studying the issues, take time to learn about the nominees for president-elect and the board and read what they have to say about their visions for the future of the CAS.

Given the recent spate of ransomware attacks, our cover story on that moving target cyber insurance is well-timed. Cyber criminals are perhaps the most successful innovators because they are constantly finding new ways to breach security. Actuaries and the insurance industry have a lot of work to do to stay ahead and protect against these law breakers.

This issue also covers some recent CAS Spring Meeting sessions that include social inflation and market cycles. Our regular columns as well as articles on CAS diversity initiatives and The CAS Institute will keep you informed.

You will not want to miss the video interview that CAS President Jessica Leong has with Brian Duperreault, who is the former CEO and now executive chairman for AIG. Duperreault's storied career is fascinating, and, despite all his success, he is quite humble and down to Earth. President Leong keeps delivering in-depth and entertaining discussions with some of the most successful actuaries around. Read her summary in the President's Message and then watch the video on the *AR* website or CAS YouTube channel.

I hope you enjoy this issue. Remember to do your research and vote! ●

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.

SEND YOUR COMMENTS AND SUGGESTIONS TO:
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Casualty Actuarial Society
4350 North Fairfax Drive, Suite 250
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Or email us at AR@casact.org

Follow the CAS

A CEO's Perspective: A Conversation with Brian Duperreault

For my President's Message columns, I will be talking to distinguished actuaries who embody the new Envisioned Future for the CAS. Videos of these interviews will be available as Web Exclusives on the Actuarial Review *website and the CAS YouTube channel.*

When Brian Duperreault agreed to be interviewed on his experience being an actuary, a CEO and an industry titan, I was so excited that I ran over to the spare room where my husband works and hyperventilated for about five minutes, and then I texted all my actuarial friends to tell them the news.

To sum up his incredible, almost 50-year career, Duperreault started as an actuarial trainee at AIG, moved on to become CEO of ACE, which was a 50-person insurer that he grew to a 9,000-strong insurer in 10 years. He was then CEO of Marsh, Hamilton and, most recently, AIG. Now he is AIG's executive chairman.

"The actuarial training was absolutely the best training that I could have gotten to be the CEO," he said.

He shared his career advice as well as his candid thoughts on the industry and the profession. Following are six take-aways from the interview. I encourage you to see the full interview on the CAS YouTube channel or AR's Web Exclusives page.

1. **"I always believe that actuaries who don't really understand what's going on in the company don't have a chance of coming up with a good answer because the numbers don't yield their secrets so easily. You really have to get underneath it; understand where they came from.“**

To be a good actuary, you must go beyond the technical skills and understand the business from all angles — from claims to underwriting and beyond. "You can't just sit by the screen … you have to go talk to people and ask them and truly be inquisitive," he said. He acknowledged that actuaries can be reluctant: "I think … we always worry about this separation … Can we truly be independent in our analysis but too close? But you have to walk that line because you can't do the analysis unless you go close enough without going over the edge … If you want to look over the edge and see what's going on, you got to get up to it."

2. **"If you have aspirations to be more than an actuary, being an actuary is a good start."**

If you are a good actuary who understands the business from all angles, then you come to the table with a more holistic understanding of the business than anyone else. "The actuarial training was absolutely the best training that I could have gotten to be the CEO," he said.

3. **"Take a stretch assignment … Take an assignment that you actually never thought you would do."**

In the beginning, Duperreault aspired to do a good job and perhaps one day get his boss's job. Saying "yes" to more and more stretch assignments, like running the claims department, got him out of his comfort zone and developed him as a leader.

4. **"[As a leader] you have people who are doing that work for you. Your job is to get them to be good."**

To take on the stretch roles successfully, Duperreault said that building a great team and getting them all focused on the job is key — and keep building on your leadership skills from one stretch assignment to the next. "There's leadership skills which are universal regardless of a team you're leading, and those skill sets do translate. They do transfer," he said.

5. **"The actuarial profession doesn't have to be on this Earth. There is no God-given reason why you have to be here. So, you have to earn it, you know, and you earn it by continuing to be relevant."**

Duperreault was candid about his thoughts on the business and profession: "I just don't think we've embraced as an industry that kind of predictive analytics that other industries have embraced." He noted that there is a natural and understandable caution in our approach to innovation. "If it's a reserve, you've got to certify it. Are we going to do that with what we know has worked and generally speaking is acceptable? … Or do we go out on a limb with something that isn't?"

President's Message, page 8

President's Message

from page 6

Nevertheless, he urged the profession to continue innovating and reaching into other areas of science and taking what we think works best for us.

6. **"Would you rather be a data scientist getting people to put more ads on some site or would you rather solve world problems?"**

Attracting diverse talent into the industry is something that Duperreault is passionate about. "When I recruited in college, I never told them that I was in the insurance business," he said, "I told them I was a professional gambler, which always got their attention."

"There are a lot of similarities for taking risk ... Think about what you have to do to do it right — you've got to be a psychologist; you have to understand people; you have to be numeric; you have to have an insatiable interest on how things work in the world ... It's so much fun!" And it's also purposeful, with the goal of helping the world through difficult situations.

Brian Duperreault has shown what is possible when you start on an actuarial career path. When I reflect on his career and his advice, it puts my own work challenges into perspective, and it encourages me to do more to understand the business and step out of my comfort zone. I'd like to hear from you. What did you take away from this conversation with Brian? Please send me at note at ar@casact.org.

A Seasoned Actuary's Perspective

Dear Editor:

CAS leadership is unnecessarily walking on divisive political public policy ground. Our beloved CAS should prohibit leaders from taking positions on divisive political-moral-social issues and enforce our constitution. The board of directors' political public policy decisions need formal, meaningful membership interaction. The *AR* published a transgender pronouns article. The *AR* editor puts (she/her) after her name, indicating she and, by implication, the CAS *endorses/promotes* transgenderism. The CAS Board released a document "Diversity, Equity and Inclusion" (DEI) and responded to strong member objections to the board taking positions on political public policy issues. The board claims their DEI race goals are not taking positions forbidden by our constitution. Members strongly disagree. Moreover, these divisive issues have nothing to do with casualty actuarial science. "Woke" constructs like DEI, CRT, abortion, encouraging child gender dysphoria, etc., are "liberal/progressive" constructs and "conservatives" strongly oppose them. These "woke" constructs are fundamentally Democratic Party values, not Republican Party values. By taking woke liberal Democrat positions the CAS Board is obviously taking political public policy positions prohibited by our constitution. The transgender article was 1,250+ words and apparently not vetted by committee. My article was delayed, committee vetted and arbitrarily limited to 250 words. Why? Does this seem like censorship to you? The CAS is a professional society, not a political public policy forum for promoting woke ideology, conservative ideology or any political public policy ideology. To read my full article and posts, and interact with other concerned CAS members, please go to www.WeLoveTheCAS.com and actively participate. Let's make our voices heard.

—Bob Daino, FCAS

ACTUARIAL REVIEW *LETTERS POLICIES*

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

***AR* Managing Editor Elizabeth Smith responds:**

The article in question, "The Importance of Pronouns: A Nonbinary Actuarial Analyst's Perspective" (*AR* March-April 2021), was submitted by a member of the organization Sexuality and Gender Alliance of Actuaries with the support of the CAS/SOA Joint Committee for Inclusion, Equity and Diversity as a featured story intended to educate others about a particular workplace scenario. It was not considered an opinion piece and therefore was not subject to examination by the Periodicals Editorial Board (PEB), which reviews all opinion pieces (e.g., President's Message, In My Opinion, Random Sampler) for all CAS publications. The story was, however, reviewed and edited by members of the *Actuarial Review* Committee. Mr. Daino's article submitted in response to "The Importance of Pronouns" was reviewed by the PEB, which determined that the piece was best suited as a letter to the editor, which we welcome from our readers. *AR* is a forum for members to discuss professional issues, and provocative opinion pieces are encouraged to fuel discussions and ensure that all sides of a professional issue can be expressed. The *AR* is also committed to sharing stories that enable CAS members to progress in their careers and to navigate the intricacies of changing workplace environments, be they technological or cultural. "The Importance of Pronouns" article was published in that spirit.

The CAS Institute Announces New CSPAs

Nineteen individuals have earned The CAS Institute's Certified Specialist in Predictive Analytics credential as of March 2021. For more information about The CAS Institute, visit thecasinstitute.org.

- Mingqiong Chen, FCAS, CSPA
- Dr. Jay Michael Call, ACAS, CPCU, MAAA, CSPA
- David Clapp, ACAS, CSPA
- Wilfred John Edwards, FCAS, MAAA, CSPA
- Matthew Drury Frieling, FCAS, CSPA
- Matthew C. Godkin, FCAS, CSPA
- Alex James Harris, FCAS, CSPA
- Nicholas Havrilla, CSPA
- Hsiang Wen Huang, FCAS, CSPA
- Andrew Thomas Hutchinson, ACAS, CSPA
- Ethan Yisung Kang, FCAS, CSPA
- Nitija Kharel, CSPA
- Teig Boden Loge, CSPA
- Cody Lee Marsh, FCAS, CSPA
- Robert B. McCleish, FCAS, CSPA
- Tyson Mohr, FSA, CSPA, CPCU
- Prem Prakash, ACAS, CSPA, CPCU, MAAA
- Amanda C. Weihe, FCAS, CSPA
- Ce Xiong, FCAS, CSPA

COMINGS AND GOINGS

Mallika Bender, FCAS, MAAA, has joined the Casualty Actuarial Society as its first Diversity, Equity & Inclusion (DE&I) staff actuary. Bender has worked for GEICO, QBE North America and Suncorp Insurance in Sydney, Australia, and most recently served as a consultant for Willis Towers Watson. She brings over a decade of experience supporting DE&I initiatives, including serving on multiple CAS diversity committees.

Robert F. "Bob" Brown, FCAS, has been appointed executive vice president and general manager of the Virginia Farm Bureau Mutual Insurance Companies and Countryway Insurance Co. Brown previously served on Farm Bureau's insurance management team as senior vice president of product development and actuarial.

CAS Research Actuary **Brian A. Fannin, ACAS, CSPA, MAAA,** has been elected to the board of ASTIN (Actuarial Studies in Non-Life Insurance). He will serve a two-year term. Also, in the spring of this year, ACTEX Learning published Fannin's textbook *R for Actuaries and Data Scientists, with Applications to Insurance*. Written for anyone using R within the insurance industry, regardless of their prior programming experience, the book contains numerous code examples and uses insurance data for illustration.

Ascot Group has appointed **Mathew Lillegard, FCAS, MAAA,** as group chief actuary. He will be responsible for leading the company's overall actuarial functions and will closely collaborate with Ascot's underwriting, risk, ERM, IT and data strategy teams to create a comprehensive framework for analytical excellence. He joins Ascot from CNA Insurance, where he worked for over 20 years.

Mike Stienstra, FCAS, has been named chief actuary for the home insurance group Hippo and will be responsible for continuous risk evaluation and pricing. Stienstra previously worked for Chubb as senior vice president in charge of the personal risk services actuarial team.

Ryan Michel, FCAS, MAAA, president and CEO of the Allstate Insurance Company of Canada, was elected to the Insurance Bureau of Canada's (IBC) board of directors as its chair. With over two decades of industry experience, Michel is accountable for five companies in the Allstate Canada Group of Companies (ACG) property and casualty insurance business.

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

See real-time news on our social media channels. Follow us on Twitter, Facebook, Instagram and LinkedIn to stay in the know!

CALENDAR OF EVENTS

September 13–15, 2021
Virtual Casualty Loss Reserve Seminar

November 7–10, 2021*
Annual Meeting
Marriott Marquis San Diego Marina
San Diego, CA

May 15–18, 2022
Spring Meeting
Disney's Coronado Springs Resort
Orlando, FL

May 17–20, 2022
Actuarial Colloquia (hosted by the CAS)
Disney's Coronado Springs Resort
Orlando, FL

*Visit casact.org for updates on meeting locations.

IN MEMORIAM

Richard D. Thomas (FCAS 1994)
1958-2020

Mark S. Wenger (FCAS 2006)
1966-2020

Community Counts: Help The Actuarial Foundation Support Students

The actuarial community has been lauded for its generous volunteer spirit and steadfast commitment to serving those in need. Through The Actuarial Foundation (TAF), one of the profession's means for giving back, many CAS members have demonstrated their commitment to creating possibilities for underserved teachers and students by volunteering their time and making financial contributions to the Foundation's innovative math programs.

In 2017, CAS Past President Steve Lowe was so inspired by the work of the Foundation that he challenged CAS members to donate in a special pledge drive called the 100 Donors in December Challenge. Running in 2017, 2018 and 2019, 100 Donors in December resulted in $123,000 in donations and brought over 80 new donors to the Foundation.

This year the CAS is splitting a generous gift of $40,000 to both the Foundation's Math Motivators Tutoring Program and the Underserved Engagement Initiative of the Modeling the Future Challenge. This donation supports the CAS strategic approach to diversity, equity and inclusion by investing in the community and in organizations that support equitable access to high-quality education as well as breaking down barriers to entry in the actuarial profession, such as inadequate academic preparation and lack of or late awareness of the profession.

CAS members are challenged to create possibilities for underserved students and teachers by supporting The Actuarial Foundation.

Now the CAS is once again challenging its members to raise an additional $10,000 in support of The Actuarial Foundation. You are encouraged to join the CAS Community Counts Challenge by committing time, talent or treasure to these Foundation programs that are making a difference in underserved communities nationwide.

"I am an enthusiastic supporter of the CAS Community Counts Challenge," said Mike Wacek, FCAS, CERA, MAAA, TAF chair and former CAS Board member. "This is an opportunity for CAS members to contribute to the expansion of two of the Foundation's signature programs that fill an immediate need for math resources in communities across the country."

Math Motivators

This volunteer-driven, free math tutoring program pairs underserved middle and high school students with professionals and college students possessing strong mathematics backgrounds. Math Motivators provides weekly in-person and virtual tutoring using a proven 2:1 student-to-tutor ratio for a wide range of math subjects, including algebra, algebra 2, trigonometry, precalculus, AP statistics and AP calculus.

The program has most recently expanded its reach to upper elementary and middle school classrooms to strengthen foundational math skills. Math Motivators also provides tutoring in both SAT and ACT mathematics. Supporting these students in learning mathematics more widely opens the door to college and career opportunities in STEM fields, including actuarial science.

Left: A volunteer in Portland, Maine, coaches a student as part of the Math Motivators Tutoring Program.
Right: A student presents at the Modeling the Future Challenge Symposium in 2019.

Supporting these students in learning mathematics more widely opens the door to college and career opportunities in STEM fields, including actuarial science.

Modeling the Future Challenge and the Underserved Engagement Initiative

Another TAF cornerstone program, the Modeling the Future Challenge (MTFC) is an academic competition where high school students learn real-world data analytics, mathematical modeling and actuarial science. In designing the Challenge, TAF and its partner, the Institute of Competition Sciences, wanted students to learn how mathematics applies to cutting-edge industries and technologies so that students gain exposure to highly sought-after careers as actuaries and other math-related professionals. As part of the Challenge, qualifying teams compete nationally for scholarship awards. The MTFC Symposium is the culminating event of the Challenge and brings together the finalist teams, actuaries and other industry leaders for two days of career sessions, problem-solving activities, virtual tours and other unique experiences.

The Underserved Engagement Initiative was recently launched with a goal to increase and expand access and inclusion to high school students who are traditionally underserved, often students from racial minorities or low- or middle-income families. Targeting students and educators in Title 1[1] schools, this initiative provides new resources specifically designed for theme with two programmatic components:

1. A virtual six-week summer training course hosted by MTFC Master Trainer educators and volunteer actuaries that shows participating educators how to implement the MTFC with students in their math classrooms.
2. Virtual fall mentorship from MTFC Master Trainers and volunteer actuaries that help participating educators gain the skills and knowledge needed to be successful in the larger Modeling the Future Challenge.

The Underserved Engagement Initiative's ultimate goal is to bring more diversity to the actuarial and STEM (science, technology, engineering and math) talent pipelines.

Challenge Accepted

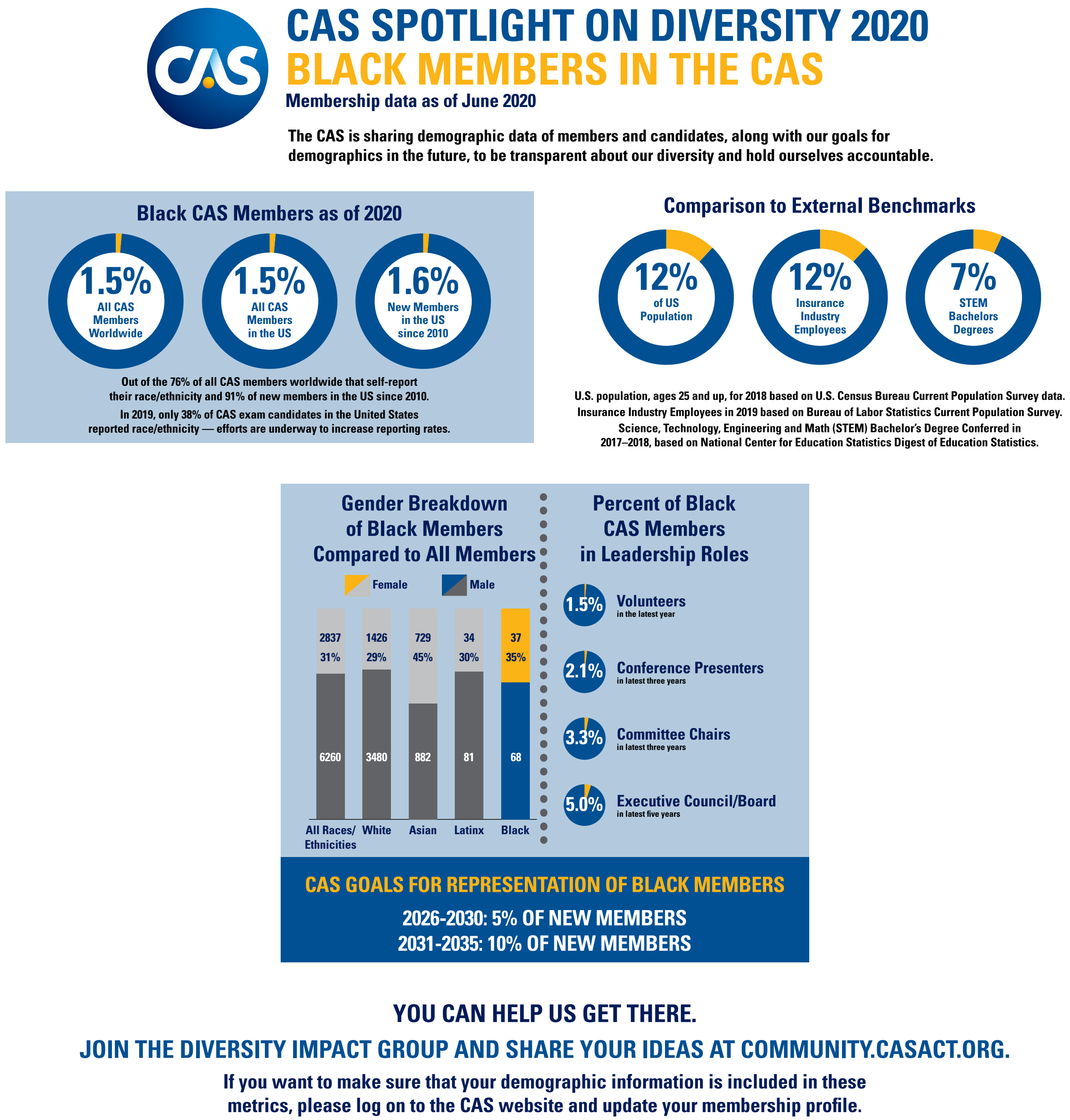
Steve Lowe's ingenuity, competitive spirit and unwavering dedication started this great tradition four years ago, and The Actuarial Foundation is incredibly grateful for and humbled by the continued support of the CAS and its members. By participating in this year's Community Counts Challenge, CAS members will help the Foundation bring The Math Motivators Tutoring Program and the Modeling the Future Challenge to more schools and communities where it is most needed.

Writer and consultant Margaret J. Wheatley once said, "There is no greater power for change than a community discovering what it cares about." To be part of the movement of change to help bring diversity to the actuarial and STEM talent pipelines, join the CAS Community Counts Challenge. Visit www.actuarialfoundation.org/cas-community-counts-challenge/ for more information and to make a difference today.

[1] A provision of the Elementary and Secondary Education Act passed in 1965, Title I ("Title One") is a program created by the U.S. Department of Education to distribute funding to schools and school districts with a high percentage of students from low-income families, with the intention to create programs that will better serve children who have special needs that without funding could not be properly supported.

Spotlight on Diversity

As part of its Strategic Approach to Diversity, the CAS has developed a series of infographics to better understand the current state and to track the progress of our diversity efforts. In honor of the newly declared U.S. federal holiday, Juneteenth, *AR* presents "Black Members in the CAS." The CAS is dedicated to increasing the representation of Black candidates and members at all levels of leadership in our actuarial community. ●



A Tale of Two Actuaries: The Origin Story

By JAMALA ARLAND

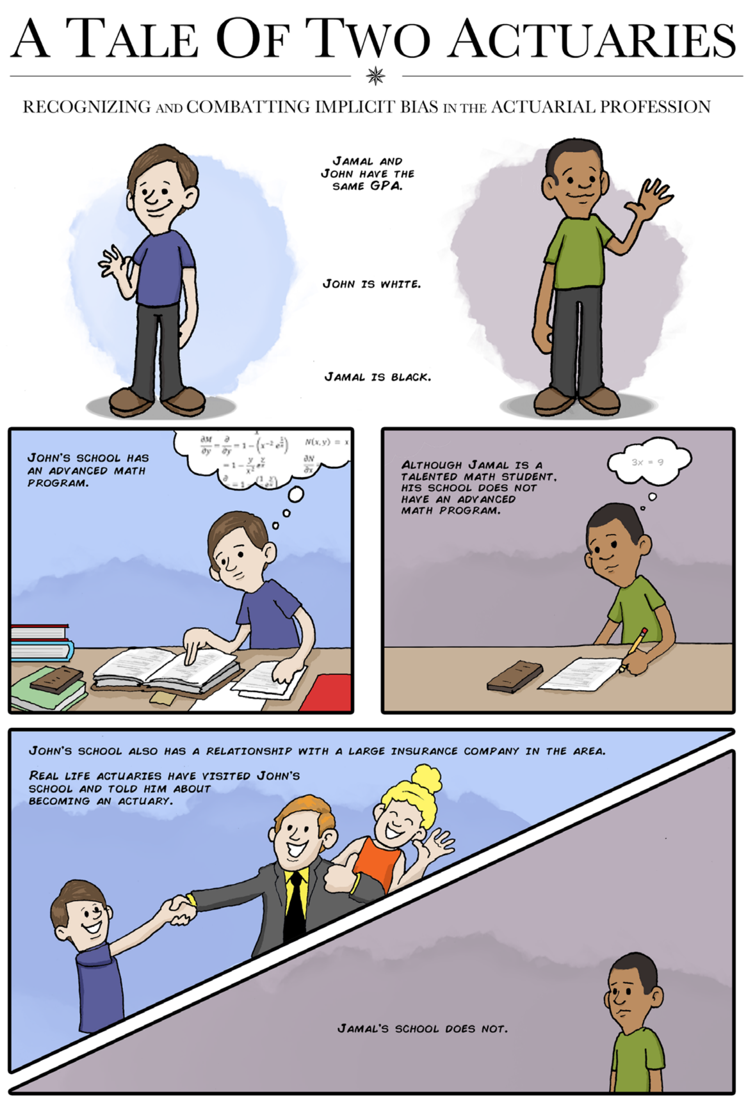
After the murder of George Floyd, the International Association of Black Actuaries (IABA) hosted a listening session for Black actuaries, and I listened. I listened to stories that sounded like they belonged to another age and time. I listened to stories so subtle that, if you chose to, you could ignore the subtext. Not long after, a viral video emerged showing an *actuary* calling the police and falsely reporting that an African American man was threatening her in Central Park. I imagined a scenario where that actuary went back to work. She may have been asked to make decisions that affected the hiring or firing or development of people on her staff. I thought about how she was *overt* in her actions that day in the park and may have been *covert* in her actions in the workplace.

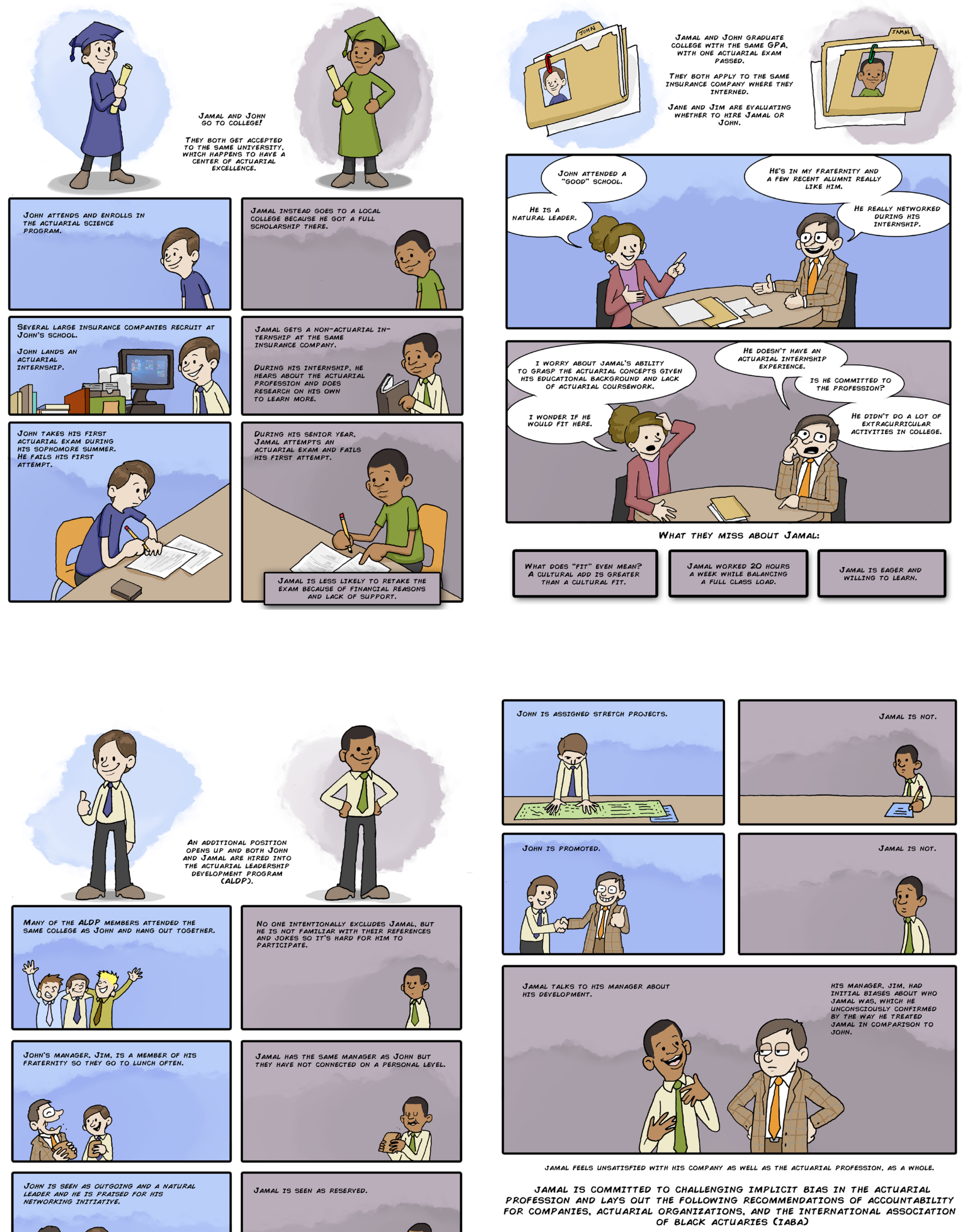
I wanted to help make the connection between systemic inequities that often manifest across racial lines and the impact of implicit biases at work. I worked with the IABA and an illustrator, Jason Deeble, to create "A Tale of Two Actuaries," a comic strip based on the Barriers to Entry study jointly commissioned by the IABA, the Society of Actuaries, the Casualty Actuarial Society and The Actuarial Foundation. The comic strip translates the study's results into something that could resonate with actuaries — something that would allow actuaries to see themselves in the characters and something that could be impactful and actionable.

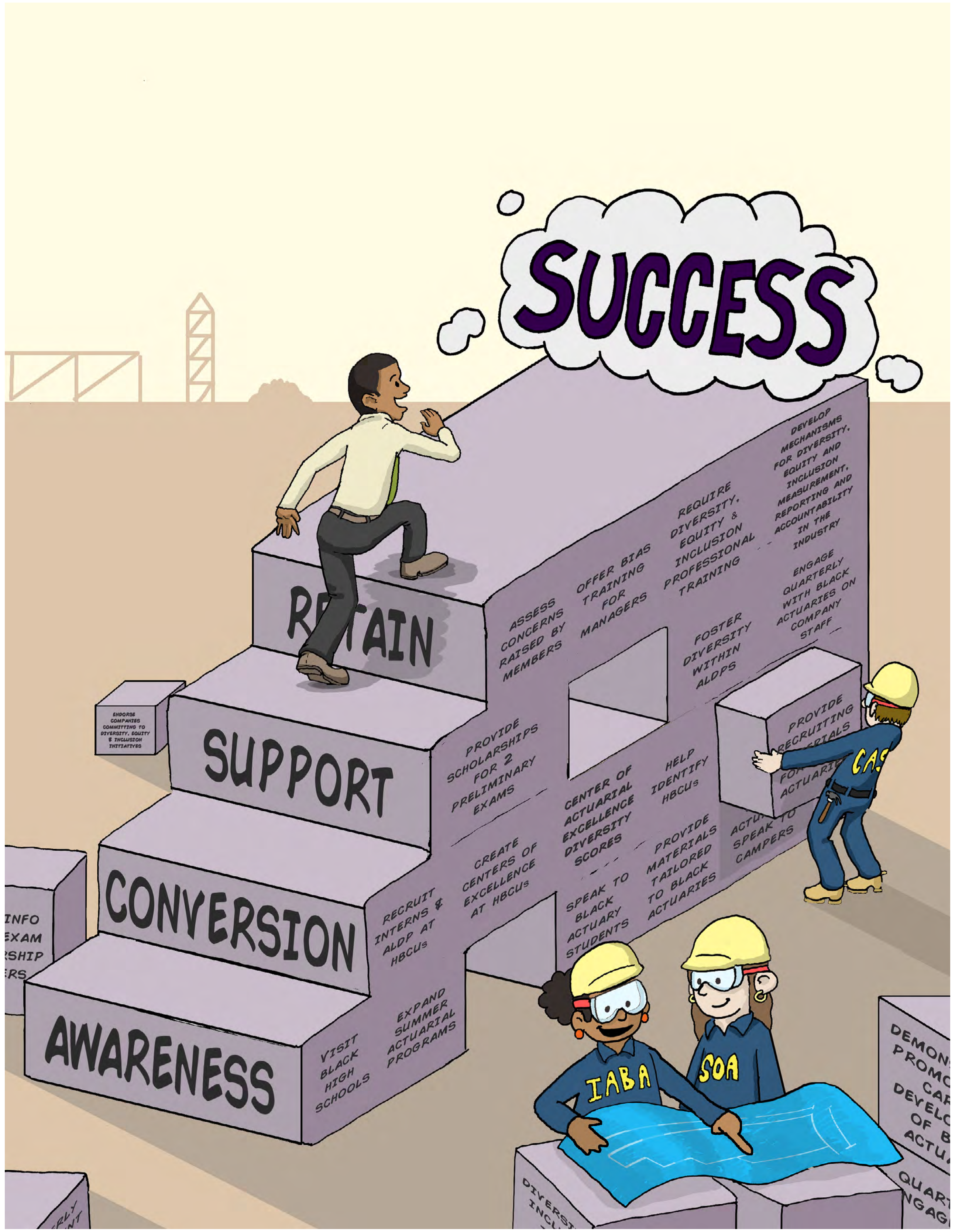
It is well documented that African Americans and other people of color are disproportionately impacted by social disparities and systemic barriers; the comic shows how this plays out at many points in the actuarial career path. After seeing the comic, a fellow actuary said, "John's path mirrors mine so much (almost perfectly). I also see myself in John's manager . . . I plan to challenge myself and our team to find ways to act differently. I have shared with friends and family as well since I believe this illustration provides great insight beyond actuaries."

Regardless of your racial identity, you may look at this comic and recognize your own story in John's or Jamal's or both. Others may look at this comic and think it interesting but that it doesn't affect them. I challenge everyone to dig deeper to understand how we bring to light societal inequities in our actuarial workplaces and how we use our power to address them. ●

Jamala Arland, FSA, MAAA, CFA, is vice president and actuary for Long-Term Care Inforce Management at Genworth in Richmond, Virginia.




Jamal and John go to college!
They both get accepted to the same university, which happens to have a center of actuarial excellence.
John attends and enrolls in the actuarial science program.
Jamal instead goes to a local college because he got a full scholarship there.
Several large insurance companies recruit at John's school.
John lands an actuarial internship.
Jamal gets a non-actuarial internship at the same insurance company.
During his internship, he hears about the actuarial profession and does research on his own to learn more.
John takes his first actuarial exam during his sophomore summer. He fails his first attempt.
During his senior year, Jamal attempts an actuarial exam and fails his first attempt.
Jamal is less likely to retake the exam because of financial reasons and lack of support.
JOHN
Jamal and John graduate college with the same GPA, with one actuarial exam passed.
They both apply to the same insurance company where they interned.
Jane and Jim are evaluating whether to hire Jamal or John.
JAMAL
John attended a "good" school.
He is a natural leader.
He's in my fraternity and a few recent alumni really like him.
He really networked during his internship.
I worry about Jamal's ability to grasp the actuarial concepts given his educational background and lack of actuarial coursework.
I wonder if he would fit here.
He doesn't have an actuarial internship experience.
Is he committed to the profession?
He didn't do a lot of extracurricular activities in college.
What they miss about Jamal:
What does "fit" even mean? A cultural add is greater than a cultural fit.
Jamal worked 20 hours a week while balancing a full class load.
Jamal is eager and willing to learn.
An additional position opens up and both John and Jamal are hired into the Actuarial Leadership Development Program (ALDP).
Many of the ALDP members attended the same college as John and hang out together.
No one intentionally excludes Jamal, but he is not familiar with their references and jokes so it's hard for him to participate.
John's manager, Jim, is a member of his fraternity so they go to lunch often.
Jamal has the same manager as John but they have not connected on a personal level.
John is seen as outgoing and a natural leader and he is praised for his networking initiative.
Jamal is seen as reserved.
John is assigned stretch projects.
Jamal is not.
John is promoted.
Jamal is not.
Jamal talks to his manager about his development.
His manager, Jim, had initial biases about who Jamal was, which he unconsciously confirmed by the way he treated Jamal in comparison to John.
Jamal feels unsatisfied with his company as well as the actuarial profession, as a whole.
Jamal is committed to challenging implicit bias in the actuarial profession and lays out the following recommendations of accountability for companies, actuarial organizations, and the International Association of Black Actuaries (IABA)


SUCCESS
RETAIN
SUPPORT
CONVERSION
AWARENESS
Develop mechanisms for diversity, equity and inclusion measurement, reporting and accountability in the industry
Require diversity, equity & inclusion professional training
Offer bias training for managers
Assess concerns raised by members
Engage quarterly with Black actuaries on company staff
Foster diversity within ALDPs
Provide recruiting materials for actuaries
Provide scholarships for 2 preliminary exams
Center of Actuarial Excellence diversity scores
Help identify HBCUs
Create centers of excellence at HBCUs
Speak to Black actuary students
Provide materials tailored to Black actuaries
Speak to campers
Recruit interns & ALDP at HBCUs
Visit Black high schools
Expand summer actuarial programs
Endorse companies committing to diversity, equity & inclusion initiatives
CAS
IABA
SOA

Team CAS Wins Division in Travelers 13th Annual Actuarial Case Competition

By MARGARET KERR, CAS UNIVERSITY ENGAGEMENT MANAGER

The Casualty Actuarial Society (CAS) is proud to be a continuing supporter of the Travelers Annual Actuarial Case Competition. Since 2014, the CAS has participated as an event sponsor, providing P&C career resources and information to student competitors and their accompanying professors, and contributing a portion of the prize money awarded to the winning teams. This year, the CAS was given the unique opportunity to participate in a new way, by entering its own team to compete in the virtual event.

In a typical year, teams of college undergraduates are brought to the main Travelers campuses in Hartford, Connecticut, and St. Paul, Minnesota, to compete in person. The teams are tasked with researching and developing a solution to an actuarial business problem, which they then present to a panel of judges made up of Travelers actuarial and analytics business leaders. Because of the pandemic, the event was changed to a virtual format, which gave Travelers the opportunity to invite additional universities and partner organizations like the CAS, the Organization of Latino Actuaries (OLA) and the International Association of Black Actuaries (IABA).

Freshmen and sophomore actuarial science students from six different universities comprised Team CAS: Jennah Grant, Brigham Young University; Alison Hansen, Arizona State University; Nevin Kara (they/them), Pennsylvania State University; Tanmay Karandikar, University of Texas at Dallas; Thomas Moler, University of Texas at Austin; and

Meet Team CAS. Top row, left to right: Jennah Grant and Alison Hansen. Middle row, left to right: Nevin Kara (They/Them), Thomas Moler and Tanmay Karandikar. Bottom row: Tanner O'Grady.

Tanner O'Grady, Middle Tennessee State University.

During the day-long event, participants were given a dataset for a fictitious auto insurance agency and were asked to present a reasonable estimate for reserves while considering extra losses resulting from the COVID-19 pandemic. The team spent 4.5 hours working on the case and then presented to the judges. After the presentations, the judges named Team CAS the winner in their division, earning them a cash prize of $1,000 that the CAS will match for a grand total of $2,000.

"The day of the competition was incredibly intense," said Team CAS member Tanmay Karandikar. "Working together as a team to ensure that everyone was operating on the same page and understood the purpose of what we were doing helped us find success in the competition," he said.

Congratulations to the other division winners, University of St. Thomas and Worcester Polytechnic Institute!

The CAS sincerely thanks Travelers for the invitation to this exciting event and applauds the outstanding students who, without ever meeting in person, worked as teams and demonstrated astute actuarial capabilities.

Want to Hold Your Own Case Competition?

The CAS has developed a series of five case competition toolkits on the topics of predictive modeling, data visualization, workers' compensation reserving, auto safety features and warranties. Each toolkit offers a full set of materials to run the competition including a case study, introductory presentation, data workbook and templates, including rubric and grading sheets for judges and award certificates. For more information, please contact CAS University Engagement Manager Margaret Kerr at mkerr@casact.org.

2021 CAS ELECTION

CAS Fellows will vote on proposed amendments to the CAS Bylaws and a slate of candidates for the CAS Board of Directors and CAS President-Elect, with online voting beginning on August 2, 2021. On that day, Fellows will receive an email with a link to the online ballot. Completed ballots must be submitted online by August 31, 2021.

In the following pages, readers can learn about the candidates through the 100-word summaries they provided regarding their interest in running for CAS leadership positions.

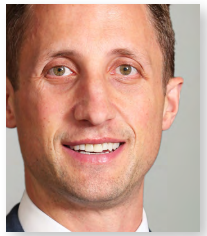
More details about each candidate can be found in the Meet the Candidates section of the CAS website. Please contact Mike Boa (mboa@casact.org) with any questions or comments about the election process. Following the slate of candidates is information on the proposed amendments to the constitution and bylaws concerning streamlining CAS government.

Meet the *Candidates* — *2021* CAS Elections

President-Elect Nominee

Roosevelt Mosley
FCAS 1999
I am excited to continue my service to the CAS as we advance our position as leaders in analytics and in diversity, equity and inclusion. My professional career and years of service to the CAS have prepared me to lead during this time of evolution and change. It is vitally important that we continue to develop our members for an envisioned future as problem solvers and analytics professionals, and to establish a leadership position internally and externally related to DE&I issues. Key in achieving these objectives will be frequent and open communication with membership and external constituents.

Board Director Nominees



Justin Brenden
FCAS 2009
The CAS is at an important point in time, and we will need to simultaneously stay true to our history and step boldly into the future. To do this, we need broad representation of membership, including veteran and younger members. I represent the younger generations of actuaries, but I also have extensive experience volunteering with the CAS, including serving a term as VP, chairing committees, co-authoring an exam textbook and speaking at numerous events. Therefore, I can bring the perspective of younger actuaries, but also back it up with extensive CAS experience that will help me to be effective.

Daniel Fernandez
FCAS 2015
Throughout my career, I have gained a global perspective through working with colleagues across geographies and disciplines to solve a variety of problems. I look forward to leveraging this experience to help advance the CAS in many areas, including building skills for the actuaries of tomorrow as the profession transforms, increasing the diversity of our membership and continuing to expand globally. I have volunteered for the CAS since I became a member, and for the Organization of Latino Actuaries as a co-founder and current president. I would be honored to volunteer in this capacity and serve on the CAS Board.

Kathy Olcese
FCAS 1993
I am proud to say that I am an actuary. I am proud of the benefits that actuarial science brings to the business of insurance and, in fact, to the world. I am also proud that our professional organization relies on the work of volunteers who, with CAS staff, serve the profession in educating and credentialing the membership and advancing the field of actuarial science. At this pivotal time for the CAS, bold and visionary leadership is needed to achieve our Envisioned Future. I am committed to serve the CAS in realizing this new and exciting future.

Kathleen Ores Walsh
FCAS 2010
While there has been growth in our profession during my career, we have only scratched the surface of our potential. The pandemic has shown that the need for qualified professionals who understand the forces that drive our industry is more important than ever. Given our analytical acumen, strategic thinking and domain knowledge, actuaries should be THE insurance professionals chosen to navigate through these changing times. If elected, my focus will be on appropriately evolving the credentialing process and more purposeful collaborating with the insurance industry to market, grow and develop the CAS's most vital product, the actuary.

Alejandro Ortega
FCAS 2006
The CAS has a goal to increase diversity in the actuarial profession. I've spent the majority of my six-year sabbatical focusing on this specific goal as a co-founder, board member and president of the Organization of Latino Actuaries (OLA). The issues can be summarized as access and retention. OLA has done a lot of work on improving access to the profession. I'd like to take my experience and apply it to the CAS and support other marginalized communities.

Tetteh Otuteye
FCAS 2014
We live in a world with a rapidly evolving set of risks. Whether preparing for insurable risks that will emerge from the deployment of blockchain, autonomous vehicles, internet of things, global warming, global supply chain disruptions or the range of catastrophes that are likely to emerge as our world continues on its path of increasing interconnectivity, interdependence (and hence potentially greater correlation of risks), CAS actuaries are uniquely qualified to help manage and mitigate these risks as leaders within insurers as well as the new and existing industries they serve. My objective is to help future actuaries fulfill this potential.

Yvonne Palm
FCAS 2011
Having worked in the U.S. and the U.K., I am now one of only three CAS-credentialed actuaries on the African continent. I therefore bring a truly international flavo(u)r to the boardroom; this is key to achieving the latest CAS strategy. Diversity of thought is essential in the CAS boardroom to continue to stay relevant in these rapidly changing times. I would bring some very unique views with me to the board as I appreciate the issues faced in more developed economies while understanding firsthand what is happening on the ground in less developed economies.

Jason Russ
FCAS 1996
My background: worked both as insurance company actuary and consultant; ran projects across reserving, pricing and valuation; opining actuary for both large and small companies; volunteer experience includes writing ASOPs and principles, chair of a research committee, and helping put on the CAS's first-ever webinars; and oversaw team of 700+ volunteers as chair of Syllabus/Examination Committee, culmination of 23 years on committee. I come with no preconceived notions of any agenda, but rather will use my experience and my emphasis on logic, planning and transparency to help the CAS follow through with its Strategic Plan and achieve its Envisioned Future.

CAS Constitution and Bylaws *Amendments*

CAS Board Proposes Constitution and Bylaws Amendments to Streamline Governance

The CAS Board of Directors is proposing changes to the CAS Constitution and Bylaws to streamline the governance of the Society. Fellows will be asked to vote on the changes in conjunction with the 2021 CAS elections in August. In putting the proposals on the ballot, the board is recommending that the Fellows vote in favor of the amendments.

The recommended changes were originally initiated by the board's adoption of an evolving volunteer-staff model, which includes retiring the Executive Council layer of governance and its role in CAS operations. The impetus for the board's decision stemmed from the Future of Volunteerism Task Force, which concluded that the CAS volunteer staffing model does not fully and efficiently support the Society's current and long-term initiatives and recommended that the CAS would benefit from a reorganization of the existing committee structure. The thrust of the evolving model puts a focus on the contribution of subject matter expertise and thought leadership by volunteers and a professional staff, led by the CEO, that executes strategy and has accountability for CAS operations.

With accountability for CAS operations assigned to the CEO, the Executive Council governance layer is no longer required by the board. Oversight of committee operations will be the responsibility of senior staff executives, including the chief financial officer, chief learning officer, chief communications officer, and chief growth officer, all reporting to the CEO. Senior CAS volunteer leaders will continue to serve as advisors to staff, and the board-level Operational Oversight Committee will monitor CAS operations. For more details and background on the evolving Volunteer-Staff Framework, see the recently posted announcement.

With plans to revise the CAS Constitution and Bylaws to remove reference to vice presidents and the executive council, the board took the opportunity to revisit the governing documents in totality. The board sought the advice of legal counsel, which recommended that the CAS governance documents be updated to reflect current best practices, including condensing the two documents into one set of Bylaws.

To oversee this work, the board established a working group of CAS Board/Executive Council members and staff, which included Mary Frances Miller, Mary Hosford and Erika Schurr, working with the CAS Staff, CEO and general counsel. The group developed a final proposed set of new CAS Bylaws, which were accepted by the board during its June 25, 2021, meeting.

In addition to removing references to vice presidents and the CAS Executive Council and delegating authority for day-to-day operations to the CEO, the new Bylaws replace lengthy descriptions of specific procedures with more general language, stating that these procedures are "specified by the Board." The procedures extracted from the Constitution and Bylaws relate to discipline of members and public expression of professional opinion. Detailed procedures for discipline were previously approved by the board and have been in place for many years. Procedures for public expression of professional opinion were separately adopted by the board during its June 25, 2021, meeting, with very minor changes from what had been included in the CAS Constitution.

The board noted that this approach has already been in place for the CAS election procedures, as the current Bylaws state: "Procedures for nominations and elections shall be established by a majority vote of the Directors present and voting at a meeting of the Board of Directors." Adopting this approach for other procedures in the new proposed Bylaws will allow greater efficiency and flexibility in making future changes to administrative processes, while also aligning the documents with current association best practices.

The proposed Bylaws are available for review, along with separate procedures that were extracted from the Constitution and Bylaws and/or approved by the Board. The current Constitution and Bylaws are also available (see box, next page). An FAQ has also been developed, with additional details on the proposed changes at casact.org/sites/default/files/2021-07/CAS_Bylaws_Proposal_FAQ.pdf.

Balloting on the proposed changes will open on August 2, with ballots due by August 31. Constitution and Bylaws changes require an affirmative vote from 10% of the Fellows or two-thirds of the Fellows voting, whichever is greater. Note: CAS Associates possessing the designation for five or more years can vote in CAS Board elections, however, Bylaws amendment voting is reserved for CAS Fellows.

Helpful Links

- Proposed CAS Bylaws (clean)
- Proposed CAS Bylaws (annotated)
- CAS Rules of Procedure for Disciplinary Actions
- CAS Rules of Procedure for Public Expression of Professional Opinion
- CAS Rules of Procedure for Elections (2021)
- Current CAS Constitution
- Current CAS Bylaws

Casualty Actuarial Society Bylaws
(Draft as of May 19, 2021)

ARTICLE I. - *Name*

The name of this organization is the "Casualty Actuarial Society" ("CAS" or "Society"), a nonprofit and nonstock corporation incorporated under the laws of the State of Illinois.

ARTICLE II. - *Statement of Purpose*

The purposes of the Society are to advance the body of knowledge of actuarial science applied to property, casualty, and similar risk exposures, to establish and maintain standards of qualification for membership, to promote and maintain high standards of conduct and competence for the members, and to increase the awareness of actuarial science.

ARTICLE III. - *Membership*

Section 1.—Classes Of Members

The membership of the Society shall be composed of three classes:

a) Fellows

The Fellows of the Society shall be those who are duly admitted to Fellowship as hereinafter provided. Fellows shall be Voting Members of the Society and shall also be eligible to hold office, make nominations, and generally exercise the rights of full membership. Fellows are authorized to append to their names the initials F.C.A.S.

b) Associates

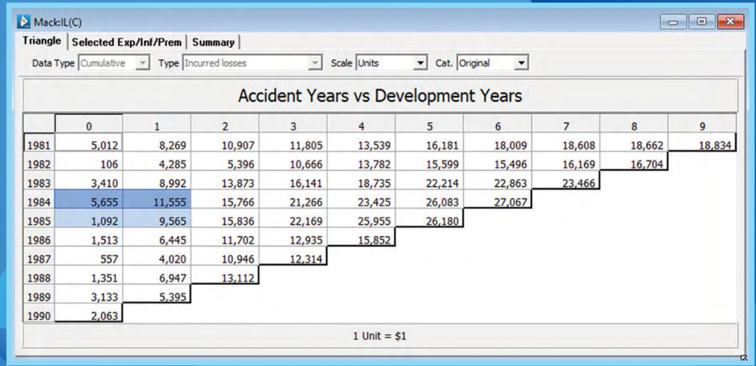
The Associates shall be those who are duly admitted to Associateship as hereinafter provided. Associates shall be entitled to attend meetings of the Society and to participate at Society functions. Five years after becoming an Associate (or upon becoming a Fellow, whichever occurs first), an Associate shall become a Voting Member of the Society. Associates are authorized to append to their names the initials A.C.A.S.

CAS Constitution and Bylaws Amendments, page 30

Graphical Representation and Regression Formulation of Link Ratios

Insureware
Innovative Statistical Solutions for P&C Insurance

Thomas Mack identified the stochastic regression model that underlies volume weighted average link ratios. Other authors, including Murphy and Venter, have developed these ideas further. A graphical representation and regression formulation of link ratios makes it clear what assumptions underpin the methods and extensions thereof.



Mack:IL(C)

Triangle | Selected Exp/Inf/Prem | Summary

Data Type: Cumulative — Type: Incurred losses — Scale: Units — Cat.: Original

Accident Years vs Development Years

	0	1	2	3	4	5	6	7	8	9
1981	5,012	8,269	10,907	11,805	13,539	16,181	18,009	18,608	18,662	18,834
1982	106	4,285	5,396	10,666	13,782	15,599	15,496	16,169	16,704	
1983	3,410	8,992	13,873	16,141	18,735	22,214	22,863	23,466		
1984	5,655	11,555	15,766	21,266	23,425	26,083	27,067			
1985	1,092	9,565	15,836	22,169	25,955	26,180				
1986	1,513	6,445	11,702	12,935	15,852					
1987	557	4,020	10,946	12,314						
1988	1,351	6,947	13,112							
1989	3,133	5,395								
1990	2,063									

1 Unit = $1

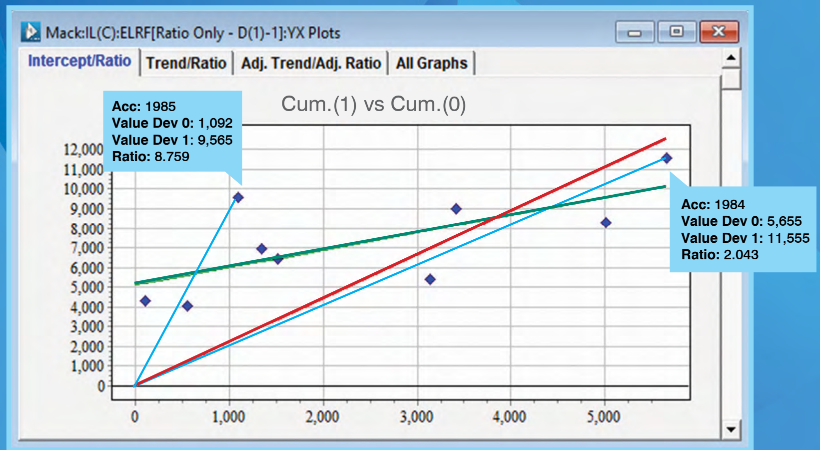
"There is pleasure in recognizing old things from a new viewpoint."
Richard Feynman

Consider the (diagonally opposite) Incurred Loss triangular data from the American Reinsurance Association.

In general, each link ratio (y/x) is the slope of the line from the number pair (x,y) to the origin.

The graph below plots the cumulatives in development year one versus the cumulatives in development year zero for accident years 1981 to 1989.

The caption on the right is for the point (5,655, 11,555) corresponding to accident year 1984. The caption on the left is for the point (1,092, 9,565) corresponding to accident year 1985. The slope of the blue lines represent the corresponding link ratios – which is 2.043 for 1984 and 8.759 for 1985.



Accordingly, an average link ratio, equivalently average trend, is an average slope through the origin.

This means that the method can be formulated as a regression (Mack (1993)).

Let y(w) denote the cumulative in development period j for accident year w and x(w) the cumulative in the previous development period, j-1.

We can write,

$y(w) = b * x(w) + e(w), \ldots$ (1)

where b is the slope of the line (equivalently, the average link ratio), and e(w) is the difference between the actual value y(w) and the corresponding point on the average link ratio line (b * x(w)).

When actuaries use link ratios there are two critical assumptions:

- The expected value of the next cumulative is conditional on the previous cumulative multiplied by an unknown factor.
- The selected link ratio (factor) is optimal for prediction.

The optimum value of b is found by weighted least squares estimation according to the scale of the error terms e(w).

Let the variance of $e(w) = v * x(w)^{delta}$

For the following values of delta (0, 1, 2):

- 0, or constant variance, the weighted least squares estimated of b is the volume squared weighted average link ratio.
- 1, the weighted least squares estimate of b is the volume weighted average link ratio – sometimes called the chain ladder ratio.
- 2, the weighted least squares estimate of b is the arithmetic average link ratio.

In the graph (previous page), the red line is the best least squares line through the origin and the green line is the best least squares line that includes an intercept. The latter appears to be a better model.

Murphy (1994) extended the regression formulation to include an intercept term.

$y(w) = a + b * x(w) + e(w), \ldots$ (2)

where a is the intercept term, but b is no longer the average link ratio.

Given that the intercept is positive in the previous graph, the slope of the line with an intercept term is less than any average link ratio (through the origin).

We can obtain visual indications of whether a line with an intercept (Murphy (1994) method) or a line through the origin (Mack (1993) method) is better.

Most importantly, the focus should be on the incremental model, Venter(1998), even if a = 0:

$y(w) – x(w) = a + (b-1)*x(w) + e(w), \ldots$ (3)

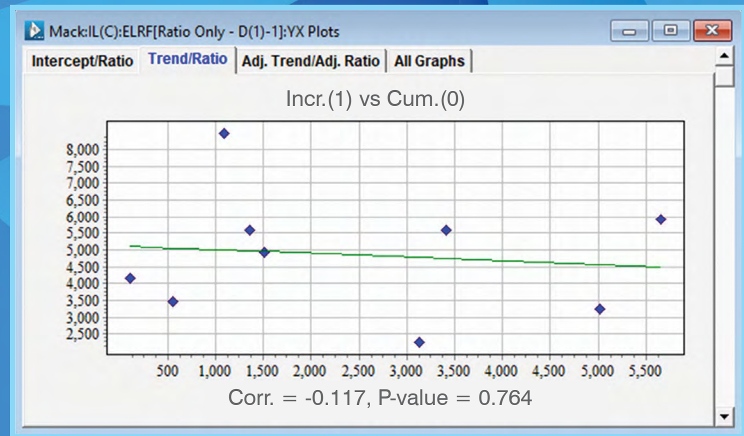
where y(w) – x(w) is the incremental data point.

When you use a link ratio to project the cumulative in the next period in essence you are only projecting the next incremental as you know the current cumulative. This is the reason all the focus should be on equation (3) not (2).

But what if b in equation (3) is statistically equal to 1, (Venter(1998))?

Then the incrementals in development periods (j) are not correlated to the cumulatives in the previous development period (j-1). That is, any ratio applied to the cumulatives does not predict the incrementals!

Here is a graph (right) of the incrementals in development year 1 versus the cumulatives in development year 0.



Note that the correlation is zero (slope not statistically significant). Equivalently b–1 = 0.

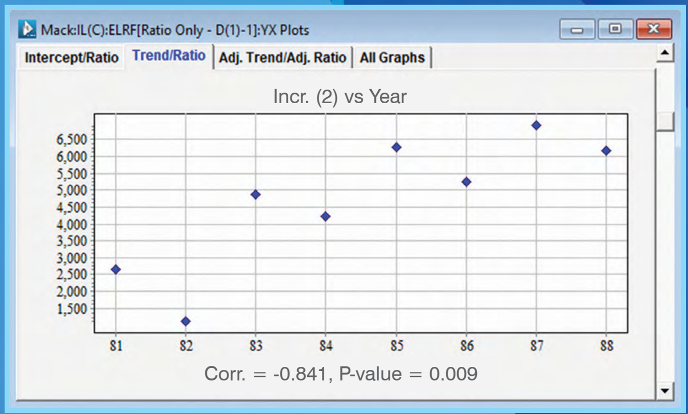
In this case, the reduced model only contains an intercept term.

$y(w) – x(w) = a + e(w) \ldots$ (4)

In this model, the incrementals across the accident years are random numbers from a distribution with mean a, and variance, Var(e(w)). If e(w) has a constant variance, then the ordinary least squares estimate of a is the arithmetic average of the incrementals y(w) – x(w).

It turns out, if you graph the incrementals in any development period against the cumulatives in the previous period, you will note that there are no statistically significant correlations. All the b-1 parameters are statistically zero.

The assumption that the incrementals are random, might not be true. A case in point, is development period two. This suggests that we need to include an accident year trend parameter in model (3).



The equation that includes the intercept, accident year trend and slope can be written:

$y(w) - x(w) = a_0 + a_1 * w + (b-1)*x(w) + e(w), \ldots$ (5)

where a_0 is the intercept, a_1 is the accident year trend parameter and b-1 is the incremental coefficient.

The family of models included in the **Extended Link Ratio Family (ELRF)** are represented by equation (5) between each two consecutive development years. The significance of the parameters is determined by the data.

Mack:IL(C):ELRF[Best dellta=0?1]:Regression Table

ELRF Parameter Estimates

Development	Intercept			Trend			Ratio			
Period	Est.	S.E.	P-Value	Est.	S.E.	P-Value	Est.	Ratio-1	S.E.	P-Value
0~1	4,849.33333	611.65863	0.00005	****	****	****	1.00000	0.00000	0.00000	0.00000
1~2	2,309.50000	744.19326	0.02103	678.00000	177.89622	0.00885	1.00000	0.00000	0.00000	0.00000
2~3	3,267.14286	883.07057	0.01009	****	****	****	1.00000	0.00000	0.00000	0.00000
3~4	2,717.66667	296.35234	0.00026	****	****	****	1.00000	0.00000	0.00000	0.00000
4~5	2,164.20000	551.44695	0.01718	****	****	****	1.00000	0.00000	0.00000	0.00000
5~6	839.50000	400.27168	0.12689	****	****	****	1.00000	0.00000	0.00000	0.00000
6~7	625.00000	24.02776	0.00147	****	****	****	1.00000	0.00000	0.00000	0.00000
7~8	294.50000	240.50000	0.43596	****	****	****	1.00000	0.00000	0.00000	0.00000
8~9	172.00000	0.00000	0.00000	****	****	****	1.00000	0.00000	****	****
To Ultimate							1.00000	0.00000	0.00000	****

Delta = 0, AIC = 738.5
If the test is to be conducted at an overall 5% level, a parameter would be regarded as insignificant if the corresponding P-Value is greater than 0.005116

Link ratios have no predictive power for this incurred loss development array. The optimal combination of parameters uses simply an intercept term with the exception of the regression equation between development periods 1 and 2 where an accident year trend is also statistically significant.

Mack, T. (1993). Distribution-free calculation of the standard error of chain ladder reserve estimates. ASTIN Bulletin: The Journal of the IAA, 23(2), 213-225.

Murphy, D. M. (1994, March). Unbiased loss development factors. In CAS Forum (Vol. 1, p. 183).

Venter, G. G. (1998). Testing the assumptions of age-to-age factors. In Proceedings of the Casualty Actuarial Society (Vol. 85, pp. 807-847).

Volume weighted average link ratios do not distinguish between accident years and development years

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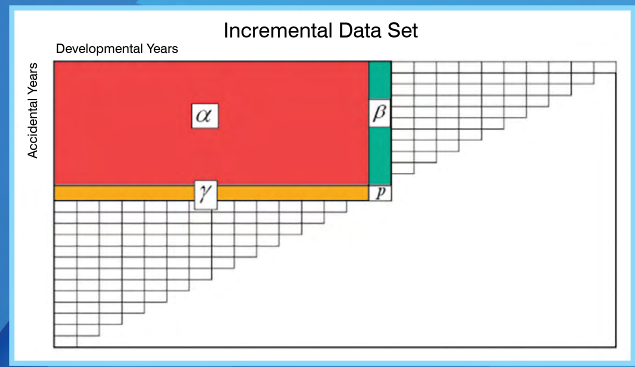


Consider any triangle with incremental values where:

- alpha denotes the sum of the values in the red rectangle,
- beta denotes the sum of the values in the green rectangle (one development year), and
- gamma is the sum of the values in the orange rectangle (one accident year).

Let p denote the incremental value projected for the accident year represented by the gamma values for the next development year.

The value alpha represents both the aggregate of the row sums in the red rectangle and the aggregate of the column sums.

The volume weighted average when you cumulate the triangle in the traditional way is (alpha + beta) / alpha. If you cumulate the triangle for each development year down the accident years, then the volume weighted average is (alpha + gamma) / alpha.

Accordingly:

$$p = \gamma\left(\frac{\alpha+\beta}{\alpha}-1\right) = \frac{\gamma\beta}{\alpha}$$

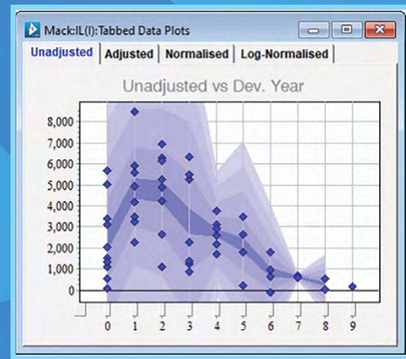
If you cumulate along the development years, and

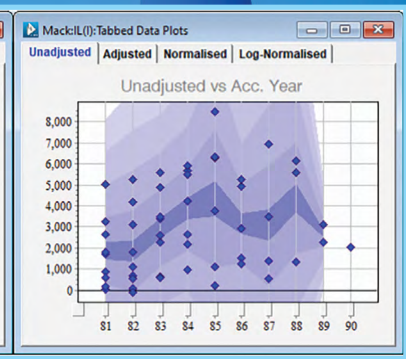
$$p = \beta\left(\frac{\alpha+\gamma}{\alpha}-1\right) = \frac{\beta\gamma}{\alpha}$$

If you cumulate along the accident years. QED.

We know that development years are not like accident years.

CONCLUSION: Link ratios have got nothing to do with the structure of the data.





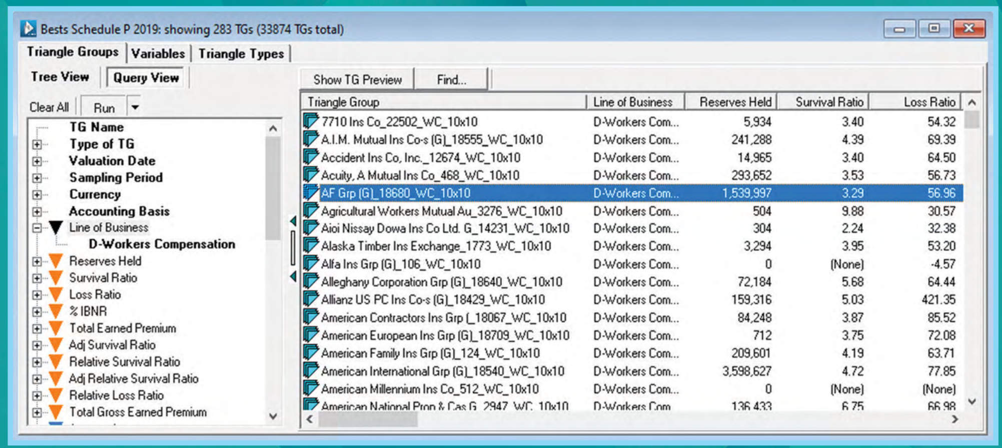
For the incurred array we plot the incremental values versus development year. We also plot the values versus accident year. Note the different structure.

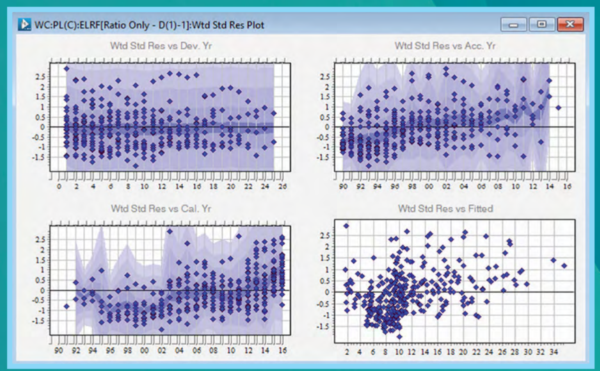
Clearly, we expect any incremental loss development array to decay to zero, but you would not expect the same pattern down the accident years.

ELRF™ 2020

ELRF™ 2020 is for P&C actuaries who want to take advantage of the graphical representation and regression formulation of link ratios, and extensions thereof.

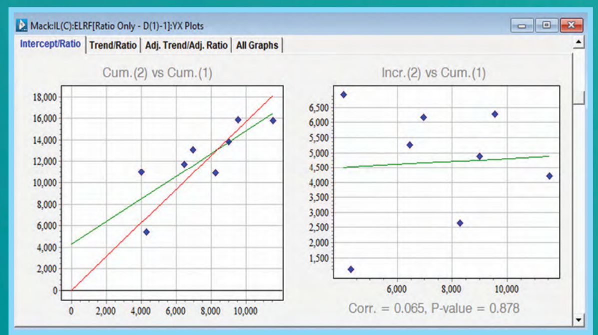
All this, coupled with the power of a relational database are included in ELRF™ 2020. All the information in the database including data, models, and results, are a mouse click away. Accessing data and information through the ELRF™ 2020 application is a pleasure.





The Extended Link Ratio Family (ELRF) modeling framework provides diagnostics for testing assumptions.

Residual plots versus development period, accident period and calendar period are also used to assess model specification error. Any patterns in the residual plots show features of the data that the method is not describing.



The Y versus X and Y - X versus X plots (left) provide diagnostic testing of the intercept and ratio minus one. Formal tests are provided in the regression tables.

Here there is no relationship between the incremental Incurred in development period 3 with the cumulative Incurred in development period 2. Link ratios do not have predictive power.

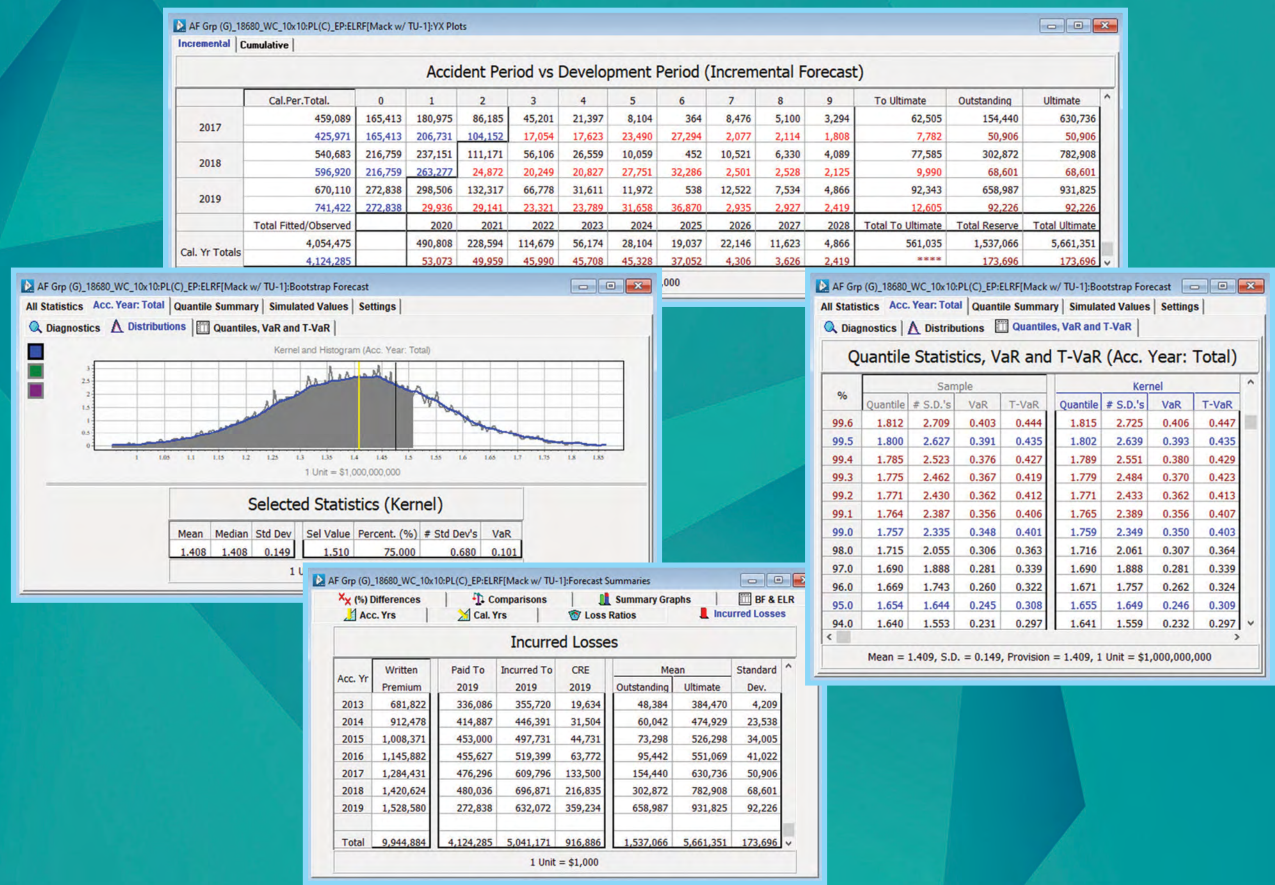
ELRF™ 2020 Standard:

- Over 144 link ratio methods including Bornhuetter-Ferguson and Expected Loss Ratio Methods
- Link ratio methods formulated as regression estimators
- Extensions including intercept (Murphy) and constant accident year trends for each development year
- Diagnostic tools
- Bootstrap distributions by accident year, calendar year and total

ELRF™ 2020 Professional:

- COM API
- Extended report templates
- Server database (Oracle & SQL Server)

ELRF™ 2020 affords benefits at warp speed unlike any other reserving product.



ELRF™ Best's Schedule P:

Included with a Best's Financial Suite - P/C, US subscription!

- Offline access to Schedule P data from AM Best and derived financial metrics;
- All analytical tools included in ELRF™ 2020!

Contact AM Best at sales@ambest.com to learn more.

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CAS Constitution and Bylaws Amendments

from page 30

c) Affiliates

The Affiliates shall be those who are duly admitted as Affiliates as hereinafter provided. Affiliates are encouraged to refer to themselves as such but are not authorized to append CAS initials to their name. In referring to themselves Affiliates may refer to themselves as "Affiliate of the Casualty Actuarial Society" or "Affiliate Member of the Casualty Actuarial Society." They may not refer to themselves as "Member of the Casualty Actuarial Society."

Section 2.—Requirements For Admission To Membership

a) Associates

Any applicant shall be enrolled as an Associate upon notification by the Society provided that the applicant successfully completes the admission requirements prescribed by the Board of Directors for Associateship

b) Fellows

An Associate shall be enrolled as a Fellow of the Society following notification of successful completion of the admission requirements prescribed by the Board of Directors for Fellowship

c) Affiliates

An actuary who is not otherwise a member shall be enrolled as an Affiliate, subject to such requirements as the Board may prescribe.

d) Mutual Recognition

The Board of Directors may negotiate and implement Mutual Recognition Agreements with other actuarial organizations that qualify actuaries through a process that includes rigorous testing of a comprehensive property and casualty specialization. Such Mutual Recognition Agreements will include requirements that applicants complete the property and casualty specialization requirements and all other requirements for full membership in their home organization, and complete any additional requirements specified by the Board.

Any applicant who meets the Mutual Recognition requirements so agreed shall be enrolled as a Fellow.

ARTICLE IV. - *Meetings of the Members*

The President shall preside at meetings of the members of the Society. There shall be an annual meeting of the Society on such date as determined by the Board of Directors. Other Society meetings may be called by the Board from time to time and shall be called by the President at any time upon the written request of 5% of the Voting Members. At least two weeks' notice of all Society meetings shall be given to the members. Five percent of the Voting Members of the Society shall constitute a quorum at meetings of members of the Society and the affirmative vote of a majority of Voting Members voting shall be required for action unless otherwise required by law or these Bylaws.

ARTICLE V. - *Dues*

Section 1.—Amount

The Board of Directors shall fix the annual dues for members.

Section 2.—Failure To Pay

The Society shall be responsible for notifying any member whose dues are six months in arrears. If a member shall fail to make payment within three months from the date of such notice, the member shall cease to be a member, except at the discretion of the Board of Directors this provision may be waived.

Section 3.—Exemption, Deferral Or Waiver

The Board of Directors may, at its discretion and in accordance with established policy, exempt, defer or waive, partially or fully, the dues of any member who submits a written request to the Board of Directors before dues have become six months in arrears, citing the reason for the request.

Section 4.—Reinstatement

A member who has ceased to be a member because of failure to pay dues, or by voluntary resignation, may be reinstated in accordance with procedures to be set by the Board of Directors.

ARTICLE VI. - *Resignation and Discipline of Members*

Any member who is not in default in payment of dues, and against whom no complaints are pending, may resign at any time by filing a resignation request in writing with the Society Office. Notwithstanding the foregoing, the Board of Directors may, in its discretion, approve the resignation of a member in default of payment of dues or against whom a complaint or charge is pending before the Actuarial Board for Counseling and Discipline, the Canadian Institute of Actuaries, or other appropriate investigatory body, or against whom a recommendation for public disciplinary action has been made to the Society by the Actuarial Board for Counseling and Discipline, the Canadian Institute of Actuaries, or other appropriate investigatory body. The Board, on written application of any member who has resigned, may reinstate such member subject to such conditions as it may prescribe.

Members of the Society and candidates for membership shall be subject to disciplinary action in accordance with the Bylaws of the Society and rules of procedures of disciplinary actions as adopted by the Board of Directors.

Section 1.—Complaints And Questions

a) Complaints concerning alleged violations of the Code of Professional Conduct, and all questions which may arise as to the conduct of a member of the Society, in the member's relationship to the Society or its members, or in the member's professional practice, or questions affecting the interests of the actuarial profession, constitute matters for serious consideration.

b) Such complaints, questions, or requests for advice shall be referred to the national organizations responsible for profession-wide investigation, counseling and/or discipline, e.g., the Actuarial Board for Counseling and Discipline (ABCD) and the Canadian Institute of Actuaries (CIA).

Section 2.—Referral And Consideration Of Public Disciplinary Action

Acting pursuant to Section 1, and if circumstances warrant, the appropriate investigatory body shall present a recommendation for disciplinary action to the Society. The member whose activities are the subject of the disciplinary recommendation is referred to here as the subject actuary.

Disciplinary action includes a public or private reprimand by, or suspension or expulsion from, the Society.

If an appropriate investigatory body recommends disciplinary action to the Society, the matter shall be referred to the CAS Discipline Committee. Rules of procedure for the CAS Discipline Committee will be as approved by the Board of Directors.

Section 3.—Appeals

The subject actuary shall be entitled to appeal the decision of the Discipline Committee by submitting a written request for an appeal to the CAS President within 45 days from receipt of the Discipline Committee decision. Rules of procedure for appeals will be as approved by the Board of Directors.

Section 4.—Reinstatement

An individual who has been expelled may be reinstated only upon request to and approval of the Board of Directors.

Section 5.—Confidentiality And Notification

All proceedings under this Article shall be confidential in accordance with the Rules of Procedure.

Section 6.—Case Reviews

The Board of Directors retains the right to review a decision by a national organization responsible for profession-wide counseling and discipline which does not result in a recommendation for disciplinary action with respect to a Society member.

ARTICLE VII. - *Board of Directors and Officers of the Society*

Section 1.—Composition Of The Board

The Board of Directors shall consist of the President, the President-Elect, the immediate past President, 12 other elected Fellows and up to three additional appointed members.

Section 2.—Authority

The Board of Directors supervises, directs, and controls the policies and programs of the Society. The Board of Directors shall set criteria for membership and promulgation of statements of principles. The Board of Directors delegates to the Chief Executive Officer responsibility for operational management of the Society when the Board is not in session, consistent with any policies established by the Board.

Section 3.—President And President-Elect

The President and President-Elect, both of whom shall be Fellows, shall be Officers of the Society.

Section 4.—Election And Term Of Office For President And President-Elect

At the close of the annual meeting, the President-Elect shall assume the office of President for a term of one year. Annually, a new President-Elect shall be elected by the Voting Members in a secret ballot for a term of one year.

The term of all Officers shall begin at the close of the annual meeting in the calendar year of their election and continue until their successors take office.

Section 5.—Election And Term Of Office For Board Of Directors

Annually, in a secret ballot of the Voting Members, four Fellows shall be elected to the Board of Directors for a term of three years. A retiring elected Director shall not be eligible for reelection for at least one year after the expiration of the term for which the Director was elected. Appointed Directors will be elected by the Board of Directors and will serve a term of one year, renewable for up to three years.

Section 6.—Succession

a) In case of death of the President, or of a prolonged period of incapacity, or removal, the position of the President will be assumed by the President-Elect or, if the President-Elect is unable to assume these duties, by the Immediate Past President. The Board will decide by majority vote of those voting whether to proceed to a special election of the membership for a new President-Elect to serve in the subsequent Presidential term, or whether the new President will serve the unexpired term of the past President and the full term that follows.

b) In case of death of the President-Elect, or of a prolonged period of incapacity, or removal, a special election of the membership will be held to fill the position of President-Elect. If at the time of the annual meeting the election has not concluded, the term of the incumbent President will be extended until such time as the election is concluded.

Section 7.—Removal From Office

The process for the removal of any member from the Board of Directors can be initiated by either a petition of 5% of the Voting Members, or a majority vote of the Board of Directors (with the person proposed to be removed not voting). Reasons for the removal include violation of the code of conduct; abuse of power; behavior materially incompatible with the proper function and purpose of the office.

Procedures relating to the removal process shall be adopted by the Board. Once the removal process has been initiated, a hearing and vote of the Board will be held within 45 days. A vote to recommend removal requires a two-thirds majority of the Board members voting (with the person proposed to be removed not voting). A Board recommendation for removal shall be subject to approval by a vote of the Voting Members, to be held within 45 days of the Board vote. A two-thirds majority of the Voting Members voting is required for removal.

ARTICLE VIII. - *Meetings of the Board of Directors*

Meetings of the Board of Directors shall be chaired by the immediate past President and shall be called whenever the immediate past President or three members of the Board so request. Notice shall be sent to each member of the Board no less than seven days before the time appointed. An emergency Board meeting may be called by the immediate past President or by three members of the Board, if there are circumstances that could not have been reasonably foreseen which require immediate attention and possible action by the Board, and which of necessity make it impracticable to provide seven days' notice. Such notice shall state the agenda for the meeting. A majority of the members of the Board of Directors shall constitute a quorum and the affirmative vote of a majority of members of the Board voting shall be required for action unless otherwise required by law or these Bylaws. A two-thirds vote of the Board members voting is required for approval or promulgation of statements of principles.

ARTICLE IX. - *Elections and Filling of Vacancies*

Procedures for nominations and elections shall be established by a majority vote of the Directors present and voting at a meeting of the Board of Directors. These procedures shall be provided to the membership annually at the beginning of the election process.

The Board of Directors may fill vacancies in the term of any Board member. Any member of the Board so appointed shall serve, until the expiration of the term of office of the Board member being replaced.

ARTICLE X. - *Chief Executive Officer*

The Chief Executive Officer is an Officer of the Society and serves as Secretary of the Society. The Chief Executive Officer is charged with overseeing operations of the Society. The Chief Executive Officer shall have such other duties as may be assigned by the President or the Board of Directors.

ARTICLE XI. - *Public Expression of Professional Opinion*

No opinion with respect to questions of public interest shall be publicly expressed by, or on behalf of, the Society, except on matters within the special professional competence of actuaries and then only in accordance with procedures determined by the Board of Directors.

ARTICLE XII. - *Indemnification*

Directors, officers, volunteers, and other authorized employees or agents of the Society shall be indemnified against claims for liability arising in connection with their positions or activities on behalf of the Society to the full extent permitted by law.

ARTICLE XIII. - *Amendments*

These Bylaws may be amended by an affirmative vote of 10% of the Fellows or two-thirds of the Fellows voting, whichever is greater. Notice of such proposed amendment shall be sent to each Fellow at least one month before the vote is taken.

An amendment to the Bylaws can be proposed by a two-thirds majority vote of the Board members voting. Alternatively, an amendment can be proposed by a petition of 5% of the Fellows, unless such petition is vetoed by a two-thirds majority vote of the Board members voting.

ARTICLE XIV. - *Arbitration*

Any dispute or controversy arising under or in connection with the above or any controversy or claim that is in any way connected to or associated with the Society shall be settled exclusively by arbitration to be held in the Commonwealth of Virginia in accordance with the rules of the American Arbitration Association then in effect. Judgment may be entered on the arbitrator's award in any court having jurisdiction.

ARTICLE XV. - *Use of Financial Resources: Dissolution*

The funds of the Society shall be devoted exclusively to the purposes stated in Article II hereof. No part of the net earnings of the Society shall inure to the benefit of, or be distributable to, its members, Directors, Officers, or other private persons, except that the Society shall be authorized and empowered to pay reasonable compensation for services rendered and to make payments and distributions in furtherance of the purposes set forth in Article II hereof. If the Society is dissolved, all of its remaining assets shall be transferred to one or more organizations organized and operating exclusively for purposes similar to those of the Society and which qualifies as an exempt organization under section 501(c)(3) or section 501(c)(6) of the Internal Revenue Code of 1954 (or the corresponding provision of any future Internal Revenue Law).

BY ANNMARIE GEDDES BARIBEAU

CYBER CHALLENGES

> Covering cyberattacks was profitable business for insurers — until ransomware grew out of control.

Cyber insurance has generally been a risky, albeit profitable, insurance line.

For the first time, the line's profitability is no longer assumed. The overall combined ratio for cyber insurance is 95.4% for the year 2020, according to Aon Reinsurance Solution's U.S. Cyber Market Update published in June 2021. For stand-alone cyber policies, which are purchased separately rather than as part of insurance packages, the combined ratio was 100.1%, according to the report, which notes that these numbers may be understated.

What's more, cyber insurance posted its highest rate increase of 18% for the first quarter 2021, accelerating from its first quarterly double-digit climb of 11.1% in the fourth quarter 2020, according to the Council of Insurance Agents and Brokers' Property/Casualty Market Survey (see Figure 1).

"The market has definitely hardened. Insurers want to batten down the hatches and want to offer less — reinsurers too," said Jon Laux, head of cyber analytics for Aon's Reinsurance Solutions. "The whole industry is reckoning with the fact that the risk is underpriced and undermitigated."

Insurance lines commonly experience pricing cycles. It takes a while for claims experience to reveal a trend troubling enough to compel tighter underwriting selection and adjustment. For well-established insurance lines, which went through developmental adolescence decades ago, adjusting prices just goes with the territory.

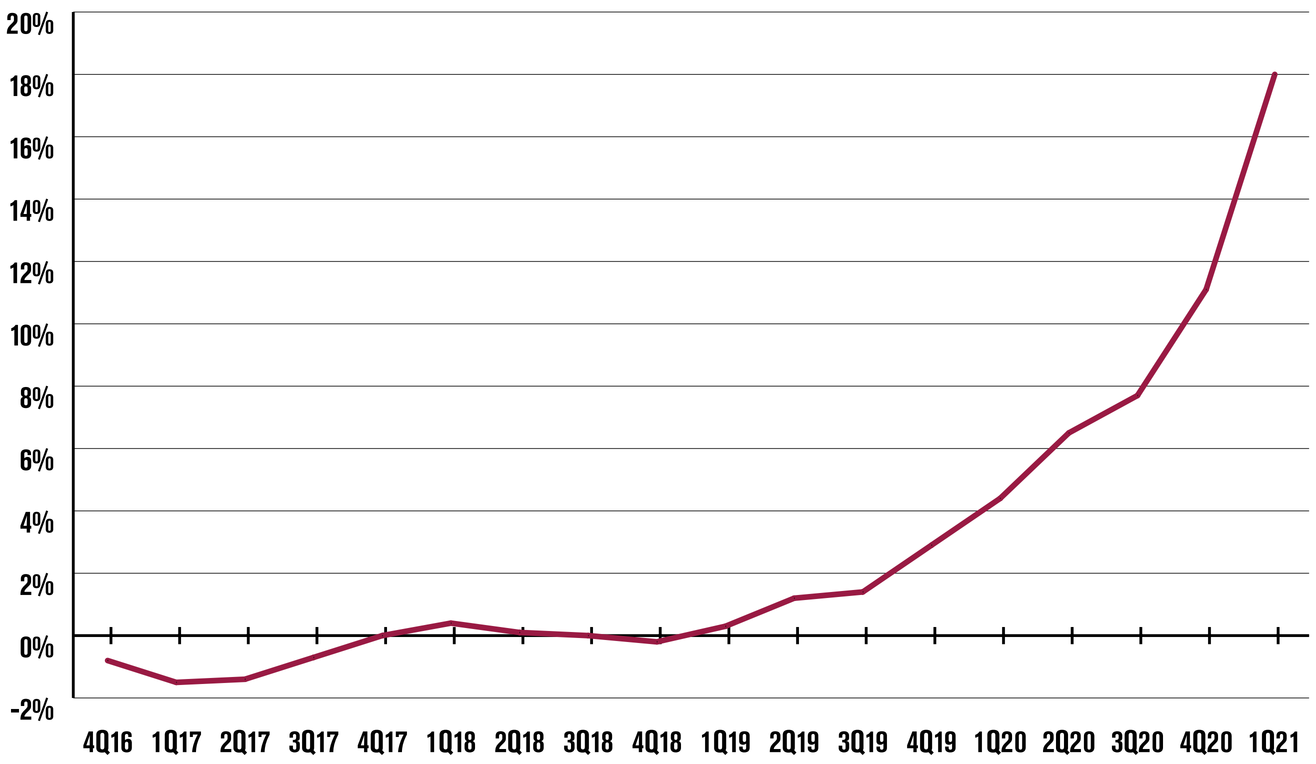
But having originated a couple of decades ago, cyber insurance is a line now going through its own developmental adolescence. "The cyber insurance market is still evolving, and today it's in a state of flux," said Eduard Alpin, chief actuary for Resilience Cyber Insurance Solutions, a program manager combining cyber security and cyber insurance.

How cyber insurers, customers, regulators and other stakeholders respond will shape the line's maturation going forward. "We are in a crucible," warned Laux.

Changing Conditions

The cyber insurance line has grown significantly since data breaches began making headlines in the early-to-mid 2010s. In 2020, about 200 insurance groups offered cyber coverage. This figure is up from 140 groups in 2016, according to the Aon report,

Figure 1. Premium Change for Cyber, Q4 2016–Q1 2021



which is based on data from the National Association of Insurance Commissioners (NAIC) Cybersecurity and Identity Theft Insurance Coverage Supplement.

Another measure of cyber insurance's growth is direct written premiums (DWP). The total DWP for stand-alone and package policies accelerated by 22% in 2020 to approximately $2.7 billion, up from a 14% increase in 2019, according to "U.S. Cyber Insurance Market Update," released in May 2021 by Fitch Ratings. Stand-alone cyber premium rose 29% in 2020, reflecting a growing interest in securing affirmative cyber coverage and dedicated limits for related exposures to address coverage ambiguity, the report notes.

Alpin suggests that the DWP amount is higher and is closer to $6 billion because the NAIC statutory data does not capture all cyber insurance. Alpin explains that cyber insurance policies in the United States can be written in many ways, are heavily reinsured, typically through quota shares, and can be written by companies based in London and Bermuda.

Increases in cyberattacks are not the only factor driving growth, however. According to the Fitch report, more comprehensive regulatory and legal requirements, such as the California Consumer Privacy Act and the New York Department of Financial Services Cybersecurity Regulations, are also driving cyber insurance growth.

From 2014 to 2020, the cyber insurance market expanded rapidly; premium volumes grew and coverage broadened, Alpin said. Carriers noticed the high growth and high profitability and jumped into the market. "Underwriting was very lax during the soft market," he said. "Often underwriters were only given a company name and asked for a quote, no application."

For the year 2020, Laux observes that some carriers were enjoying reasonable profitability, but many others sustained significant losses. Among U.S. cyber insurers, the incurred loss ratio was 76.7% at the 75th percentile and 137.8% at the 95th percentile. "The question now is what is 2021 going to look like?" he says.

Laux states that the inflection point in the direct incurred industry loss ratio — the direct loss plus defense and cost containment (DCC) ratio — took place in 2019. In just one year, the loss ratio rose from 44.9% in 2019 to 67% in 2020, according to Aon's report. That is a far cry from the enviable low of 32.4% in 2017.

For stand-alone cyber insurance, which is growing in popularity compared to coverage sold in insurance packages, the incurred loss ratio rose dramatically in 2020 to 73%, compared to an average of 42% for the previous five years from 2015 to 2019, Fitch Ratings notes in its report.

Prior to the loss ratio increases, Laux said, there seemed to be some margin in cyber — even when including a reasonable catastrophe load — regardless of whether the expense ratio was closer to 30% or 40%. "Now I would say that margin is gone," he observes, "when incorporating a CAT load, it's definitely gone."

Alpin estimates the cyber insurance line experienced $4.2 billion in industry losses in 2020, based on the incurred loss ratio estimates of around 70% and $6 billion in collected premium.

Not surprisingly, when insurers started to notice rising losses in late 2019 and 2020, rates went up and coverage began to tighten. From fourth quarter 2016 to fourth quarter 2018, rates were declining quarterly before beginning a modest incline in 2019 and picking up speed into their first double-digit increase in fourth quarter 2020 (see Figure 1).

"Regarding companies' portfolios, some companies are reducing their cyber portfolio sizes by non-renewing certain policies," Alpin said. "Others are also managing their exposure by not writing new business on certain segments or going out with high rate increases — in some cases up to 50%."

Carriers also are sublimiting some of these coverages, Alpin said, citing AIG, which began introducing a sublimit at 50% for any cyber event when ransom is demanded. They've also introduced co-insurance to the cyber market, requiring their clients to contribute 50% to any ransomware loss.

However, while profitability has generally deteriorated, some segments of business have remained profitable. "Recent disappointing results for some or most of cyber insurance underwriters should be seen as a minor turbulence and not a major disruption," offers Alex Krutov, president of Navigation Advisors LLC.

Ransomware

The declining profitability in cyber insurance is driven by increases in claims costs, primarily due to ransomware.

The average 2020 claim frequency across all companies was 5.62 claims per 100 policies, which was virtually unchanged since 2019 based on NAIC data cited in "Ransomware and Aggregation Issues Call for New Approaches to Cyber Risk," published by A.M. Best in June 2021.

Aon reported that the high loss ratio is primarily due to the average claim size increasing from $48,709 in 2019 to $74,354 in 2020. Another way to look at insurer costs, according to data provided by A.M. Best to *Actuarial Review*, is the average incurred losses per claim by calendar year. While the

Not surprisingly, when insurers started to notice rising losses in late 2019 and 2020, rates went up and coverage began to tighten.

amount is driven by reserves, it also shows an upward trend in claim costs (see Figure 2). "Cyber claims are becoming more sophisticated," explained Sridhar Manyem, director of industry research and analytics for A.M. Best. They are also more expensive to process.

The loss ratio is mostly driven by ransomware, which has been increasing dramatically while less lucrative cyber data breaches have been on the decline, according to Aon's "Cyber Insights for Insurers," released in April 2021. Specifically, from fourth quarter 2018 to fourth quarter 2020, ransomware increased 621%, while other data breaches decreased by 84%.

The cybersecurity firm Sophos reports that the average

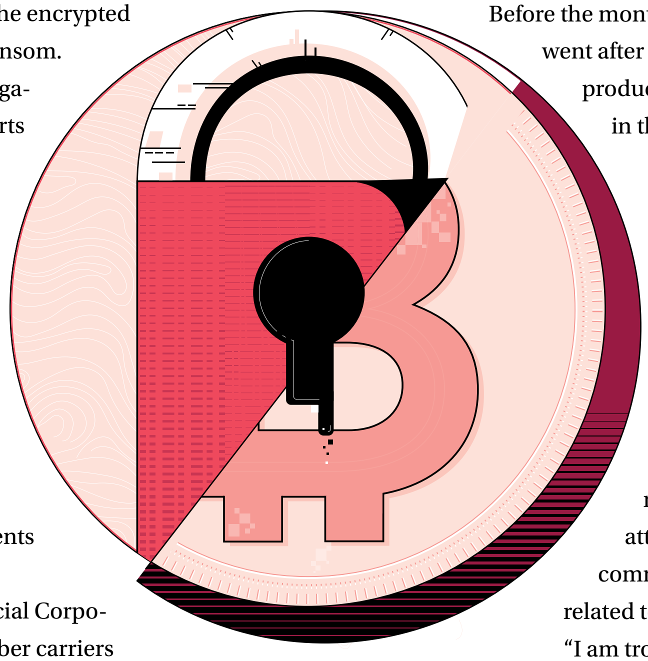
Figure 2. U.S. P&C Industry — Average CY Incurred Per Cyber Claim.

	2016	2017	2018	2019	2020
Total Earned Premium ($000)	1,021,313	1,334,850	1,686,943	2,020,424	2,431,169
Total Incurred Loss ($000)	434,582	411,148	629,049	725,229	1,311,683
Total DCC ($000)	102,736	91,578	8,803	172,276	307,278
Total Claims	5,995	9,017	12,843	18,659	21,920
Loss Ratio (%)	52.6	37.7	37.8	44.3	66.6
Loss/Claim ($)	72,978	45,597	48,980	38,868	59,840
DCC/Claim ($)	17,252	10,156	685	9,233	14,018

Source: AM Best data and research & SNL Financial. Published with permission.

ransom paid by a mid-sized organization is $170,404, according to its "State of Ransomware 2021" white paper published in April 2021. The average bill for rectifying a ransomware-involving attack — including downtime, people time, device cost, network cost, lost opportunity, ransom paid, etc. — is $1.85 million worldwide, double the 2020 costs. The report is based on a survey of 5,400 information technology decision makers in 30 countries that was conducted in January and February 2021. Even worse, there is no guarantee of data returning. On average, only 65% of the encrypted data is restored after paying the ransom.

The Federal Bureau of Investigation and many cybersecurity experts recommend against paying ransoms. In May French insurer AXA announced it would not pay ransoms to cyber attackers for its clients in France. "It might be a good test to see if they can offer cyber without ransomware coverage," Alpin said. Ironically, a couple of weeks later, ransomware attacked AXA's Asian division, though the two events are reportedly unrelated.



AXA is not alone. CNA Financial Corporation, one of the top 10 largest cyber carriers in the United States, was forced to move operations offline in March 2021 due to ransomware. Cyber insurers are inviting targets for ransomware attackers, suggests an article at Cyberscoop.com, because client data could reveal the most potentially lucrative policyholders.

CNA paid a ransom of $40 million following an attack on its own systems, Bloomberg Business News reported, though that figure is unconfirmed. If accurate, it would be one of the largest ransoms ever paid by a company.

Even more disconcerting are cyberattacks on infrastructure upon which the public depends. The cyberattack on the Colonial Pipeline, which reduced available gasoline by 45% from Washington, D.C., to Florida in early May for about a week, led to an eye-popping ransom of $4.4 million. Before the month was over, cyber attackers went after JBS Foods, the second-largest producer of beef, pork and chicken in the U.S.

The CNA and Colonial Pipeline ransoms got the attention of the U.S. Congress. In June 2021, Congresswoman Carolyn Maloney (D-N.Y.), chair of the House Oversight and Reform Committee, wrote the CEOs of both companies requesting them to provide all attack-related documents and communications, including those related to any ransom payments. "I am troubled that the company declined to provide the Committees with any information regarding how and why you decided to pay the attackers, including whether federal agencies and law enforcement had any input on your decision," she wrote on June 3. "… I am extremely concerned that the decision to pay international criminal actors sets a dangerous precedent that will put an even bigger target on the back of critical infrastructure going forward."

Awkward Adolescence

Compared to other established commercial insurance lines, cyber insurance is in its gawky adolescence stage. "It's not a child anymore, and yet it's clearly lacking in maturity," said Laux, whose rap "Cyberlescence," personifies the cyber insurance line. "And until this last year, there was a lot of chest-puffing and self-congratulatory behavior among the cyber insurance community," he explained, due to its fast growth and good results.

Cyber has been an evolving line for the past 20 years, Alpin said, and coverage has been broadening the entire time.

"Frankly," said Robert Parisi, head of cyber solutions North America at Munich Re, "even in the current hardening market, the dollar you spend on cyber insurance today gets you much broader coverage than the dollar you spent in 1999." Parisi, who pioneered of one of the earliest cyber insurance products, said cyber insurance has evolved tremendously from its early iterations in 1999 and 2000. Coverage has expanded beyond its focus on e-commerce companies and liability to include privacy breaches and responses and contingent business interruption, he explained. "Then cyber insurance products began filling in coverage gaps when traditional coverage lines began to introduce cyber exclusions," he explained.

More recently, in 2020, the COVID-19 pandemic has compelled insurers to address issues stemming from Bring Your Own Devices and a new remote workforce, he explained, with several insurers clarifying the meaning of a covered "computer system … to expressly include the personal devices used by remote workers."

Although cyber is making more steps toward maturation, the sophistication of cybercrime is also evolving. "Because of these variables, it's hard to say when the market will mature," Alpin said. Its development depends on many factors, he observed, such as the coverage being offered, insured security controls, amount of data that carriers can accumulate and use, and the U.S. government response to attacks.

"We will see cyber mature when loss trends and pricing stabilize, coverages become more standard and consistent year over year, and penetration rates increase," said Alpin.

Always lingering in the background is the possibility that a significant cyber event or "Cybergeddon" could shut down entire systems on a broader scale than has happened so far.

Moving Forward

The hard market is an opportunity for insurers to underwrite coverage more carefully and selectively while insisting on and assisting with tighter cybersecurity. "Anecdotally, buyers of cyber insurance feel like the insurer questions are a waste of time and that there's too many," Laux said. But, because of the market hardening, "If insurers want to ask more questions in underwriting or raise rates significantly, now they can."

Insurers should also take a closer look at data they already have. "There is a shortlist of repetitive actions that the threat actors are doing that is generating the claims right now," Laux explained.

Cyber models are also still evolving. There is not enough data to price cyber, Manyem observed, and modeling "is an art and science."

Krutov warns that "catastrophic components of cyberrisk are often not fully reflected in cyber insurance premiums and not properly taken into account by cyber insurance underwriters in their portfolio management." He sees opportunity "for those underwriters who can differentiate themselves by better quantifying cyberrisk, both on an individual risk level and in managing their overall portfolios."

Alpin offers that there are some parts of the policy where insurers have a lot of information. For example, carriers know how much they have paid out on breaches, liability and expense claims, and they have information on business interruption and ransomware. Alpin adds that publicly available information is available from sources such as Coveware and NetDiligence.

> **At the very least, the past demonstrates that the bad actors will continue to raise the stakes with cyberattacks, higher ransoms and whatever comes next.**

At the same time, however, Krutov cautions against relying too much on historical data because it is very limited and may be completely inapplicable to the current risk environment. "Cyberrisk continues to evolve in ways not reflected by the current models and often unanticipated by experts," he says.

Alpin points to trends that can change so quickly, such as the recent uptick in ransomware frequency and severity. "When the trends are 5% to 10% year over year, and next year it's 50% to100%, that's something hard to predict," he says.

It is also difficult to predict how long trends will last because they could change quickly, Alpin says. For example, if governments ban cryptocurrency worldwide, which is highly unlikely, that will eliminate the main way ransomware hackers are paid.

Always lingering in the background is the possibility that a significant cyber event or "Cybergeddon" could shut down entire systems on a broader scale than has happened so far. The Colonial Pipeline and JBS Foods attacks could be preludes to future threats to the public infrastructure that could have even worse implications.

That means the line's most significant potential challenges could be yet to come. Krutov calls these current difficulties important reminders. "We have to place greater emphasis on assessing cyberrisk and, in particular, on managing this risk on a portfolio basis," he says.

Conclusion

The cyber insurance line's maturation will depend significantly on the insurance industry's ability to respond to ever-morphing risk. Modeling is challenging when cyberrisk and incidents are continuously dynamic, limiting the usefulness of some past data. At the very least, the past demonstrates that the bad actors will continue to raise the stakes with cyberattacks, higher ransoms and whatever comes next.

While insurers strive to anticipate future cyberrisk, underwrite coverage appropriately and assist in risk management, the fundamental reality is that preventing cyberattacks remains the customer's responsibility.

At the organizational level, preventing cyber incidents should not be seen as the sole responsibility of the IT department but must become part of its culture.

Until insurers and their insureds live and breathe cybersecurity, they will be in constant reactive mode to cyber criminals' latest innovations.

Annmarie Geddes Baribeau has been covering insurance and actuarial topics for more than 30 years. Her blog can be found at www.insurancecommunicators.com.

Handling Race in Models: Approaches Explored By JIM LYNCH

It is a delicate balance to ensure that property-casualty insurance products properly address longstanding, systemic, racial inequities, actuaries were told in a virtual general session, "Spotlight on Race and Insurance," at the CAS Spring Meeting in May.

Kansas Insurance Commissioner Vicki Schmidt outlined efforts by the National Association of Insurance Commissioners (NAIC) to develop tools for regulators to monitor the issue while "maintaining the ability of insurance companies to accurately assess and rate risk."

The trade-off could require actuaries to explicitly consider customers' race as they construct their models, panelists Birny Birnbaum of the Center for Economic Justice and Dorothy Andrews of the Actuarial and Analytics Consortium suggested in their remarks. Currently, insurers are prohibited from collecting customer data on race or considering it in the rating of their products.

Schmidt gave an update on the NAIC's Special (EX) Committee on Race and Insurance, which consists of five workstreams:

1. Diversity in the industry
2. Diversity in the regulatory community
3. Property-casualty insurance issues
4. Life and annuities issues
5. Health insurance issues

Schmidt is chair of the property-casualty workstream. The workstream is trying to determine steps that can be taken to mitigate the impact of residual markets, premium financing and non-standard markets on disadvantaged groups. They also want to develop ways to improve access to underrepresented groups through education, outreach and consumer partnerships. The workstream is collaborating closely with other actuary-centric NAIC groups, such as the Big Data and Artificial Intelligence Working Group and the Casualty Actuarial and Statistical Task Force. They also will be working closely with the CAS, Schmidt said.

> **"There is a history of discrimination that leaves a legacy of outcomes that are embedded in actuarial variables," [Birnbaum] said.**

Much of the discussion has involved pricing of insurance products, particularly personal auto, and the NAIC may be collecting data by race to better understand how and why race and insurance products interact.

"Many of these issues are very difficult," Schmidt said. "We must be mindful of how we develop tools for regulators. We have to do everything we can to have an industry that looks like the people we serve."

To address systemic racism in auto insurance pricing, Birnbaum has proposed a model that explicitly considers race as a variable. He notes that race has been banned as a variable even though it can be predictive.

The simplest example of how race can be predictive comes from life insurance. White people live longer than Black people. That, he said, is because Black people have been systematically discriminated against in housing, policing and health care. Such discrimination would shorten life expectancy.

Some of that bias, he said, creeps into the rating variables actuaries use. "There is a history of discrimination that leaves a legacy of outcomes that are embedded in actuarial variables," he said.

Birnbaum's methodology attempts to address the two subtle ways in which models sometimes discriminate: *proxy discrimination*, which he defined as a disproportionate outcome tied to proxies for race, and *disparate impact*, a disproportionate outcome tied to historic discrimination.

To tease out the discrimination, his modeling approach would explicitly look for how all other variables are correlated with race.

A model in which race is not a significant predictor and whose other variables are unchanged by, and uncorrelated with, the race variable would appear to be free of discrimination and could be used as is.

An example of proxy discrimination would be as follows: a model in which race is a significant predictor and has a variable that is both correlated with race and has lost its predictive power because of the introduction of the race variable. That variable would have to be removed from the model.

A model in which race is a significant predictor but whose other variables are largely unchanged would be an example of disparate impact. What happens to the model would depend on whether the other variables are essential to the insurer's business purpose or whether less discriminatory approaches were available.

A model in which race is a significant predictor but whose other variables have changed and lost some of their statistical significance would be a model with elements of proxy discrimination and disparate impact. The model would need to be revised and perhaps some of its variables prohibited.

This methodology, Birnbaum said, should be used in all types of modeling that insurers employ — pricing, marketing, claims settlement and anti-fraud initiatives.

Andrews said race could be incorporated into models to tease out algorithmic bias — the embedding of systematic discrimination into an algorithm.

The concept is drawing legislative scrutiny, she said. Ninety-four bills in the last session of Congress focused on algorithms. Two dozen have already been proposed this year. Andrews endorsed the concept of algorithmic accountability, defined as "the assignment of responsibility for how an algorithm is created and its impact on society." The accountability starts with an audit. Part of the audit is to examine how well the algorithm fits the data. "If an algorithm has a poor fit, it should not be put into production."

The audit should transcend statistical rigor, she said. It should also examine an algorithm from a social science perspective.

Using race as a variable has become a popular way to ensure that an algorithm is free of bias.

"By using race, firms can be forced to statistically isolate and remove the adverse effects of race in models," she concluded.

Schmidt, the Kansas regulator, said using an explicit race variable is "worthy of much more discussion."

Birnbaum agreed: "You have to measure what the problem is." ●

James P. Lynch, FCAS, has recently retired as chief actuary of the Insurance Information Institute.

Insurance as a Marketplace and a Community-Builder By JIM LYNCH

Most folks in the property-casualty world consider a hard market the once-in-a-generation time when commercial insurance prices rise rapidly. By that measure, spring 2021 was a hard market, with most lines of business seeing rates increase more than 10% from a year earlier.

To Jason Busti, president of North America for Axis Re, we're not quite there. A true hard market has insurers booking record profits, and U.S. property-casualty net income fell 4% last year, according to NAIC data compiled by S&P Global Market Intelligence.

Busti and Sean Keveligan, chief executive officer of the Insurance Information Institute, shared their executive-level insights into where the industry is heading, both financially and as a leader shepherding the economy through truly disruptive times. Busti and Keveligan presented at a virtual session of the CAS Spring Meeting in May called "Insurance Market Overview and Outlook: Where Are We in the Cycle?"

Though there was some crossover, Busti tended to focus on the business aspects — profits, market share and underwriting — while Keveligan addressed insurance as a provider of forward-thinking solutions for consumers, communities and employees.

Keveligan focused on how insurers help manage several areas disrupting society, including:

- Natural catastrophes, both by protecting customers and by educating them in how to be more resilient.
- The pandemic, through returning $14 billion to customers who drove less during lockdowns.
- Economic instability, by providing steady employment and premium growth even as the pandemic throttled much of the economy.
- Social unrest, by protecting businesses damaged during unrest while focusing on fairness and equity for customers and employees.

"At the center of all this is insurance," Keveligan said, helping to manage disruption "in a positive way."

Both Keveligan and Busti listed climate change as a top risk the industry faces.

"We've seen the beginning of it," said Busti, noting the increasing number and size of natural catastrophes. From a business standpoint, he is concerned that climate change is happening so quickly that the catastrophe models that insurers depend on have a hard time keeping up. He noted that, despite more than a year of rate increases, industry return on equity remains in the single digits.

"The impacts of climate risk and social inflation are starting to heat up in the results," he said, which leaves a bit of a race between rising rates and rising loss trends. Keveligan noted the I.I.I./Milliman forecast pegs the combined ratio at just under 100% for the next couple of years. Busti concluded that for lines that absorb a lot of capital (property insurance and reinsurance, for example), that the projected combined ratio might not be good enough.

"What we have seen in the last few years is so radically different from anything we have seen in history," Busti said.

For Keveligan, the climate issue runs parallel to the movement for socially responsible investing, which usually is known through the shorthand ESG, standing for environmental, social and governance issues.

"ESG is in insurance's DNA," Keveligan said. Insurers already factor those issues into their balance sheets and need to do more to create ESG-friendly products and to encourage customers to practice resilience by, say, understanding the risk of moving into a wildfire-urban interface or moving into a flood-prone area.

"It might be beautiful to have a place with a beautiful ocean view, but there are risks associated with that," he said.

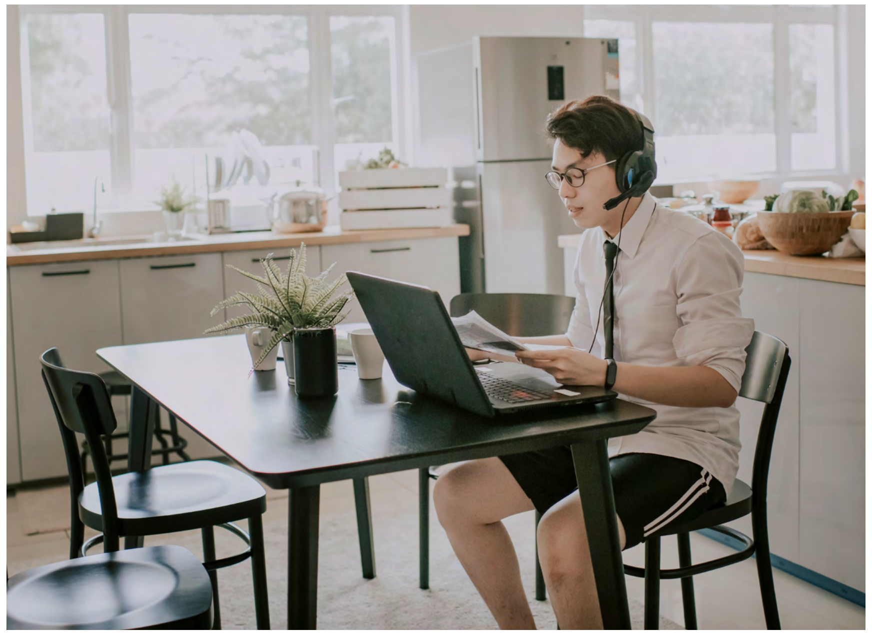
The challenges come from more than just the changing natural world.

Last year's work-from home culture increased exposures, and ransomware severity exploded — the typical ransom exceeds $1 million now, versus a year ago when the norm was in the tens of thousands.

Cyber insurance has also provided temptation and frustration for insurers — temptation by being one of the fastest-growing lines of business and frustration because the nature of claims keeps changing. Last year's work-from-home culture increased exposures, and ransomware severity exploded — the typical ransom exceeds $1 million now, versus a year ago when the norm was in the tens of thousands.

Cyber insurance is "very difficult at the moment," Busti said, though it remains a "fascinating space." The changes in cyber threats are likely to change the way that insurers deploy the product.

"It will be very difficult to price something that evolves so quickly," he said.



Keveligan expressed concern that the industry may end up inadvertently insuring a cyber event so big that it "could have a pandemic-type impact." It would make sense, he said, to get government more engaged in the market, lest insurers become overextended in their commitments.

Both speakers said actuaries have an important role to play in solving these and other problems. Keveligan noted that actuaries' skills can "truly create ways to solve climate risk," which should make the field attractive to college graduates who yearn to make a difference in the world.

Busti encouraged pairing the actuarial skillset with macroeconomic research to better forecast trends. He recommended actuaries spend more time with other insurance and reinsurance functions — clients, cedents and underwriters — and create an "actuwriter" profession that both calculates and communicates.

"There is so much going on" in insurance, he said, that "it is such an exciting time" to be an actuary. ●

Taming the Social Inflation Tiger

By JIM LYNCH

The term social inflation is hardly new — Warren Buffett trotted it out in a 1977 letter to Berkshire Hathaway shareholders — but the term has a new resonance as insurers grapple with a disturbing growth in claims.

Actuaries attending “Social inflation: The rising costs of insurance claims as a result of societal trends and views,” a virtual session at the CAS Spring Meeting in May, got an overview of the topic — what it is, how it’s growing, why it’s happening and what can be done about it.

David Corum, vice president of the Insurance Research Council, documented the rise of the phenomenon. Dana Franzetti, head of P&C reinsurance claims, U.S., at Swiss Re, discussed the role of plaintiffs’ attorneys and the legal strategies to overcome it, and William Finn, FCAS, senior vice president and chief actuary of Hanover Insurance, discussed the role that actuaries can take in diagnosing and addressing the issue.

Speaking first, Corum noted that Buffett said social inflation was “a broadening definition by society and juries of what is covered by insurance policies.” The problem may have ebbed after Buffett spoke, and plaintiffs’ attorneys say the term is used as an excuse to “distract the public from unrelated economic decisions.”

Corum said his research showed “alarming” trends in liability lines.

Commercial auto losses, which had grown just 1.0% annually from 2009 to 2014, grew 10.9% a year from 2014 to 2018. Product liability and other liability lines suffered similar upticks, Corum noted. All of them grew considerably faster than the gross domestic product and the consumer price index. His research also pointed to signs of social inflation in medical malpractice and personal auto bodily injury liability.

Speaking first, Corum noted that Buffett said social inflation was “a broadening definition by society and juries of what is covered by insurance policies.”

Why is it happening?

People are more motivated to seek compensation for losses, Corum said. People are angrier. The Gallup Organization periodically polls people on how angry they felt the day before the pollster visited. In 2020 38% said they had been angry, which is more than twice as many as in 2017.

“We don’t know what people are angry about,” he said, but “anger is a factor that determines claiming behavior.” Researchers have found people with higher levels of anger are more likely to file personal injury lawsuits.

Society trusts business less, he noted; only the media and Congress rate lower in public esteem, according to polling by the Pew Research Center. “These deteriorating attitudes might motivate more persons to file personal injury claims,” he said.

Meanwhile, Americans have become more tolerant of litigation. The percentage of people agreeing that there are too many lawsuits fell markedly from 2016 to 2018, according to surveys by DecisionQuest, a jury consulting firm.

There’s also evidence that people are becoming more litigious, even in areas like no-fault auto insurance, which was designed to minimize the need for attorneys. Insurance Research Council work shows attorney involvement in no-fault claims rose steadily between 2007 and 2017.

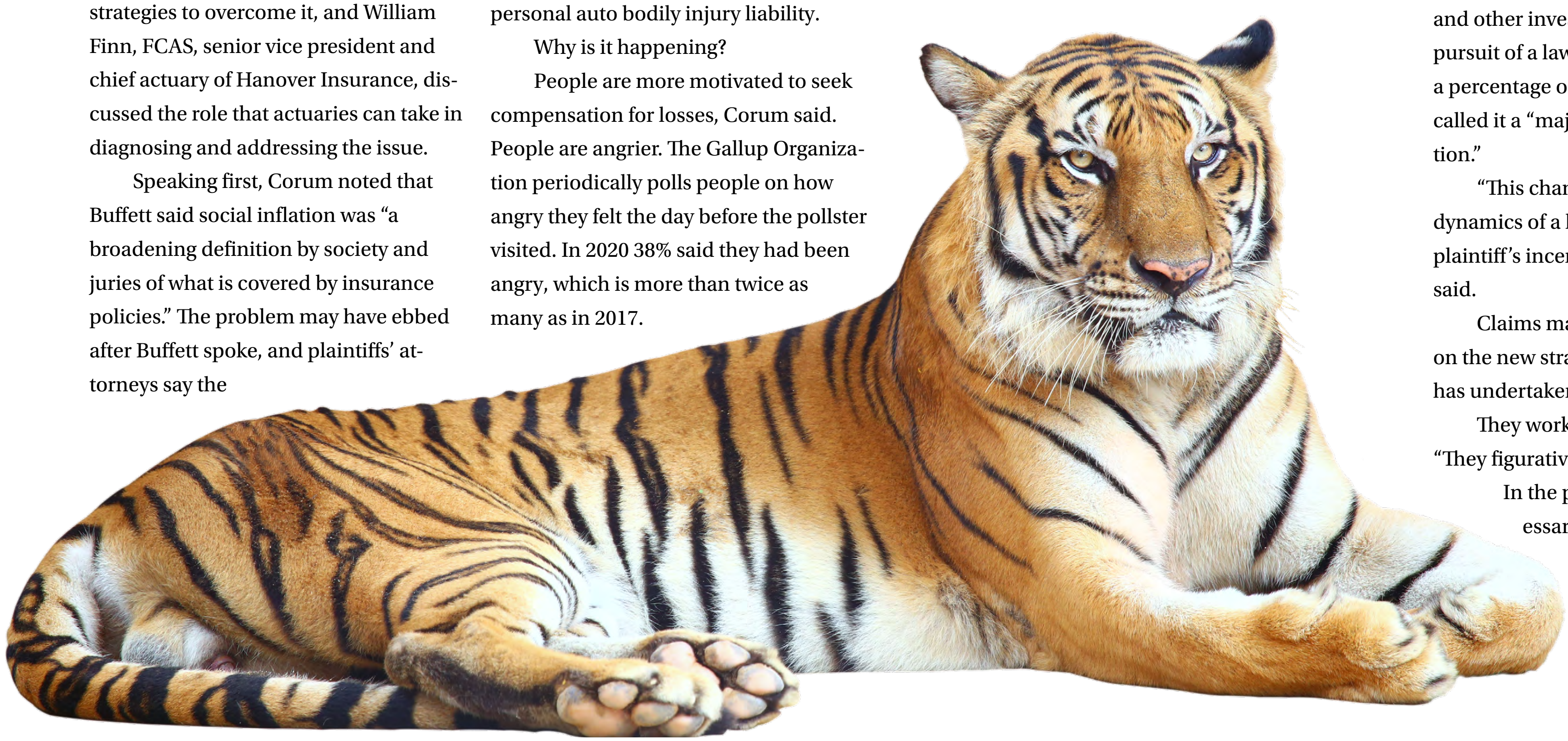
And attorney advertising seems to be on the rise. Chicago, Los Angeles, New Orleans and Philadelphia all posted steep increases in lawyers advertising on local broadcast stations between 2016 and 2019.

Attorneys are increasingly receiving financial support from investors, Corum said, as the legal doctrine of champerty, which forbids third parties from financing plaintiffs, erodes. Venture capitalists and other investors help bankroll the pursuit of a lawsuit, in exchange for a percentage of a settlement. Corum called it a “major factor in social inflation.”

“This changes the fundamental dynamics of a lawsuit by neutralizing the plaintiff’s incentive to settle a claim,” he said.

Claims manager Franzetti focused on the new strategies the plaintiff’s bar has undertaken.

They work together more, she said: “They figuratively unionized.”



In the past, “they wouldn’t necessarily share what they were doing.” Now they understand “if the attorney down the hall gets a big verdict, that’s good news for them all.”

They share names of witnesses and claims adjusters, transcripts of depositions — all to provide a roadmap for how to handle those same witnesses should they be deposed or testify again.

And they share when they will be making their opening statements, so fellow attorneys can file into the courtroom and sit behind the plaintiff. “That sends a subliminal message to the jury,” she said.

They remain consummate storytellers, but the story has changed. In the past, Franzetti said, they tried to get the jury to sympathize with the plaintiff. Now they want to make jurors angry at the defendant, and to persuade jurors that assuaging that anger will be a socially responsible action.

Plaintiffs’ attorneys have also developed new tactics to get at multi-million verdicts. They don’t focus on the total award. They break it into pieces. It’s not pain and suffering taken together; they endorse one calculation for pain (say $10,000 a month) plus another for suffering plus another for loss of enjoyment plus another for loss of consortium, and so on.

The defense can fight back, though.

It starts early in the legal process. Witnesses need to be prepared before they are deposed, because it is at that stage that plaintiffs’ attorneys assess how strong (and profitable) their cases can be.

Franzetti recommended that defense attorneys develop a counter-narrative, an alternative to the anger-inducing tale plaintiff attorneys develop. When that doesn’t happen, Franzetti said, jurors “latch onto the story they understand — the one the plaintiffs have presented.”

And research is finding the conventional wisdom on defense behavior could stand tweaking. Franzetti noted that it is now considered OK if plaintiffs acknowledge they did something wrong. And it’s OK to suggest a settlement number to jurors. Without that, jurors will anchor the settlement to the number the plaintiff developed.

Actuaries can play a role in squashing social inflation, chief actuary Finn suggested. Up to now, he said, traditional actuarial techniques have not been especially helpful when the marketplace pivots.

He invoked the old joke that actuaries help direct insurance companies, the way a passenger can direct a car down the freeway by looking out the back window. “That works well,” he said, “when the road is straight.”

Social inflation presents a windy road, however, which he demonstrated by showing accident year results for commercial auto liability. From 2004 to 2009, initial loss estimates for the line were too high. Every year since, they have been too low.

Industrywide, analysis failed to recognize the impact of the recovery from the Great Recession, the increase in distracted driving, the new attorney strategies.

He said actuaries should be encouraged to be creative. Reserving actuaries should link their work to that of the claims department, particularly in developing analytic tools that help adjusters manage claims more efficiently. They need to advocate for data-driven decision making.

“We’re very reactive,” he said. “By the time we actuaries see it in the data, it’s too late.” ●

An Interview with the First Recipient of the Certified Specialist in Catastrophe Risk by Exam

By AMY BRENER, DIRECTOR OF THE CAS INSTITUTE (iCAS)

A few weeks ago, I spoke with Andrew Golub, FSA, CERA, who, in addition to being the chief analytics officer at Beecher Carlson, has the distinction of being the first person to attain The CAS Institute's Certified Specialist in Catastrophe Risk (CSCR) designation through examination. It was gratifying to hear him talk about the transparency of the program and how it has increased his ability to unpack what is in the "black box" and learn more about the workings of models. Following is part of our talk.

Amy Brener: Let's start by telling me a little bit about yourself. I know that you are a Fellow of the Society of Actuaries and a CERA. How does being an actuary help you do your current job?

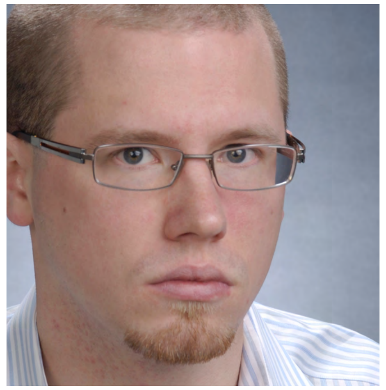
Andrew Golub: I think actuarial training is about two things. One is baseline knowledge, a breadth of contextual information that you have been trained on. That allows you to apply technical methods to real-world problems, whether those methods are from mathematics, statistics, basic finance, interest theory, or balance sheet management for risk-bearing entities. All of those are skill sets that are useful. So having a baseline knowledge that can allow you to be fluent in risk models, decision making around risk and financial optimization is one element.

The second part of being an actuary that is helpful is the critical thinking component. I believe that the actuarial profession, through its required course work, has done a really good job over the years of training people who are not just designed to check a regulatory box. Actuaries do add substantial value to the insurance industry through their interactions with the regulatory system, but they are also able to help solve the types of challenging risk-related problems which require you to look across different disciplines to find the best solution, and to implement that solution. So, I would summarize it as skill sets plus problem solving.

Brener: You recently completed the examinations and earned the iCAS CSCR (Certified Specialist in Catastrophe Risk) designation. What prompted you to take those exams?

Golub: Catastrophe modeling has been part of my job on some level for most of my career. I began in the underwriting business unit of our company, which had underwriting authority on behalf of carriers to assess and price risk associated with construction projects. And immediately upon our beginning that business … catastrophe modeling came up. The carrier partners we were doing business with were leveraging tools [produced by cat modeling software companies] like RMS and AIR, so it was incumbent upon us to get involved with that overall process, license the software, become astute at using it, etc.

That was the beginning of my career and throughout the progression of my work life, catastrophe modeling has been involved in my roles at varying levels. So, when this new educational program was launched, it caught my eye. I had worked with catastrophe model outputs from the vendors for many years but had always viewed their underlying methodologies as opaque. If I had to explain with rigor how the software translates exposure data into loss estimates, it was challenging. I could articulate basics but did not have as deep of an understanding of the underlying science as I wanted to have.



Andrew Golub, FSA, CERA, CSCR

These courses formed a continuing education program that elucidates some of those inner workings and provides some level of insight into at least where to look, if you want to research the scientific assumptions related to the modeled frequency or severity of cat events. It was really appealing. You can get materials from the vendors' documentation libraries, but those libraries are not set up to be optimized for this purpose. Rather than having to organize some sort of educational track myself, having organizations I was already familiar with, such as iCAS and The Institutes, was great. The program put together clear and accessible educational materials which intersected with a topic that I was interested in. That appealed to me.

Brener: When we developed this credential, we deliberately made it platform-agnostic, for exactly the reason that you are stating. In fact, we had people from RMS, AIR and CoreLogic working on it. So, it is clear that the modeling companies also see a value in this and understand that this is complementary to the certifications they offer, as opposed to being in competition with it. I appreciated hearing you talk about transparency and that the program increased your ability to unpack what is in the black box because you gained more knowledge about what goes into the models. I'm gratified to hear that because that was one of the aims of the program.

Brener: What would you tell someone who works for you about the value of these exams?

Golub: I would definitely recommend this to someone who is in a place in their life where they are looking for a continuing education program to dedicate time to. That is always a personal decision. We do not like to bully people into shifting their professional vs. personal life balance … .

Even if you are not in a natural catastrophe focused role, it still provides valuable insights into how to tackle problems. One example would be leveraging the framework and the thought process that the innovators within the catastrophe modeling space took to quantify risk from natural perils like hurricane and earthquake and using it as a case study to address other problems where there is no historically defined model development path, such as cyber liability. In that case, you have something that shares some properties with natural catastrophes in that there is a low annual probability of an occurrence, but when you do have an occurrence, it can be very severe. There is not a clear-cut actuarial playbook for how to address that, and most of the analytical tools accessible to P&C actuaries are not going to apply well because they rely on large volumes of claims data, which is not necessarily in existence for the most extreme types of cyber losses.

The way people were able to figure out an approach that did not exist 40 years ago to quantify hurricane exposure for an insurance portfolio provides lessons in critical thinking and how to navigate through multidisciplinary problems and embed conclusions into a consolidated framework for quantifying risk.

This credential provides a lot of value for anyone in the analytical space working on property-casualty problems. But if you are a practitioner solely focused on catastrophe modeling, I think it is doubly important to have some source of shared information you can access, even if it is shared with people from competing firms. A credential program like this has a lot of promise when it comes to serving as that focal point, in my opinion.

Brener: I know that you are familiar with our Certified Specialist and Predictive Analytics (CSPA) credential. Who would you recommend that credential to?

Golub: I can think of two groups of practitioners that would materially benefit from the CSPA. If you are a new insurance analytics professional who does not have practical experience working with insurance data and you are interested in building predictive models, or if you are in a role where you have to support the building of predictive models, I think it looks valuable. I would also potentially recommend it to someone who has a traditional actuarial background and a good knowledge of insurance data but is not yet really familiar with the statistical underpinnings of calibrating multivariate models, GLMs and so forth.

Brener: Great. Is there anything that you would like to add that I did not touch upon?

Golub: I am impressed by the amount of work that was put into this program, which I think is needed. Some of the course readings mentioned that many catastrophe modeling practitioners look at the actuarial profession and say, "We wish we had a similarly standardized set of best practices, which even people at competing firms can agree on, and a set of baseline educational knowledge that we would expect practitioners within this field to have mastered." This is definitely a strong move in the right direction for this blossoming field of natural catastrophe modeling, which is already very prevalent and seems as if it will be of increasing importance in the years to come.

Brener: Super! Thank you so much for spending time with me.

If you are interested in learning more about how credentials and continuing education in predictive modeling or catastrophe risk from The CAS Institute can benefit your career, please visit our website, TheCasInstitute.org.

The CAS Institute Conducts Its Predictive Analytics Community of Practice

By MIKE WOODS, CHAIR OF THE ICAS CONTINUING EDUCATION COMMITTEE

On March 15, 2021, the CAS Institute met for its annual Predictive Analytics Community of Practice, bringing together predictive analytics professionals for a series of presentations and roundtable discussions on current topics. This year the all-day virtual event was open to everyone including those without the CSPA credential. The morning session centered on the current hot topic of fairness and social justice in insurance. Participants learned about the impact that the social justice movement has had on insurance rating and discussed a framework to assess fairness in insurance based on the field of ethics. A roundtable discussion was also held on how predictive analytics professionals could contribute to assessing bias in insurance rating.

Given their understanding of the underlying data and computational algorithms, analytical professionals need to be major contributors in assessing and ensuring equity in insurance.

One important takeaway was that, given their understanding of the underlying data and computational algorithms, analytical professionals need to be major contributors in assessing and ensuring equity in insurance. During his presentation, Roosevelt Mosley, FCAS, CSPA, suggested several methods that analytical professions could use to increase equity in insurance pricing. These could include excluding specific characteristics from rating plans, controlling for protected characteristics in pricing or adjusting final outcomes for protected classes.

The afternoon session focused on predictive analytics techniques. The topics included a new and flexible regression model for ratemaking and reserving; how artificial intelligence (AI) can be utilized in actuarial functions; and how data scientists, actuaries and business partners can better work together to solve business problems.

Professor Andrei Badescu from the University of Toronto introduced a flexible framework for modeling actuarial problems that utilizes a Logit-weighted reduced mixture of experts model. This framework can be "fully flexible" to capture any distribution, dependence, or regression pattern including nonlinear regression and covariate interactions. Badescu and his colleagues developed a publicly available R package (LRMoE.R) and Julia package (LRMoE.jl) that allow anyone to apply the framework. In addition, he mentioned that he and his colleagues are seeking partnerships with insurance companies to further develop their research on this topic.

Ronald Richman, FIA, FASSA, CERA, managing head of insurance actuarial at SA Taxi in Johannesburg, presented on the application of AI in actuarial functions. He showed that deep learning can open new possibilities for actuarial modeling by solving difficult model specification problems, especially those involving large-scale modeling problems. Richman also challenged the assumption that artificial intelligence algorithms are black boxes by showing that learned representations from deep neural networks often have readily interpretable meanings.

To purchase recordings of the 2021 iCAS Community of Practice event, please visit the iCAS website. Meanwhile, planning has begun for the traditional in-person iCAS Community of Practice Event to be held immediately prior to RPM in March 2022.

The CAS Institute hopes to see you at the Community of Practice event next year!

Mike Woods, FCAS, CSPA, MAAA, is an actuary and senior manager for Allstate Insurance Company.

IN MY OPINION By GROVER EDIE, *ACTUARIAL REVIEW* EDITOR IN CHIEF

Aligning Goals with Purpose

Have you ever wondered why some enterprises thrive and others fail? One way to answer that question is to look at turnarounds — why did these programs get in trouble in the first place, and how did they return to being successful?

One of the things I noticed about nearly all of the programs that ran into difficulty is that they departed from what made them successful in the first place. Management became distracted from what they had been doing successfully to go after something else. Some sought growth over profitability; others failed to follow the standards they advocated as an organization.

In the successful turnarounds, tasks are prioritized using the acronym SAGE, which stands for Survive, Accomplish, Grow and Expand. SAGE gives the order of priority of what must be secured before going to the next letter.

Insurance companies would grow, abandoning solid underwriting, pricing and the other activities that had made them profitable initially, and then wonder why they were in financial straits. You can probably add your own list of failed organizations to the list.

And it isn't just insurance companies. It applies to cities and towns, clubs and nearly any other collection of individuals banded together for a purpose.

In the successful turnarounds, tasks are prioritized using the acronym SAGE, which stands for Survive, Accomplish, Grow and Expand. SAGE gives the order of priority of what must be secured before going to the next letter: Make sure the organization will survive before moving to accomplish the purpose. Secure those first two items before moving on to grow. Insurance programs I was working with generally had gotten into trouble when they concentrated on "grow and expand" and neglected "survive and accomplish."

Even restaurants try to grow without protecting their base. They expand their menus to attract a broader client base and lose their regular customers as their base fare and service deteriorate. Six months later, they either go back to the original menu or go out of business.

At one restaurant where I was a regular patron, they stopped adding cheese to the "loaded baked potato" and subsequently stopped offering sweet and sour sauce to go with the shrimp.

When asked, the manager replied, "We didn't have much of a demand for them, so we took them off the menu." In turn, I took them off my list of restaurants to patronize. When profits overshadow customer service, businesses tend to lose customers. When restaurants provide excellent service, including their fare, price is secondary, and the establishments can make a profit.

Rabbi Daniel Lapin writes in his book, *Thou Shall Prosper*, "When you receive payment after supplying the needs of a client, a customer, your boss … that money is a testament to your having pleased another human being."[1] When the payment is prioritized over supplying the needs of the customer, the process falls apart. Profit is the result — the grade card.

The CAS has four purposes:

- Advance the body of knowledge of (P/C & related) actuarial science.
- Establish and maintain standards of qualification for membership.
- Promote and maintain high standards of conduct and competence for the members.
- Increase awareness of actuarial science.

That's it. That is what the organization is designed to do, and it is what has enabled us to be successful as an organization and rebuff attempts at takeovers, mergers and other losses of independence. Sticking to our purposes is fundamental in our continued success.

Growth in membership, including our growing international presence, is a result of our meeting and maintaining these purposes, not the other way around. If we ever concentrate on growth over these four purposes, we risk failure as an organization.

I have seen many successful growth campaigns — successful both in volume and profitability. But such growth was generally not performed by the top personnel. They approved the plan, monitored the progress, but kept their focus on running a successful organization. The day-to-day activity of growth is delegated to another group, who could work full-time on the growth project. Some growth programs literally grew their companies into insolvency.

I have also seen many churches engage in a building expansion, only to see the support for the projects dwindle as the pastors spent more energy on the physical expansions than doing the jobs they were hired to do, which is to lead the congregation and preach. Having taken their eyes off the ball, neither job (pastoring nor building superintendent) tended to succeed. And often the pastors were forced out of the very church buildings they championed.

I have seen the same issue at companies and even with marriages. The individuals were more involved in building the building than building the company or the marriage.

"Expand" is what the Society of Actuaries is doing with their "general insurance track" by moving outside their traditional domain of expertise.

I am concerned that the CAS may be becoming involved in activities, as honorable as they might be, and taking its eye off the purposes for which it was founded.

Any endeavor, any goal, any initiative we undertake that is not exactly aligned with our Society's purpose distracts us from that purpose.

It provides the seeds of failure. It is like corn in a wheat field — a worthy grain, just distracting and taking nutrients from the primary purpose (growing wheat).

As you make decisions, whether it is voting in the CAS election or another venue, I'd like you to ask yourself, "Will what I am about to do support or detract from accomplishing the purposes for which the organization is purposed?"

In my last column, I described how I got things out of my sight to enable me to better concentrate on the task at hand. The to-do piles distracted me from my current purpose. For an organization, seeking alternate goals can be a similar distraction from accomplishing the purpose for which it was established. A goal is different from a purpose, but any goal of the organization needs to be aligned with its purpose. Otherwise, it is distracting and diverting its energies and funds and is diluting its effectiveness, like planting corn in a budding wheatfield.

As you make decisions, whether it is voting in the CAS election or another venue, I'd like you to ask yourself, "Will what I am about to do support or detract from accomplishing the purposes for which the organization is purposed?"

[1] *Thou Shall Prosper*, second edition, John Wiley & Sons, Inc. 2010, p. 17.

IT'S A PUZZLEMENT By JON EVANS

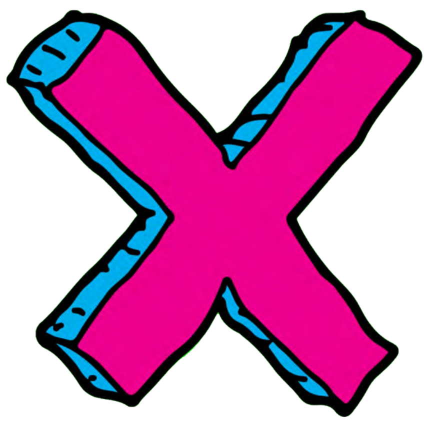
Which Number is Larger?

Let $k = 10^a$ where $a = 10^{1,000,000,000,000}$. Which number is larger, the k^{th} root of k, $\sqrt[k]{k}$, or the $(k+1)^{\text{th}}$ root of $k+1$, $\sqrt[k+1]{k+1}$? What if k is some other positive integer?

Multiply Them All Together

Intuitively, it seems like all the positive rational numbers, except 1, could be paired off as p/q and q/p, where p and q are coprime. Since the product of each of these pairs is 1, it would seem like when you multiply these infinitely many "pair 1s" together and then multiply by 1 itself, you would just get 1!

The problem is that when you actually line up all the positive rational numbers in an infinite sequence (prior to any "pairing"), you get infinitely long subsequences that diverge to $+\infty$ or converge to 0, respectively. Since the logarithmic function is continuous on the positive real numbers, if the product of the rational numbers converged to a finite number other than 0, then the sum of the corresponding logarithms would also converge to a finite number. This is clearly impossible since this infinite sequence of logarithms will contain subsequences that diverge to $+\infty$ or $-\infty$, respectively. It is possible to form orderings of the positive rational numbers so that the product will either converge to 0 or "converge" (monotonically diverge) to $+\infty$, respectively, which is an inconsistent and unsatisfactory answer!



Now, if $q_2 > 1 > q_1 > 0$, the same divergence problems happen for all the rational numbers in either of the intervals (q_2, q_1) or $[q_2, q_1]$. However, if $1 \geq q_2 > q_1 > 0$, then the product of all the rational numbers in either of these intervals clearly converges to 0. On the other hand, if $q_2 > q_1 \geq 1$, then the interval products clearly monotonically grow larger beyond any limit, "converging" to $+\infty$.

Solutions were also submitted by John Berglund, Bob Conger, Clive Keatinge, Chak Wai Lam, Eamonn Long, Tim Mosler, Anthony T. Salis, David Skurnick, J. Tyler Smith and William D. Volterman.

Know the answer? Send your solution to ar@casact.org.

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