



The 56th Actuarial Research Conference

Special Invited Session Information

Thursday, August 19, 2021

10:20 AM – 11:35 AM

Climate Risk Session

Panelists:

Steven Bowen, Aon

Didier Serre Ruah, Clearsum

Robert Erhardt, Wake Forest University

Steven Bowen, Managing Director | Head of Catastrophe Insight, Aon



Steve has had a lifelong fascination with the weather. With a scientific background in meteorology and after starting his professional career in television, he shifted into the insurance industry when joining Aon in 2007. His current title is Managing Director and the Global Head of Catastrophe Insight. He is based in the Impact Forecasting division. His role is focused on helping to communicate the growing risks of natural perils and climate change around the world. A key motivation of his work features the emerging and evolving trends associated with increasing weather volatility, climate change, population and exposure patterns, and natural hazard-related financial losses. He is a frequent collaborator with governmental agencies, academia, and industry groups, and has co-authored several published peer-reviewed journals.

Steve earned his Master of Science in Business Analytics degree from the University of Notre Dame, and his Bachelor of Science degree in Meteorology from Florida State University.



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Presentation Title: Navigating Catastrophe Risk in an Era of Climate Change

The risks associated with weather and climate-related impacts to the public and private sector continue to grow. An evolution of weather behavior across the United States and beyond has led to increased loss costs and begun to prompt greater awareness around planning and initiating mitigation measures. This session will highlight some of the driving factors behind the trend of higher financial costs, including weather variability, climate change, and socioeconomics, and discuss how the industry is starting to account for these challenges.

Didier Serre Ruah, Director - Climate Risk Modeling & Research, Clearsum



Didier is a consulting actuary with climate, sustainability, and risk knowledge. Currently, he serves as the Director, Climate Risk Modelling and Research at Clearsum, a Canadian-based risk strategy firm. Outside of work, he is a continuous learner who loves helping others. With a mathematical background, Didier is focused on assisting organizations with climate risk assessment, scenario analysis and resilience planning to guide strategic decisions and value creation in a constantly changing landscape. He is fascinated by the interconnected nature of the world, and by how key sectors may be reshaped in the long-term by changes in weather patterns, exposures, population dynamics, stakeholder behaviors, and the much-anticipated climate response.

Didier has several years of global experience in traditional and less traditional actuarial roles in insurance, reinsurance, and health economics consulting, which fosters a multi-view approach to solving complex problems. He pursued higher education in Montreal, QC and London, UK. He is also an active member of the Climate Change and Sustainability Committee at the Canadian Institute of Actuaries (CIA) and the Catastrophe and Climate Strategic Research Committee at the Society of Actuaries (SOA).



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Presentation Title: Number Crunching and Storytelling: A Framework for Actuaries for Managing Climate Risks and Building Resilience

In this session, Didier will be sharing five key learnings and insights from the perspective of a health actuary turned climate actuary. As a profession, quantifying risk is our bread and butter but navigating high uncertainty requires an additional set of tools, particularly when the risks analyzed are complex and non-linear, fraught with many inter-dependencies, and lacking relevant historical data due to their unprecedented nature. The quest for climate mitigation and adaptation also represents a new challenge for the profession.

Understanding, assessing, and managing climate-related risks ultimately require a holistic view, preferably one that encompasses qualitative as well as quantitative approaches to risk and uncertainty, and nested within a narrative that supports climate resilience and long-term business sustainability. This framework for the 'next-gen' actuary is forward-looking, challenging business-as-usual assumptions, and fostering societal resilience in a changing climate.

Robert Erhardt, Associate Professor of Statistics and Associate Chair, Wake Forest University



Rob Erhardt is an Associate Professor of Statistics at Wake Forest University in Winston-Salem, NC. He holds a Ph.D. in Statistics and Operations Research from the University of North Carolina at Chapel Hill, an M.S. in Statistics from the University of Wisconsin-Madison, and a B.A. in Physics from SUNY Geneseo. He is also a credentialed actuary and Society of Actuaries Hickman Scholar. His research areas include environmental statistics, computational statistics, and actuarial science, with a particular interest in work at the intersection of insurance and climate risk. Originally from rural New York State, he is an avid runner and backpacker, and a poor jazz pianist.



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Presentation Title: Climate, Spatial Dependence and Flood Risk: A U.S. Case Study

Flood represents one of the costliest and most disruptive natural disasters in the United States, and the economic losses from flooding are trending upward. While this trend is known to be driven primarily by an increasing population and wealth exposure, climate change is also impacting flood risk in more subtle ways. We merge data on economic flood losses, historical climate, census population, and geological characteristics to explore drivers of flood losses and climate trends. Our data covers 292 hydrobasins spanning the continental United States, over the period 1979-2018. We fit a Bayesian spatial mixed effects model for flood loss frequency. We also fit a Bayesian mixed effects model for flood severity loss-per-person. Both models control for measured covariates, contain random effects to capture variation from unmeasured covariates, and quantify climate drivers of flood risk. We show empirically that: flood losses exhibit spatial dependence which requires spatial statistical models; climate variables are partial drivers of increased frequency and severity; measures of spatial dependence have been changing over time; and, through a simulation study, we lay a groundwork to disentangle climate and non-climate drivers of these changing measures of spatial dependence.

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11:40 AM – 12:40 PM

Diversity, Equity, and Inclusion Session (Round Table)

Panelists:

Jake Akstins, Nationwide

Trisa-Lee Gaynor, Genworth Financial

Enrique Schulz, Segal Consulting



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Jake Akstins, Actuarial Consultant at Nationwide | SAGAA President & Co-Founder



Jake Akstins, ACAS (pronouns: he/him) is an Actuarial Consultant at Nationwide Excess & Surplus, where he specializes in Individual Risk Pricing for General Liability and Excess. In 2020, Jake co-founded the Sexuality and Gender Alliance of Actuaries (SAGAA), a networking group for LGBTQ+ actuaries and their allies. He is a proud alumnus of the University of Illinois at Urbana-Champaign. In his free time, Jake enjoys cheering on the Chicago White Sox and engaging as a superfan of the TV show, Big Brother.

Trisa-Lee Gaynor, Long Term Care Actuary, Genworth Financial



Trisa-Lee is a Long Term Care Actuary at Genworth Financial, supporting their rate filings team and is currently one of the champions for the Genworth Actuarial Development Program. Trisa-Lee also serves as the co-leader for the IABA Mentoring Committee. She started her actuarial career at Genworth in the Actuarial Development Program rotating through various valuation roles before leaving for Prudential for 4 years and returning to Genworth in January 2020. Trisa-



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Lee holds a B.S. in Actuarial Science from the University of the West Indies in Jamaica. She is a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries.

Enrique Schulz, Health Actuary, Segal Consulting



Enrique is a Health Actuary with Segal Consulting specializing in employee benefits for the public government sector as well as a member of Segal's SHAPE team (Segal Health Analysis of Plan Experience). He also consults on Spanish benefit communications for his clients on a national basis.

As part of his professional commitment, Enrique finds it very important to increase Diversity, Equity, and Inclusion (DEI) in the actuarial community. This has led him to currently serve on organizations such as the Organization of Latino Actuaries (OLA) Board of Directors, the Health Equity Work Group for the American Academy of Actuaries, and the DEI Committee for the Society of Actuaries. Separately from his actuarial responsibilities, he also has the pleasure of serving on the Loyola Marymount University Alumni Board.

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1:50 PM – 3:05 PM

Cyber Risk Session

Panelists:

Michael Bean, ACTEX Learning

Maochao Xu, Illinois State University

Karen Heart, DePaul University



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Michael Bean, Staff Actuary and Chief Learning Officer, ACTEX Learning



Michael Bean is Staff Actuary and Chief Learning Officer at ACTEX Learning. Prior to joining ACTEX, he held executive-level positions in government and industry for many years and was a professor of actuarial science at the University of Michigan and the University of Toronto.

He is the author of the best-selling textbook *Probability: The Science of Uncertainty with Applications to Investments, Insurance and Engineering*, published by the American Mathematical Society, and has written papers on cyber insurance for the Casualty Actuarial Society and on the determinants of interest rates and the actuarial applications of options and other financial derivatives for the Society of Actuaries. His most recent work is *Learning by Doing: Case Studies in Predictive Analytics*, a learning guide for actuarial students and professionals published by ACTEX Learning.

Michael is a Fellow of the Casualty Actuarial Society, a Fellow of the Society of Actuaries, and a Fellow of the Canadian Institute of Actuaries. He also holds the CERA designation and has a Ph.D. from the University of Waterloo.

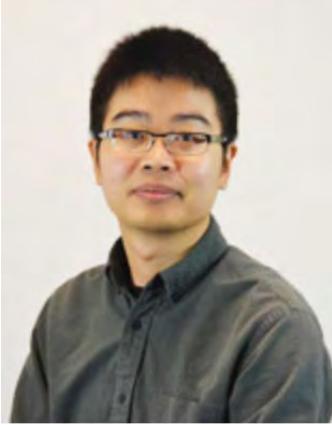
Presentation Title: Measuring Exposure in Cyber Insurance

We all know that cyber risk is a growing problem, but what exactly is it and how should it be measured? This presentation provides a brief survey of the cyber insurance coverages currently available, describes a framework for recording cyber events in a consistent way, and discusses the results of recent research on exposure measures for cyber insurance sponsored by the Casualty Actuarial Society. No prior knowledge of cyber insurance is required.



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Maochao Xu, Professor and Director of MSMC Lab, Illinois State University



Dr. Maochao Xu is a Professor in the Department of Mathematics, Illinois State University. He is also an Advisor for the cyber insurance products in CloudCover Inc. His research interests include cybersecurity insurance, statistical modeling, and risk analysis. His research is/was supported by SOA and CAS.

Presentation Title: A Multivariate Frequency-Severity Model for Healthcare Data Breach

Data breach in healthcare has become the biggest concern in recent years which causes millions of dollars in financial losses each year. It is fundamental for government regulators, insurance companies, and stakeholders to understand the breach frequency and the number of affected individuals for each state as it is directly related to the federal HIPPA and state data breach laws. However, an obstacle for studying the data breach in healthcare is the lack of suitable statistical approaches. In this talk, we discuss a novel multivariate frequency-severity model to analyze the breach frequency and the number of affected individuals at the state level. A mixed effect model is developed to model the square root transformed frequency, and the log-gamma distribution is proposed for capturing the skewness and heavy tail exhibited by the distribution of numbers of affected individuals. We further discover a positive nonlinear dependence between the transformed frequency and the log-transformed numbers of affected individuals. Both the in-sample and out-of-sample studies show that the proposed multivariate frequency-severity model that accommodates nonlinear dependence has satisfactory fitting and prediction performances.



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Karen Heart, Instructor, DePaul University



Karen is a teacher, software developer, and attorney with many years of experience in both fields. Currently, she teaches computer science at DePaul University, as well as courses in cybersecurity law and IT law. From standalone end user applications to middleware to architecting distributed systems, Karen has created a wide range of software products and tools for a variety of industries, including among others publishing, banking, insurance, and logistics. As an attorney, Karen has concentrated her work in intellectual property, civil and criminal litigation, including some appellate work. She holds an MS in Computer Science from DePaul University, a JD from the University of Texas, and has completed the PhD coursework in Computer Science at UIC. Her current research interests include system security, forensics, and cybersecurity regulation and liability. She conducts research with Alexander Rasin in the Data Systems and Optimization Laboratory.

Presentation Title: Defeating Malware: Short-Term and Long-Term Solutions Guaranteed to Succeed

Current efforts to defeat malware have not slowed the pace of attacks because of resource and time limitations. Defeating malware is an ongoing arms race, which is reactive rather than proactive; a new approach is needed. Invariably, malware performs three primary actions surreptitiously: reading and writing files, transmitting, and receiving data, and launching programs. By analyzing these actions from the perspective of user prerogative, a series of long-term countermeasures were devised that would nearly eliminate the risk to users. Using this knowledge, a smaller set of short-term, operating-system based countermeasures were devised that would greatly diminish the impact of malware while the long-term countermeasures are being implemented. The short-term solutions will be presented, along with an overview of the long-term solutions and conclusions about the impacts of both sets of solution.



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10:05 AM – 11:20 AM

COVID-19 Session

Panelists:

Cindy MacDonald, Society of Actuaries

Runhuan Feng, University of Illinois Urbana-Champaign

Junying Zhao, University of Oklahoma Health Sciences Center

Cindy MacDonald, Senior Director, Experience Studies, Society of Actuaries



Cindy MacDonald is a Senior Director, Experience Studies at the Society of Actuaries (SOA) where she manages the internal and external resources that work with approximately 250 SOA volunteers to produce SOA experience studies. Prior to coming to the SOA in 2010, Ms. MacDonald worked in the life insurance industry where she obtained over 25 years of experience in life and annuity product development and asset/liability management. Ms. MacDonald is a Fellow in the Society of Actuaries, a member of the American Academy of Actuaries, and a CFA charter holder. She received her BS in mathematics/actuarial science from the University of Illinois in Champaign-Urbana.

Presentation Title: COVID-19 Impact on Population and Insured Mortality

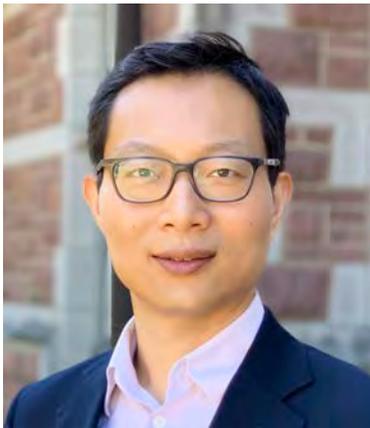
This session will review highlights of the latest Society of Actuaries' research of COVID-19's impact on U.S. population mortality, individual life insurance mortality and group life insurance mortality. The latest available data from the U.S. Centers for Disease Control and Prevention was used to analyze 2020 mortality levels by age and sex and cause of death. The analysis by age group demonstrates how excess mortality in some age groups was driven by COVID while non-COVID causes of death impacted other causes of death. The U.S. population cause of death



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analysis highlights unusually high increases in 2020 mortality in several non-COVID causes of death. The individual life and group life research used experience data collected from U.S. insurance companies and compares 2020 actual mortality against expected levels to determine the excess mortality in 2020 by various subsegments of the experience data.

Runhuan Feng, Professor, Director of Actuarial Science, Director of Predictive Analytics and Risk Management, University of Illinois at Urbana-Champaign



Runhuan Feng is a Professor, Director of Actuarial Science, Director of Predictive Analytics and Risk Management at the University of Illinois at Urbana-Champaign. He is the State Farms Companies Foundation Professorial Scholar. He is also currently the Chair of Education and Research Section Council of the Society of Actuaries. Runhuan is a Fellow of the Society of Actuaries and a Chartered Enterprise Risk Analyst. He serves as an independent consultant to many external organizations and provides expert testimonies to law firms for public policy assessment and actuarial analysis. His consulting work has been used by Illinois General Assembly for pension-related legislative proposals.

He has a wide spectrum of research interests in mathematics and economics of risk and uncertainty in the financial world. He has published extensively on top-tier actuarial and quantitative finance journals. He is an Associate Editor of multiple actuarial and applied probability journals.

As an applied scientist, Runhuan strongly believes that most interesting research problems are discovered in response to the changing needs of the industry and the society. He co-founded the [Illinois Risk Lab](#), which facilitates research activities that integrate experiential learning for Illinois students and address industrial problems. Runhuan's research has been recognized in the practitioners' community through his applied technical contributions and presentations as invited speakers at industry conferences. He is a frequent consultant to professional organizations, non-profit organizations, and start-ups.



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Presentation Title: Epidemic Models and Their Insurance Applications

Society's efforts to fight pandemics rely heavily on our ability to understand, model, and predict the transmission dynamics of infectious diseases. Compartmental models are among the most commonly used mathematical tools to explain reported infections and deaths. This work offers a brief overview of basic compartment models as well as several actuarial applications, ranging from product design and the reserving of epidemic insurance, to the projection of healthcare demand or the allocation of scarce resources. The intent is to bridge classical epidemiological models with actuarial and financial applications that provide healthcare coverage and utilize limited resources during pandemics.

Junying (June) Zhao, Assistant Professor, University of Oklahoma Health Sciences Center



June is an Assistant Professor at the University of Oklahoma Health Sciences Center. An economist and mathematician, she brings expertise in healthcare finance to address the legal and financial risks of medical enterprises and medical technologies. June obtained her PhD in health economics from McMaster University, PhD in applied mathematics from the University of California, and her MPH from Harvard.

Presentation Title: The Financial Impact of COVID-19 on Publicly Traded Healthcare Firms

How did the COVID-19 pandemic impact the healthcare industry? Using 2015Q1–2020Q3 financial data of 26 publicly traded healthcare firms, consisting of 11,322 hospitals and facilities, we find that the COVID-19 pandemic shock is associated with large losses of revenue and profit, as well as increases in debt and cash holdings. Our time series analysis reveals the trends of key



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financial performance indicators: after the pandemic onset, healthcare corporations' financial viability and profitability worsen, while their liquidity and short-term debt grow in response to a gloomy and uncertain future. Our panel data analysis shows a 21.6% (\$169.2 million) significant decrease in net operating revenue, a 20% (\$154.8 million) significant increase in current liabilities, an insignificant increase in long-term liabilities (\$44.4 million), and \$29.8 million significant losses in net income per publicly traded healthcare firm per quarter in 2020.

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Algorithmic Bias Session

Panelists:

Edward (Jed) W. Frees, University of Wisconsin - Madison; Australian National University (ANU)
James Guszczka, Stanford University
Daniel Bauer, University of Wisconsin – Madison

Edward (Jed) Frees, Emeritus Professor, University of Wisconsin-Madison |
Australian National University (ANU)



Edward (Jed) Frees is an emeritus professor, formerly the Hickman-Larson Chair of Actuarial Science at the University of Wisconsin-Madison. He is a Fellow of both the Society of Actuaries and the American Statistical Association. He has published extensively (a four-time winner of the Halmstad Prize for best paper published in the actuarial literature) and has written three books. He currently has a fractional appointment with the Australian National University.



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James Guszcza, Research Affiliate, Center for Advanced Study in the Behavioral Sciences – Stanford University



James Guszcza is a 2020-21 fellow at Stanford's Center for Advanced Study in the Behavioral Sciences. Jim has worked as data scientist for over two decades and is the first person to be designated Deloitte's U.S. Chief Data Scientist. He is a former professor at the University of Wisconsin-Madison business school and holds a PhD in philosophy from The University of Chicago. He serves on the scientific advisory board of the Psychology of Technology Institute. Jim is a fellow of the Casualty Actuarial Society.

Daniel Bauer, Professor, the Hickman-Larson Chair in Actuarial Science, University of Wisconsin – Madison



Daniel Bauer is a professor and the Hickman-Larson Chair in Actuarial Science at the Wisconsin School of Business. He is one of the architects of the UW Master's in Business Analytics, for which he currently serves as the faculty director. Dani grew up in Germany and received his PhD in Applied Mathematics and a Master's in Statistics, and he held faculty positions at other



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US Business Schools before joining UW. He has published his research in leading journals statistics, economics, finance, and management, and he teaches classes in actuarial science, quantitative finance, and data analytics.

Presentation Title: A Primer on Algorithmic Fairness in Insurance

Session Description: Considerations of actuarial and societal fairness have always been part and parcel of actuarial work. As algorithmic decision-making spreads through ever more areas of business and society, algorithmic fairness has blossomed into a vibrant area of research. This session will set the stage by briefly discussing high-level concepts relevant to AI ethics, and then will turn to a discussion of different concepts of algorithmic fairness, tradeoffs among them, and how they apply in insurance settings.

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1:50 PM – 3:05 PM

Professionalism Session

Panelist:

Jay Jaffe, Actuarial Enterprises

Jay Jaffe, President, Actuarial Enterprises



Jay Jaffe is President of Actuarial Enterprises, Ltd. His firm provides actuarial and marketing consulting services to insurance companies, banks, and insurance agencies/TPA's.

Mr. Jaffe received his undergraduate degree from Brown University in 1962 and a M.S. in 1964 from the Sloan School of Management at MIT. He became a Fellow in the Society of Actuaries



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and a Member in the American Academy of Actuaries in 1969. He has served in leadership positions in several actuarial organizations including two terms as Chairperson of the Society of Actuaries' Non-traditional Marketing Section and a SOA Vice President (2005-7).

Following college Jay entered the insurance business with Connecticut General Life (now CIGNA.) A few years later he joined Montgomery Ward Life where he served as Vice President and Actuary. For nearly 50 years Jay has operated his own firm.

In addition to being a frequent speaker at actuarial meetings, Jay has made presentations to numerous insurance and marketing conferences throughout North American, Europe, and Australia. He has been a frequent author for Bests, Direct Marketing, The National Underwriter, and several actuarial publications.

Because of Jay's experience in both actuarial science and marketing, he provides a unique perspective to his insurance clients. He is particularly adept at developing new and innovative insurance products and programs. One of his best-known concepts is the "Dog Bone New Product Rating System" which he presented at a PIMA meeting several years ago.

During the past several years, Jay has shared his knowledge and experiences of professionalism at SOA and actuarial club meetings as well as in articles. He hopes that his "legacy knowledge" will be of benefit to other actuaries.

Jay resides in Chicago, Illinois. His hobbies include walking or riding his bike to work during the warmer months, golf, and fly fishing.

Presentation Title: Engaging Actuarial Students in Professionalism

Session Description: This session will begin by discussing the concepts of professional and professionalism. Among the themes of the session are making professionalism a career responsibility and not just a continuing professional development requirement.

The program will include discussions of several professionalism topics such as conflicts of interest, ethics, and communications. It will draw from the recent and continuing COVID-19 pandemic as well as academia to illustrate how non-actuarial professions have dealt with professionalism.

Towards the end of the session there will be suggestions for the development of a professionalism program for actuarial students.

Finally, the session provides the opportunity to earn 1.5 credit hours of professionalism study towards your professionalism requirement.