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2016 SOA Modeling Sessions

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Welcome to the first of what we hope to be a recurring feature—highlighting recorded sessions, webcasts and slides on modeling topics in the recent past.

Recorded webcasts and virtual sessions are available for a fee, but SOA members have free access to audio recordings synchronized with slide presentations of many of the major 2016 SOA meetings: Investment Symposium, Life & Annuity Symposium, Health Meeting, Valuation Actuary Symposium and the SOA Annual Meeting & Exhibit, as well as various webcasts and a seminar. Slides from meeting presentations are downloadable and free to all online.

Thanks to Eric Schwartz and the SOA staff for help in compiling this list.

2016 INVESTMENT SYMPOSIUM[1]

SESSION 16: MODEL RISK

Moderator: David Paul, FCAS, MAAA

Presenters: David Paul, FCAS, MAAA; Chad R. Runchey, FSA, MAAA

Analytical models of many descriptions and purposes are used throughout insurance and pension organizations. To the extent that a model is not reality but is merely a simplified representation of reality, all models are subject to the risk of simply being wrong. This session focused on how financial organizations can quantify, document and reduce the potential for errors within their models. Due to regulatory concerns (as illustrated in Federal Reserve release SR 11-7), a consistently increasing amount of resources are being applied in this area. Industry critics have argued that this focus has been misplaced on trivial but easily identified problems (e.g., data quality) while ignoring the greater intellectual challenge of dealing with models that are theoretically unsound, as many believed played an important part in bringing forth the global financial crisis of 2008–2009. (See session slides at *https://www.soa.org/Files/Pd/2016/investment-symposium/pd-2016-02-is-session-16.pdf*.)

2016 LIFE & ANNUITY SYMPOSIUM[2]

SESSION 15 PANEL DISCUSSION: MODEL GOVERNANCE

Moderator: Jason A. Morton, FSA, MAAA

Presenters: David R. Beasley, FSA, CERA, MAAA; Jason A. Morton, FSA, MAAA; Robert P. Stone, FSA, MAAA

Model governance continues to be a hot topic in the industry. This topic continues to receive attention from regulators and will become increasingly high profile with principle-based reserves (PBR). Experts at this session provided different viewpoints on the current and likely future state of model governance and the changes that may be necessary. (See session slides at *https://www.soa.org/Files/Pd/2016/las/pd-2016-05-las-session-15.pdf*.)

SESSION 48 PANEL DISCUSSION: EXTREME EVENTS FOR INSURERS: CORRELATION, MODELS AND MITIGATION

Moderator: Ronora E. Stryker, ASA, MAAA

Presenters: Thomas P. Edwalds, FSA, ACAS, MAAA; Kailan Shang, FSA, ACIA; Marc Alexandre Vincelli, ASA

The modeling and mitigation of extreme events is complex due to scarcity of experience data, emergence of new risks, dependence among risks and other factors. Often, familiar traditional statistical techniques are not enough to address these issues. To provide a resource for practitioners outlining more advanced tools for extreme risk analysis, the Financial Reporting Section, the Committee on Life Insurance Research and the Committee on Finance Research sponsored research resulting in a primer on this topic. Experts at this session presented the results of the study and explored extreme events from the perspective of a global insurance company, with an emphasis on market risk, credit risk, insurance risk, liquidity risk and business risk. They also introduced practitioners to extreme risk concepts and models. (See session slides at *https://www.soa.org/Files/Pd/2016/las/pd-2016-05-las-session-48.pdf*.)

SESSION 49 PANEL DISCUSSION: MODEL RISK MANAGEMENT

Moderator: Mark Stephen Mennemeyer, FSA, MAAA

Presenters: Kristen E. Dyson, FSA, MAAA; Mark Stephen Mennemeyer, FSA, MAAA; Daron J. Yates, FSA, MAAA

With the rapid growth in modeling capabilities and technology resources, actuaries are being called upon to produce more frequent and more detailed analysis than has previously been possible. While this is generally good news for product managers who need timely results, risk managers must be aware of the accompanying growth in model risk. Presenters at this session explored sources of model risk and practical approaches for managing it. Topics covered were validation techniques, reporting tools and interaction with governance processes. (See session slides at *https://www.soa.org/Files/Pd/2016/las/pd-2016-05-las-session-49.pdf*.)

SESSION 57 PANEL DISCUSSION: MODEL EFFICIENCY—PART I

Moderator: Anthony Dardis, FSA, CERA, FIA, MAAA

Presenters: Anthony Dardis, FSA, CERA, FIA, MAAA; Trevor C. Howes, FSA, FCIA, MAAA; Tung Tran, ASA, MAAA

Model efficiency is a hot topic in the industry, and it consists of a wide range of techniques. Experts at this session provided an overview and discussion of several of these techniques. They also discussed how model efficiency fits into a model governance framework. (See session slides at *https://www.soa.org/Files/Pd/2016/las/pd-2016-05-las-session-57.pdf*.)

> **Actuaries are being called upon to produce more frequent and more detailed analysis than has previously been possible.**

SESSION 70 PANEL DISCUSSION: MODEL EFFICIENCY—PART II

Moderator: Anthony Dardis, FSA, CERA, FIA, MAAA

Presenters: Anthony Dardis, FSA, CERA, FIA, MAAA; Ronald J. Harasym, FSA, CERA, FCIA, MAAA; Andrew Ching Ng, FSA, MAAA

The presenters at this session discussed several model efficiency techniques from real-life case studies. These case studies illustrated how companies are actually using model efficiency techniques in practice. The panel consisted of experts speaking from experience regarding methods that have worked well and shared lessons learned in the process. (See session slides at *https://www.soa.org/Files/Pd/2016/las/pd-2016-05-las-session-70.pdf*.)

2016 HEALTH MEETING[3]

SESSION 34 PANEL DISCUSSION: THE ACA, TRANSITIONAL RELIEF AND GROUP MIGRATION MODELING

Moderator: Joseph P. Slater, FSA, MAAA

Presenters: Bethany McAleer, FSA, MAAA; Anthony W. Piscione, FSA, MAAA; Joseph P. Slater, FSA, MAAA; Joshua Ryan Strupcewski, ASA, MAAA

Under the Affordable Care Act (ACA), all individuals and groups with 50 or fewer subscribers will eventually be subject to the ACA's modified community rating rules. While some individuals and small groups have benefited financially from ACA's rating rules, a significant number have avoided the ACA's pools because of the expectation of significantly higher premiums. To date, the most popular ACA avoidance tactic has been the use of transitional relief or "grandmothering" in states with that option available. With the transitional relief window scheduled to close in 2017, many health insurers will need to invest a large amount of time and effort into determining how the end of transitional relief will impact their ACA business. A large part of this task will be modeling individual and group decision making in light of the options available to them. Some will move to an ACA pool. Others will drop coverage. And some will seek other alternatives. (See session slides at *https://www.soa.org/Files/Pd/2016/health-meeting/pd-2016-06-health-session-34.pdf*.)

SESSION 40 LECTURE: PRINCIPLES IN MODEL-BUILDING

Moderator: Douglas T. Norris, FSA, MAAA

Presenters: Joan C. Barrett, FSA, MAAA; Geoffrey R. Hileman, FSA, MAAA

This session focused on key conceptual principles in building and explaining actuarial models. The presenters discussed the importance of explaining potential uncertainties, approaches for properly communicating results, the importance of a priori assumptions and the essential importance of driving stakeholders to key underlying questions rather than simply presenting data and model results. The second presentation proposed 10 questions that should be asked about any analysis. They also covered the importance of data governance as a component of model-building. (See session slides at *https://www.soa.org/Files/ Pd/2016/health-meeting/pd-2016-06-health-session-40.pdf*.)

SESSION 115 PANEL DISCUSSION: ADVANCING RISK ADJUSTMENT MODELING IN MANAGED MEDICAID LONG-TERM CARE PROGRAMS

Moderator: Sabrina H. Gibson, FSA, MAAA

Presenters: Aaron Beaudoin, FSA, MAAA; Maria Catherine Dominiak, FSA, MAAA; Mathieu Doucet FSA, MAAA; Sabrina H. Gibson, FSA, MAAA

Since the passage of the American with Disabilities Act more than 25 years ago, an effort has been made in the Medicaid program to transform its primary role as an institutional care-focused financing mechanism to a community-based long-term services and supports (LTSS) program. Many states are using Managed Medicaid Long-Term Care programs to support this transition while at the same time using this financing mechanism as a way to control trends and improve quality in Medicaid Long Term Services and Supports (MLTSS) costs. Managed Care Organizations (MCOs) receive capitation payments to provide services to the population, but the variations in costs across the spectrum of LTSS require a risk adjustment mechanism to support the appropriate distribution of funds across the MCOs. Simple risk methodologies of blending rates by service location have morphed into more complex risk adjustment mechanisms that account for the varying levels of member functionality in the more advanced models. This session discussed these advanced models including the following topics:

- Variables necessary in the models
- Data needed to support the models
- Complexities of building the models
- Case studies on two current models
- The future of MLTSS risk adjustment models

An intermediate to advanced session assumed attendees have some experience with risk adjustment models and familiarity with MLTSS programs and Medicaid rate setting. (See session slides at *https://www.soa.org/Files/Pd/2016/health-meeting/pd-2016-06-health-session-115.pdf*.)

2016 VALUATION ACTUARY SYMPOSIUM[4]

SESSION 3 PANEL DISCUSSION: FIRST PRINCIPLES MODELING FOR LTC

Moderator: Lo Linda Chow, FSA, MAAA

Presenters: Lo Linda Chow, FSA, MAAA; Gwendolyn Gibbs Hart, ASA; Nilesh Mehta, FSA, MAAA

Previously, most companies have priced LTC products with claims cost factors and filed them as such. This has led to valuation models being based off of these factors. Improvements in experience studies have led to the ability to track assumptions for morbidity, mortality on claim and recoveries explicitly. At the same time, computing power and software advances have led to the ability to model these assumptions explicitly for a "first principles" valuation approach. How exactly does a company make the move from a claims cost valuation model to one based on first principles? What is the underlying rationale to move to such a model? What are the actuarial complexities that arise from such a model? What are the regulatory hurdles? And how do you get comfortable with this approach? (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-03.pdf*.)

SESSION 5 PANEL DISCUSSION: ACTUARIAL MODELS GOVERNANCE SURVEY—THE RESULTS ARE IN

Moderator: Thomas Q. Chamberlain, ASA, MAAA

Presenters: Ronora E. Stryker, ASA, MAAA; Thomas Q. Chamberlain ASA, MAAA

Experts at this session discussed the results of the Actuarial Models Governance Survey sponsored by the Modeling Section. Final results of this survey had not yet been published, so this was a sneak peek. (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-05.pdf*.)

SESSION 7 PANEL DISCUSSION: ANALYZING ANNUITY POLICYHOLDER BEHAVIOR USING PREDICTIVE MODELING AND CLUSTER ANALYSIS

Moderator: Mark William Birdsall, FSA, FCA, MAAA

Presenters: Mark William Birdsall, FSA, FCA, MAA; Marianne C. Purushotham, FSA, MAAA

Predictive modeling is a tool for developing assumptions that are robust and responsive to stochastic modeling methods. By incorporating both traditional and nontraditional data, experts at this session described methods for developing dynamic functions of full surrender and guaranteed lifetime withdrawal benefits (GLWB) utilization for variable annuities (VAs) with GLWBs. The technique of applying cluster analysis demonstrated a process for applying the VA with GLWB full surrender results to fixed indexed annuities (FIAs) with guaranteed lifetime income benefits (GLIBs). (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-07.pdf*.)

SESSION 13 PANEL DISCUSSION: LONG-TERM CARE ASSUMPTIONS, CREDIBILITY AND MODELING

Moderator: Robert T. Eaton, FSA, MAAA

Presenters: Roger Loomis, FSA, MAAA; Missy A. Gordon, FSA, MAAA

Valuation actuaries with responsibility for LTC blocks have seen large swings in projection assumptions during the past 15 years. Experts at this session explored the causes behind these swings and examined what LTC modelers may anticipate in setting assumptions in the future, whether for cash-flow testing or establishing premium deficiency reserves. (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-13.pdf*.)

SESSION 15 PANEL DISCUSSION: ACTUARIAL TRANSFORMATION: THE STORIES AND THE SUCCESSES

Moderator: Dean K. Slyter, FSA, MAAA

Presenters: Stephen J. Bochanski, FSA, CERA, MAAA; Dean K. Slyter, FSA, MAAA

Actuaries are being asked to provide meaningful results and analysis faster and with more information. Insurance companies are transforming their actuarial processes to achieve this. Experts at this session shared transformation stories and lessons that led to success. (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-15.pdf*.)

SESSION 25 PANEL DISCUSSION: ACTUARIAL MODELS AND PROCESSES—TO PRODUCTION AND BEYOND

Moderator: Van Beach, FSA, MAAA

Presenters: Daniel L. Ahlgrim, FSA, MAAA; Van Beach, FSA, MAAA; Matthew James Kraick, FSA, CERA, MAAA

Presenters at this session discussed ways in which insurers have successfully developed and implemented models and processes. In particular, presenters focused on the following:

- The design of models that produce information needed by actuarial and nonactuarial managers
- Challenges in managing actuarial models, processes, and resources and
- How to communicate results in an understandable and effective way.

(See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-25.pdf*.)

SESSION 39 PANEL DISCUSSION: REVIEWING PBR RESULTS

Moderator: Hye-Jin Nicole Kim, FSA, MAAA

Presenters: Sam M. Steinmann, ASA, CERA, MAAA; Rostislav Kongoun Zilber, FSA, MAAA

The coming implementation of PBR will present many challenges. One of the biggest of these challenges will be understanding results and preparing for review by external parties, including regulators and auditors. Experts at this session provided insight into possible approaches for becoming comfortable with the reserve movements. The panelists also provided insights to help companies set up a successful model governance framework for PBR. Through their experience auditing AG 43 reserves, these experts have a good sense of what the audit focus areas will be as principle-based reserving for life products is implemented. (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-39.pdf.*)

SESSION 42 INTERACTIVE FORUM: MODEL GOVERNANCE: WHAT COULD POSSIBLY GO WRONG? PART I

Moderator: David R. W. Payne, FCAS, MAAA

Presenters: Dwayne Allen Husbands, FSA, MAAA; David R. W. Payne, FCAS, MAAA; Chad R. Runchey, FSA, MAAA

Participants in this session worked on a hypothetical insurance company "case study" while role-playing to explore the many things that can go wrong in the absence of governance over model risk management. They worked in teams to prepare solutions before presenting them to other participants and the facilitator/experts. (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-42.pdf.*)

SESSION 56 INTERACTIVE FORUM: MODEL GOVERNANCE: WHAT COULD POSSIBLY GO WRONG? PART II

Moderator: David R. W. Payne, FCAS, MAAA

Presenters: Dwayne Allen Husbands, FSA, MAAA; David R. W. Payne, FCAS, MAAA; Chad R. Runchey, FSA, MAAA

Session 56 was a follow-up to Session 42, continuing the discussion. (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-56.pdf.*)

SESSION 66 PANEL DISCUSSION: PREDICTIVE ANALYTICS TOOLS FOR LIFE INSURANCE

Moderator: Dorothy Andrews, ASA, MAAA

Presenters: Dorothy Andrews, ASA, MAAA; Missy A. Gordon, FSA, MAAA; Timothy S. Paris, FSA, MAAA

Experts at this session provided participants with a high-level understanding of the critical considerations and components of the predictive analytics process. They walked through a simple model, discussed its results and demonstrated how to apply some common model validation techniques to validate the model. (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-66.pdf.*)

SESSION 76 INTERACTIVE FORUM: USING PREDICTIVE ANALYTICS TO SET ACTUARIAL ASSUMPTIONS

Moderator: Dorothy Andrews, ASA, MAAA

Presenters: Eileen Sheila Burns, FSA, MAAA; Minyu Cao, FSA, CERA

This session was designed to help actuaries develop modeling assumptions using predictive analytics. "Best estimate" assumption development is often viewed by some as more "hand-waving" than science. Experts at this session gave participants an analytical framework to support their assumption setting with defendable analytics, thereby removing subjectivity. Participants were exposed to real-world examples of the use of analytics to set assumptions. (See session slides at *https://www.soa.org/Files/Pd/2016/val-act/pd-2016-08-valact-session-76.pdf.*)

> Assumption and model governance has been an evolving practice ... due to ORSA-influenced regulations.

SESSION 78 PANEL DISCUSSION: MODEL GOVERNANCE IN A PBR WORLD

Moderator: Scott D. Houghton, FSA, MAAA

Presenters: Troy Regan Elliott, ASA, MAAA; Scott D. Houghton, FSA, MAAA

Actuaries have traditionally set assumptions and used models for pricing, financial reporting, modeling and risk management functions. Assumption and model governance has been an evolving practice with growing interest as of late due to ORSA-influenced regulations. Now with the advent of PBR, a special emphasis will be placed on governance as the valuation world shifts to a new era. Experts at this session discussed the practical issues of model and assumption governance in a PBR world, especially in light of the requirements of VM-G. (A webcast recording of the session is available for purchase at *https://www.soa.org/prof-dev/events/v78-model-governance-pbr/.*)

2016 SOA ANNUAL MEETING & EXHIBIT[5]

SESSION 20 PANEL DISCUSSION: SENIOR MANAGEMENT'S WANDER THROUGH THE MODEL EFFICIENCY COUNTRYSIDE

Moderator: Anthony Dardis, FSA, CERA, FIA, MAAA

Presenters: Mark A. Davis, FSA, MAAA; Nazir Valani, FSA, FCIA, MAAA

This session was an introduction to the subject of model efficiency. Presenters shared senior management's perspective on model efficiency, including:

- The background of model efficiency usage in the life insurance industry, including a history of how the theory and practice has developed over the past 35 years

- An overview of model efficiency techniques

- Availability of model efficiency resources and

- Senior management's views on areas of skepticism, what works well in practice and hints for "selling" model efficiency to senior management and to the board.

(See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-020.pdf*.)

SESSION 40 PANEL DISCUSSION: HOW WOULD I GET STARTED WITH PREDICTIVE MODELING?

Moderator: Douglas T. Norris, FSA, MAAA

Presenters: Timothy S. Paris, FSA, MAAA; Sandra Tsui Shan To, FSA, MAAA; Qinqing (Annie) Xue, FSA, CERA, MAAA

As predictive analytics is increasingly becoming a needed expertise for actuaries, most actuaries are also very puzzled by learning how to use it in their work. In this session, experts provided guidance and suggestions on where to go to find proper study materials and how to start learning about predictive analytics and modeling. They also covered basic technical terms and important applications in insurance. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-040.pdf*.)

SESSION 54 PANEL DISCUSSION: ACTUARIAL MODELING TECHNIQUES FOR MODEL EFFICIENCY: PART 1

Moderator: Anthony Dardis, FSA, CERA, FIA, MAAA

Presenters: Chin-Mei Yvonne Chueh, ASA; Ivan Joseph Parker, FSA, MAAA

This session introduced some of the actuarial modeling techniques being used in practice for model efficiency, including

> ## Analyzing data in search of information for their models is not a new concept to actuaries.

- Scenario reduction and
- Proxy modeling, in particular Radial Basis Functions (RBF).

(See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-054.pdf*.)

SESSION 58 PANEL DISCUSSION: PREDICTIVE MODELING, START TO FINISH

Moderator: Eric J. Carlson, FSA, MAAA

Presenters: Sean J. Conrad, FSA, MAAA; Michael David Hoyer, FSA, MAAA; Guizhou Hu, MD, Ph.D.

Analyzing data in search of information for their models is not a new concept to actuaries. What is new are some of the approaches being leveraged by data scientists and actuaries. To some it might seem that these new approaches are nothing more than throwing a bunch of data into some modeling software and seeing what comes out. In this session the presenters revealed why you should look behind the curtain to give meaning to the output of a model. The first panelist discussed important theoretical, yet still practical, predictive modeling considerations. Then an actuary walked through how he used these techniques for a specific application to develop a predictive model. Finally, a reinsurer discussed how to use more traditional actuarial methods to validate the model and discuss the business implications and use of the model. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-058.pdf*.)

SESSION 72 PANEL DISCUSSION: HEDGING VARIABLE ANNUITY PRODUCTS: MODEL RISK AND PRODUCT DESIGN

Moderator: Brian Matthew Hartman, ASA, Ph.D.

Presenters: Maciej Jakub Augustyniak, FSA, Ph.D.; Pierre-Alexandre Veilleux, FSA, FCIA, MSc

This session addressed three issues related to the dynamic hedging of variable annuity products. First, they investigated the importance of hedging interest rate risk in stable, rising or volatile interest rate environments and studied the robustness of interest rate hedges to model risk. Second, they examined model risk with respect to stock market, interest rates and longevity risks for GLWB guarantees. Finally, they studied how the fee structure and surrender charges affect surrender incentives and proposed to use product design to mitigate policyholder behavior risk. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-072.pdf*.)

SESSION 78 PANEL DISCUSSION: STAND-ALONE LTC AND LIFE/LTC HYBRID MODELING PRIMER—FIRST PRINCIPLES AND STOCHASTIC

Moderator: Kevin Hyeonwook Kang, FSA, MAAA

Presenters: Lo Linda Chow, FSA, MAAA; Bonnie Elizabeth Wolf, FSA, MAAA

Given the rising needs of LTC, both stand-alone LTC and life/LTC combination products are having a significant impact on the insurance industry. For stand-alone LTC, precise financial modeling techniques that would allow carriers to better manage their in-force blocks has been a hot topic of the industry; for life/LTC combination products, pricing and risk mitigation techniques are still in the developmental stage. This session explored first principles modeling and stochastic modeling techniques to help actuaries and senior management better gain an understanding of the potential levels of benefit payments and risks for stand-alone LTC and the embedded life and LTC coverages in Life/LTC hybrid product. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-078.pdf*.)

SESSION 82 PANEL DISCUSSION: LEAF, TREE, FOREST, OH MY: ADVANCED MODELS AND THEIR INSURANCE APPLICATIONS

Moderator: Sheamus Kee Parkes, FSA, MAAA

Presenters: Dihui Lai; Satadru Sengupta

As predictive modeling is becoming a necessary skill for actuaries, basic regression modeling is no longer the only choice in certain applications. Actuaries are interested in learning more sophisticated modeling techniques. In this session, experts discussed some of the advanced tree-based models that potentially will have large impact on insurance industry. The topics included basic math foundations, simple tree and ensemble methods, considerations in model selection, and advantages and disadvantages of each model. Some real examples were introduced to illustrate the concepts and potential applications. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-082.pdf*.)

SESSION 88 PANEL DISCUSSION: PBR: PRACTICAL IMPLEMENTATION AND GOVERNANCE ISSUES

Moderator: Helen Colterman, FSA, CERA, ACIA

Presenters: Paul M. Fischer, FSA, MAAA; Carrie Lee Kelley, FSA, MAAA; Christopher Almer Whitney, FSA, MAAA

In this session, presenters reviewed the changes that are being made across the industry to prepare for PBR. This session focused on preparation for reporting under PBR and how companies have addressed the many challenges. One of the biggest of these challenges will be getting comfortable with the results.

PBR places a much heavier reliance on actuarial judgment and actuarial models than the traditional reserving methodologies for life insurance. Results and assumptions will need to undergo a thorough review process to ensure they are reasonable. Because of the nature of the calculation and assumptions no longer being locked in at issue, it will no longer be possible to rely on simple trends; this will make analysis much more complicated. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-088.pdf*.)

SESSION 94 PANEL DISCUSSION: ACTUARIAL MODELING TECHNIQUES FOR MODEL EFFICIENCY: PART 2

Moderator: Trevor C. Howes, FSA, FCIA, MAAA

Presenters: Ronald J. Harasym, FSA, CERA, FCIA, MAAA; Andrew Ching Ng, FSA, MAAA

This session followed up on Session 54 and looked at some of the emerging actuarial techniques that, although perhaps not yet so widely used, hold tremendous promise for the future:

- Cluster modeling
- Least Squares Monte Carlo (LSMC) and
- "Hybrid" approaches to model efficiency.

(See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-094.pdf*.)

SESSION 113 PANEL DISCUSSION: DATA AND MODEL—ACTUARIES SHOULD BE AN EXPERT OF BOTH

Moderator: David L. Snell, ASA, MAAA

Presenters: Matthias Kullowatz; Kenneth Warren Pagington, FSA, CERA, MAAA; Qichun (Richard) Xu, FSA

Actuaries traditionally deal with only limited amounts of data that the insurance industry accumulated over years. Today, more data are available to actuaries, not only in amount, but also data sources. Traditional actuarial analysis is no longer effective. Some advanced methodologies are needed to understand data and find business insights. Actuaries are required to have new skills to rapidly understand data and build models for business. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-113.pdf*.)

SESSION 128 PANEL DISCUSSION: TECHNOLOGY ASPECTS OF MODEL EFFICIENCY

Moderator: Trevor C. Howes, FSA, FCIA, MAAA

Presenters: Huina Chen, FSA, CERA; Philip Gold, FSA, FIA, MAAA

This session covered emerging technology and how it can be used to help make models efficient, including practical uses of emerging gaming processor technology. This session also addressed where the actuarial projection systems look to be going in the future, and how we can expect their performance to improve and what this might mean for the types of analysis and reporting that we do. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-128.pdf*.)

SESSION 165 PANEL DISCUSSION: PROFESSIONALISM ASPECTS OF MODEL EFFICIENCY

Moderator: Anthony Dardis, FSA, CERA, FIA, MAAA

Presenters: James A. Miles, FSA, MAAA; Yifeng (Jeffrey) Mu, FSA, CERA, FCIA

This session examined aspects of the professional code of conduct that need to be considered in the context of model efficiency. This included the important topic of model validation, an especially difficult area when one considers how some model efficiency techniques can be extremely complex technically, so

What techniques can be used to accelerate the run time for nested stochastic modeling?

that validation results are clear and easily communicated. This is crucial for actuaries to understand. Additionally, this panel discussed the relevant ASOPs that come into consideration when using model efficiency techniques and the use of model efficiency to support statutory calculations and reporting—when is it appropriate—and considerations to be borne in mind. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-165.pdf*.)

SESSION 174 PANEL DISCUSSION: NESTED STOCHASTIC MODELING RESEARCH

Moderator: Anthony Dardis, FSA, CERA, FIA, MAAA

Presenters: Anthony Dardis, FSA, CERA, FIA, MAAA; Runhuan Feng, FSA, CERA

Today's computing power makes nested stochastic modeling a possibility, where just a few years ago, it was an actuary's dream. However, for insurers, stochastic modeling remains costly for many reasons including hardware, software and model development costs. The calculation run time involved in such an exercise can still be too long for insurance company management to get results and take actions in a timely manner. Also, output data may be too massive to store and understand. Therefore, companies are still seeking ways to avoid a direct nested stochastic approach.

The purpose of this research project is to create a resource to help actuaries and others answer the following questions: In what situations is nested stochastic modeling commonly used? What other approaches can be used instead of nested stochastic modeling? What techniques can be used to accelerate the run time for nested stochastic modeling? (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-174.pdf*.)

SESSION 181 PANEL DISCUSSION: BEYOND GENERALIZED LINEAR MODEL, WHAT ARE POSSIBLE MODELS ACTUARIES CAN CHOOSE?

Moderator: Brian D. Holland, FSA, MAAA

Presenters: Gourab De; Jeff T. Heaton, ARA, FLMI; Yexin (Kathleen) Wang, FSA, MAAA

As predictive modeling becomes more important in insurance, actuaries will need it as a basic skill. Actuaries may have basic understanding of generalized linear models and decision tree models that have various applications in actuarial science. Beyond GLM, there are many other algorithms that actuaries may want to understand and apply. In this session experts explained some advanced algorithms, such as SVM, neural networks and deep learning. (See session slides at *https://www.soa.org/Files/Pd/2016/annual-meeting/pd-2016-10-annual-session-181.pdf*.)

MODEL GOVERNANCE—IS YOUR COMPANY THERE YET? SEMINAR[6]

PROFESSIONAL INTERESTS & STAKEHOLDER PERSPECTIVES

Moderator: Trevor C. Howes, FSA, FCIA, MAAA

Presenters: Larry J. Bruning, FSA, MAAA; Trevor C. Howes, FSA, FCIA, MAAA; David K. Sandberg, FSA, CERA, MAAA

The driving forces for improved model governance are originating simultaneously from senior management and the boards of directors of life insurance companies, from the industry regulatory authorities and from the actuarial profession itself, both in the United States and internationally. Speakers representing these key stakeholders discussed model governance issues from differing perspectives, covering both current and emerging developments. (See session slides at *https://www.soa.org/Files/Pd/2016/model-gov/pd-2016-model-gov-professional-interest-stakeholders.pdf*.)

INTERSECTION OF MODEL GOVERNANCE AND TECHNOLOGY

Moderator: Joseph N. Soga, ASA, MAAA

Presenters: Andrew Ching Ng, FSA, ACIA, MAAA; David Halldorson; Darin G. Zimmerman, FSA, MAAA

Technology is embedded in all phases of a model's life cycle. When doing it right, technology can be an enabler for better and more effective model governance. The implementation of a comprehensive model governance framework itself can often be complex as well. Again, proper utilization of technology can make a big difference in helping an organization achieve its model governance objective. In this session, experienced industry practitioners talked about the latest developments and key considerations an organization should pay attention to in the integration of technology and model governance. (See session slides at *https://www.soa.org/Files/Pd/2016/model-gov/pd-2016-model-gov-technology.pdf*.)

INTERSECTION OF MODEL GOVERNANCE AND MODEL EFFICIENCY

Moderator: Zohair A. Motiwalla, FSA, MAAA

Presenters: Anthony Dardis, FSA, CERA, FIA, MAAA; Zohair A. Motiwalla, FSA, MAAA

New and more complex modeling demands have increased the need to employ model efficiency techniques. The first part of this session briefly introduced and contrasted these techniques (clustering, proxy modeling, Least Squares Monte Carlo simulation and replicating portfolios to name a few, as well as use of technology in general) and discussed how companies validate and create governance over the application of these techniques as part of the financial reporting process. The second part of this session looked at model efficiency and governance from

the standpoint of VM-20 specifically. (See session slides for both parts of the session at *https://www.soa.org/Files/Pd/2016/model-gov/pd-2016-model-gov-intersection-model-efficiency.pdf*.)

2016 SOA WEBCAST

### AN ACTUARY'S TOOLBOX FOR MODEL RISK MANAGEMENT (JULY 26, 2016)

Moderator: Scott D. Houghton, FSA, MAAA

Presenters: David R. Beasley, FSA, CERA, MAAA; Anh Tu Le, ACIA, FCAS; Katherine Papillon-Rodrigue, ASA, CERA, MAAA

Presenters for this webcast focused on tools and techniques to build an effective model risk management framework. They shared their experiences, successes and learnings on the following topics:

- Definition of model
- Model risk definition
- Potential sources of model risk (what can happen and what can go wrong in actuarial models)
- Model inventory
- Model governance framework
- Model risk policy
- Model controls
- Model validation and testing
- Model risk quantification
- Change management frameworks
- Successes and lessons learned on the above

(A webcast recording of this session is available for purchase at *https://www.soa.org/prof-dev/events/2016-actuarys-toolbox-model-risk/*.) ■
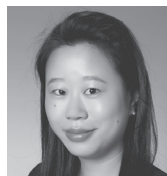
Jennifer Wang, FSA, CERA, MAAA, is an actuary at Milliman. She can be reached at *jennifer.wang@milliman.com*.

Mary Pat Campbell, FSA, MAAA, PRM, is vice president, insurance research, at Conning in Hartford, Conn. She also teaches courses on computing and business writing for actuarial science students at the University of Connecticut. She can be reached at *marypat.campbell@gmail.com*.

ENDNOTES

1 *https://www.soa.org/prof-dev/events/2016-investment-symposium/*

2 *https://www.soa.org/prof-dev/events/2016-life-annuity-symposium/*

3 *https://www.soa.org/prof-dev/events/2016-health-meeting/*

4 *https://www.soa.org/prof-dev/events/2016-Valuation-Actuary-Symposium/*

5 *https://www.soa.org/prof-dev/events/2016-SOA-Annual-Meeting---Exhibit/*

6 *https://www.soa.org/prof-dev/events/2016/model-gov/Agenda/*