2018 SOA Modeling Sessions, Part 1

By Jennifer Wang

Here are modeling-related sessions from some of the major 2018 Society of Actuaries (SOA) meetings: Life & Annuity Symposium, Health Meeting and the Valuation Actuary Symposium. SOA members have free access to audio recordings synchronized with slide presentations from these meetings, so check them out.

2018 LIFE & ANNUITY SYMPOSIUM

SESSION 14 PANEL DISCUSSION: THE SEARCH FOR MODEL EFFICIENCY THROUGH DATA COMPRESSION

Moderator: Trevor C. Howes, FSA, FCIA, MAAA
Presenters: Dan (Danielle) Li, FSA; Andrey Marchenko

Models are essential for many critical purposes that demand fast completion and accurate results, yet runtimes are exploding with new stochastic methodology, stress testing and the need to reflect individual policy characteristics. The costs of IT infrastructure and actuarial resource support are unsustainable. Compression of business data files using techniques like data clustering can be an effective way to address this issue. Presenters provided an overview to clustering as it is commonly applied in practice, and discussed roadblocks to implementing clustering and how these roadblocks might be overcome. Research into techniques including artificial intelligence methodologies that can help automate the implementation, configuration and validation of clustering algorithms were presented. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-014.pdf.*)

SESSION 15 PANEL DISCUSSION: TRADE-OFFS IN MODELING: BALANCING COMPETING GOALS

Moderator: Ricardo Trachtman, FSA, MAAA
Presenters: Brian D. Holland, FSA, MAAA; Yara Rogers-Silva

Predictive modeling inherently involves various trade-offs. Actuaries have balanced those trade-offs since the smoothness vs. fit issue in graduation, if not before. Presenters looked in depth at the trade-offs between smoothness and fit; accuracy and communicability; and description and prediction, the bias and variance trade-off from machine learning. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-015.pdf.*)

SESSION 33 TEACHING SESSION: FURTHER RESEARCH ON SOA EXPERIENCE STUDY CALCULATIONS

Moderator: Cynthia MacDonald, FSA, MAAA
Presenters: Hezhong (Mark) Ma, FSA, MAAA; John K. McGarry, ASA, Ph.D.

Expanding on the SOA's Experience Study Calculations educational tool published last year, the authors presented further research on the absolute and relative errors arising from the main study methods, how these errors accumulated in a calendar year study, and a method that largely eliminated the errors, as well as user feedback on the original paper. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-033.pdf.*)

SESSION 46 PANEL DISCUSSION: NEWLY PROPOSED ASOPS: PRICING, MODELING AND SETTING ASSUMPTIONS

Moderator: Donna Christine Megregian, FSA, MAAA
Presenters: Donna Christine Megregian, FSA, MAAA; James A. Miles, FSA, MAAA; Michael W. Santore, FSA, MAAA

Seasoned presenters discussed three important Actuarial Standard of Practice (ASOP) exposure drafts recently proposed by the

Actuarial Standards Board: Pricing of Life Insurance and Annuity Products, Modeling and Setting Assumptions.

Actuaries use numerous models that have various applications [e.g., economic capital, Generally Accepted Accounting Principles (GAAP) reporting, pricing, etc.]. It's important that the use of assumptions is appropriate in light of the model's intended purpose. Focused topics of discussion addressed what these newly proposed ASOPs mean for the actuary. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-046.pdf*.)

SESSION 52 PANEL DISCUSSION: EXPERIENCE STUDY COMMON FORMATS

Moderator: Lindsay Keller Meisinger, FSA, MAAA
Presenters: Michael Anthony Cusumano, FSA; Katherine Warner McLaughlin, FSA, MAAA; Erin Colleen Wright, FSA, MAAA

Many companies contribute to a variety of industry studies, experience studies sponsored by reinsurers and consultants, and statistical agent data calls. Having a shared understanding of experience study data would improve efficiency, promote better communication and facilitate deeper understanding of the industry experience. The National Association of Insurance Commissioners' VM-51[1] was designed in part to aid companies in the collection of experience data in a format specified for principle-based reserve (PBR) purposes. This data format is used for industry experience analysis but has limitations.

Presenters evaluated the current practice in preparing experience data, discussed the limitations and potential improvements to a common format for experience analysis, and reviewed regulatory activities to better capture the experience data. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-052.pdf*.)

SESSION 55 PANEL DISCUSSION: WHEN IS YOUR OWN DATA NOT ENOUGH?

Moderator: Robert E. Winawer, FSA, MAAA
Presenters: Leonard Mangini, FSA, MAAA; Timothy S. Paris, FSA, MAAA

Complex long-term products with a short history and interrelated policyholder options can be particularly challenging for those responsible for experience studies and assumption models. Sophisticated data analytics techniques, in conjunction with own-company and industry data, can dramatically improve these processes, providing greater insights into the experience data, more clarity in areas where expert actuarial judgment is needed and even the opportunity to reinsure these risks. Presenters used policyholder behavior data and examples from the variable annuity, fixed indexed annuity markets and life insurance markets. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-055.pdf*.)

SESSION 58 PANEL DISCUSSION: MODELING FUNCTION: TO CENTRALIZE OR NOT TO CENTRALIZE?

Moderator: Joshua S.Y. Chee, FSA, MAAA
Presenters: Joshua S.Y. Chee, FSA, MAAA; Sean Michael Hayward, FSA, MAAA; Michael Porcelli, FSA, MAAA

In reaction to a spate of model conversion activity and rising acceptance of model risk management techniques, many companies have centralized, or are in the process of centralizing, their modeling function to accommodate both governance and efficiency demands. These operating model changes have produced a wide range of questions and issues, such as division of labor, roles and responsibilities, and selection of tasks to keep decentralized, among others. Presenters framed a series of key modeling function considerations and shared lessons learned with the audience. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-058.pdf*.)

SESSION 59 TEACHING SESSION: MACHINE LEARNING AND RISK

Moderator: Dan Kim, FSA, CERA, MAAA
Presenters: Dan Kim, FSA, CERA, MAAA; Anthony D. Green, FSA, CERA, FCA, FRM, MAAA, MPhil

Machine learning techniques including predictive modeling are getting popular in life and annuity insurance underwriting, pricing and valuation. The same is true for risk management and risk calibration purposes. Presenters illustrated some machine learning techniques and how they could be used for risk management. Examples included how a predictive model used for a best estimate assumption could be used to develop risk margins and inform risk management on the accuracy or uncertainty of its predictions. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-059.pdf*.)

SESSION 72 PANEL DISCUSSION: EXPERIENCE STUDIES AND ASSUMPTION-SETTING CONTROLS

Moderator: N. Shane Leib, FSA, MAAA
Presenters: Kelly Jin, FSA, MAAA; Carrie Lee Kelley, FSA, MAAA; Kimberly M. Steiner, FSA, MAAA

In light of new principle-based reserve regulations, presenters explored the background for increased review over experience studies and assumption-setting practices. For PBR, there is a need to produce more experience studies and there has been more focus from external parties, including regulators and external auditors.

As there is increasing scrutiny over these area, and as actuaries continue to focus on controls, more will be heard about current industry practices for companies with limited resources and views from external parties. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-072.pdf*.)

SESSION 80 PANEL DISCUSSION: MODEL VALIDATION FRAMEWORK AND BEST PRACTICES

Moderator: Joshua David Dobiac, JD, MS, CAIA
Presenters: James Stuart McClure, FSA, MAAA; Zohair A. Motiwalla, FSA, MAAA

The refrain "All models are wrong but some are useful" is a common aphorism in the actuarial field. Certainly, models are at the core of what actuaries do. Irrespective of whether actuaries are involved in the pricing, valuation, risk management or hedging functions, their work means building, using, modifying or reviewing models in some fashion.

In recent years, there has been strong insurance industry focus on model validation and governance frameworks, typically at the direction of senior management and regulators. When properly carried out, such a framework can increase stakeholder confidence in the company financials. Such stakeholders include senior management and other end-users. Presenters discussed the approaches used in the industry to construct this framework, and best practices for concepts such as baselining, model inventory, model validation, effective challenge and user-acceptance testing for actuarial and non-actuarial functions. (See session slides at *https://www.soa.org/pd/events/2018/las/pd-2018-05-las-session-080.pdf.*)

2018 HEALTH MEETING

SESSION 11 PANEL DISCUSSION: CREDIBILITY ISSUES FOR LONG-TERM DISABILITY INSURANCE

Presenters: Paul L. Correia, FSA, CERA, MAAA; Tasha S. Khan, FSA, MAAA

Historical experience is used by group disability insurers to inform their pricing, underwriting and reserving work. Understanding the statistical credibility of that experience is crucial to making well-informed decisions. The panelists in this session provided a detailed discussion of credibility analysis specific to long-term disability insurance, including a summary of recent SOA research on the topic. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-011.pdf.*)

SESSION 15 PANEL DISCUSSION: BENEFIT MODELING MADNESS

Moderator: Joseph P. Slater, FSA, MAAA
Presenters: Hobson D. Carroll, FSA, MAAA; Joshua R. Strupcewski, FSA, MAAA; Dustin D. Tindall, FSA, MAAA

Panelists discussed the issues driving the increasing complexity of health benefit plans. They also described the traditional tools used to value health benefit plans and how those tools handle the more complex health benefit plans. Finally, they reviewed the new generation of benefit plan valuation models being developed to address the more complex plan health benefit plans. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-015.pdf.*)

SESSION 38 PANEL DISCUSSION: USE OF BIG DATA TO OPTIMIZE PLAN DESIGN

Moderator: David V. Axene, FSA, CERA, FCA, MAAA
Presenters: Jordan Armstrong; David V. Axene, FSA, CERA, FCA, MAAA; Timothy W. Smith, ASA, MAAA

Actuaries can utilize consumer information to help optimize benefit plan designs to proactively impact health care costs and utilization of benefits. This session presented a recent case study showing how this was accomplished. This makes use of "personas," detailed health care analytics, and actuarial health cost models. This is based upon an actual client project. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-038.pdf.*)

SESSION 41 PANEL DISCUSSION: IS IT TIME TO REVIEW YOUR TREND MODEL?

Moderator: Joan C. Barrett, FSA, MAAA
Presenters: Joan C. Barrett, FSA, MAAA; Bethany McAleer, FSA, MAAA

Most health plans have a system to project pricing trends, but given today's dynamic environment, the system may need to be reviewed and refreshed. In this session, the presenters discussed methods to determine if changes are worth the effort, a review of techniques for determining trends, key factors that may impact trends in the near future and techniques for adapting trend models to measure risk and determine actionable steps to reduce costs. In addition, longer-term factors were discussed in some detail. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-041.pdf.*)

SESSION 65 LECTURE: MEDICAID RISK ADJUSTMENT: PHYSICIAN-BASED MODEL CORRELATION

Presenters: Chris Dickerson; Barry Jordan, ASA, MAAA

The use of health status-based risk adjustment is a common practice in health care, in particular for Medicaid programs as part of capitation rate development. With more and more emphasis being placed on alternative payment methods, including subcapitation and incentive arrangements that cover a specific subset of services within the Medicaid program, the use of new or recalibrated risk adjusters geared to predict the utilization of specific services shows more and more potential. While this is not in itself a new concept, the presenters shared their findings of calibrating existing risk adjustment products to focus on a specific set of professional services. The presenters shared the results of how calibration of

risk adjustment tools toward a specific set of physician services correlates among multiple states, as well as discussed some of the potential uses of this approach as states and health plans continue to emphasize effective payment strategies specific to a subset of services. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-065.pdf*.)

SESSION 73 LECTURE:
ADVANCED ANALYTICS AND PREDICTIVE MODELING IN LOSS RESERVING
Presenter: Mark M. Zanecki, ASA, MAAA

Actuaries typically estimate insurance liabilities with models focused on triangle development patterns and other assumptions that comprise standard practice(s) of modern actuarial analyses. Advances in computing technology has led to improvements including stochastic methods, finer segmentation and frequent analysis, but machine learning/predictive methods hold the promise of improved accuracy and reliability. By using machine learning/predictive modeling build on graphics processing unit (GPU) servers, we can expect extraordinary advances that will fundamentally transform actuarial analyses in the years ahead. The presenter began with a brief overview of advanced modeling methods to estimate claim level liabilities. He also reviewed the challenges of claim level analysis and the benefits of claim triage to identify key characteristics early in the analysis of claims. He proceeded to a review of a first-generation application of machine learning to actuarial reserve analysis. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-073.pdf*.)

SESSION 79 PANEL DISCUSSION:
USING PREDICTIVE ANALYTICS TO DEVELOP ASSUMPTIONS
Moderator: Jonathan D. White, FSA, CERA, MAAA
Presenters: Missy A. Gordon, FSA, MAAA; Brian M. Hartman, ASA

Predictive modeling is no stranger in the world of health insurance. The primary focus of such analysis for medical insurance has been on the near future and disease management. However, presenters discussed how predictive analytics has been used to develop projection assumptions for long-term care insurance by applying experience adjustments to a benchmark. They examined how predictive modeling can be used to overcome challenges with traditional actual-to-expected studies and how it produces more statistically robust projection assumptions. They also explored how to use predictive modeling to understand the range of potential error in the projection assumption and whether emerging experience is deviating materially from assumptions. The discussion focused on morbidity assumptions for long-term care insurance, but the concepts can translate to various other assumptions (e.g., mortality) and other lines of business (e.g., disability, life and Medicare supplement) where one wants to experience adjust a

benchmark assumption. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-079.pdf*.)

SESSION 94 PANEL DISCUSSION:
BEYOND RISK IDENTIFICATION: PREDICTIVE ANALYTICS IN HEALTH
Presenters: Elena V. Black, FSA, EA, FCA, MAAA; Yi-Ling Lin, FSA, FCA, MAAA; Michael Y. Xiao, FSA, CERA, MAAA

In health, complex business problems are being tackled with a wide range of predictive analytics techniques, from traditional risk assessment linear regressions to innovative machine learning methodologies. One such example is applying a gradient boosting machine (tree-based) learning technique to predict a population's health plan elections among a menu of available plan options and pricing. Exploring and understanding mathematical underpinnings of methodologies, utilized in predictive analytics, is one necessary step in harnessing the power of this new actuarial toolbox. Demystifying the "black box" is necessary but not sufficient. An entire chain of necessary steps is required: formulating relevant business problems in the right way, understanding and visualizing the data and potential trends, applying appropriate optimization tools and, finally, interpreting modeling results to solve the business problem at hand. Presenters illustrated these steps through case studies. They discussed the attributes of business problems in the health care area that can greatly benefit from sophisticated machine learning and other analytical techniques; demonstrated how these algorithms are applied, leading to results that aid in an informed decision-making process; and showed how data exploration and visualization can lend a powerful hand in understanding not only data but modeling results. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-094.pdf*.)

SESSION 100 PANEL DISCUSSION:
PREDICTIVE MODELS FOR DISABILITY INSURANCE
Presenters: Jeffrey S. Bowden, FSA, MAAA; Mark J. Costello, FSA, MAAA

Attendees learned about the various uses for predictive models in disability insurance. Panelists discussed both theoretical approaches and actual applications in beta or production today. The session explored text mining in the management of disability claims and text mining in evaluating medical records. Presenters discussed the use of multivariables in disability pricing and risk selection. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-100.pdf*.)

SESSION 109 PANEL DISCUSSION:
MEDICAL COST REDUCTION OPPORTUNITIES AND CARE MODEL DESIGN
Moderator: Christopher A. Schmidt, FSA, MAAA
Presenters: Jeffrey J. Burke, ASA, MAAA; Christopher A. Schmidt, FSA, MAAA; Mike Van Den Eynde

The cost of health care in the U.S. has been on an unsustainable rise for some time driven by fundamental delivery and financing challenges. Health plans need to seek greater control and effectiveness of care management resources, while consumers are demanding care be more personalized and patient-centric. Health plans need to use data analytics to identify opportunity areas with the most potential for reducing costs through care model redesign. Understanding key care model trends, design concepts, and steps for developing and enhancing comprehensive care design models will lead to reduced costs for health plans. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-109.pdf*.)

SESSION 124 TEACHING SESSION: A PRACTICAL GUIDE TO MACHINE LEARNING FOR ACTUARIES

Presenter: Dave M. Liner, FSA, CERA, MAAA

Machine learning is rapidly transforming how many industries function. This session described the evolving machine learning landscape, provided a pedagogical introduction to common machine learning methods and identified how actuaries can use machine learning to gain better insight. Many machine learning methods are built on principles that many actuaries have acquired through basic actuarial education. (See session slides at *https://www.soa.org/pd/events/2018/health-meeting/pd-2018-06-health-session-124.pdf*.)

2018 VALUATION ACTUARY SYMPOSIUM

SESSION 31PD: (DATA) SWAMP THING: MANAGING YOUR ORGANIZATION'S MOST VALUABLE ASSET

Moderator: Stephen J. Bochanski, FSA, CERA, MAAA
Presenters: Yusuf Abdullah; Lisa M. Nurse, ASA, MAAA

Data has always been the actuary's most precious commodity. Today, we're seeing an increased focus on data at the enterprise level as an organizational asset with the advent of enterprise data strategies, chief data officer roles and data stewards. And yet, the current state of data at many companies resembles the Wild West. This session explored strategies and technologies being used to wrangle, sift, organize and manage the disparate data sources that feed the data swamp. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-031.pdf*.)

SESSION 42PD: ASSET MODELING CHALLENGES FOR VM-20 PROJECTIONS

Moderator: Jason E. Kehrberg, FSA, MAAA
Presenters: Jason E. Kehrberg, FSA, MAAA; Reanna Marie Nicholsen, FSA, MAAA; Benjamin Morris Slutsker, FSA, MAAA

With the first year of the National Association of Insurance Commissioners (NAIC) VM-20[2] transition period under the U.S.

life insurance industry's belt, there has been significant focus on overcoming modeling challenges for principle-based reserve valuation. This session informed actuaries of the technical challenges encountered when modeling assets for VM-20, including both a modeling and regulatory perspective. Attendees became better positioned to deal with modeling issues related to starting assets, future hedges, negative reserves and asset modeling simplifications. Additionally, many companies have started to turn the page from implementing point-in-time PBR reserves for statutory reporting to projecting PBR reserves at future dates. This session also profiled specific challenges that can arise when actuaries use models to project PBR reserves at future dates, such as determining starting assets and setting VM-20 asset assumptions at future valuation dates, and other technical issues related to modeling assets within nested model structures that have both inner and outer loop projections. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-042.pdf*.)

SESSION 50WS: ASSUMPTION SETTING UNDER VM-20

Moderator: Paul Fedchak, FSA, MAAA
Presenters: Arnold A. Dicke, FSA, CERA, MAAA; Leonard Mangini, FSA, MAAA

In this buzz group format session, attendees discussed assumption setting under VM-20. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-050.pdf*.)

SESSION 53PD: COMBINATION PRODUCT HOT TOPICS— VALUATION, TAX AND MODELING

Moderator: Lo Linda Chow, FSA, MAAA
Presenters: Lo Linda Chow, FSA, MAAA; Ryan LaMar Holt, FSA; Craig R. Springfield, J.D.

Combination products [e.g., 26 U.S. Code § 7702B long-term care (LTC) riders, 26 U.S. Code § 101(g) chronic illness benefits or linked benefits] continue to gain momentum amid the private long-term care insurance crisis. There is an increasing amount of carriers considering adding either chronic illness riders or LTC riders to their life policies. This session covered hot topics related to combination products, which include industry valuation approaches, NAIC development (including PBR), tax reform and its implication, assumption and modeling considerations. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-053.pdf*.)

SESSION 57: NEWLY PROPOSED ASOPS (MODELING AND ASSUMPTIONS)

Moderator: James A. Miles, FSA, MAAA
Presenters: James A. Miles, FSA, MAAA; Yifeng Mu, FSA, CERA, FCIA; Michael W. Santore, FSA, MAAA

The proposed Assumptions Actuarial Standard of Practice (ASOP) will "apply to actuaries performing actuarial services which include setting and/or assessing the reasonableness of assumptions." The proposed Modeling ASOP will "apply to actuaries in all practice areas performing actuarial services when selecting, designing, building, modifying, developing, using, reviewing or evaluating all types of models that are not simple models." Actuaries use numerous models that have various applications (e.g., economic capital, GAAP reporting, pricing, etc.). It's important that the use of assumptions are appropriate in light of the model's intended purpose. Focused topics of discussion addressed what these newly proposed ASOPs mean for the actuary. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-057.pdf*.)

SESSION 62PD:
SETTING ASSUMPTIONS FOR ANNUITIES UNDER VM-21
Moderator: Kendrick D. Lombardo FSA, MAAA
Presenter: John Thomas Dizer, FSA, MAAA

This session covered assumption determination for annuities under VM-21[3] with emphasis on contract holder behavior assumptions, prudent estimate mortality assumptions and measuring credibility. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-062.pdf*.)

SESSION 66PD:
PREDICTIVE ANALYTICS APPLICATIONS
Moderator: Alexander Jonathan Laurie, MAAA, FCAS
Presenters: Emily Marie Cassidy, FSA, MAAA; Talex Diede, MS; Richard Marshall Lagani Jr., MA; Alexander Jonathan Laurie, MAAA, FCAS

Predictive modeling is the latest tool in the insurer's arsenal, which derives deeper insights from data to extract more informational value. Predictive modeling techniques are being used to review assumptions more efficiently, develop risk margins and inform powerful business decision-making. This session provided guidance for implementing predictive modeling techniques to improve experience studies and set modeling assumptions for life and annuity products. Using a case study and real-world issues, presenters walked through the predictive model development and validation process, explained how to interpret results and discussed considerations for operationalizing the new assumption structure within a traditional valuation/projection model. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-066.pdf*.)

SESSION 67PD:
MODELING ASSETS AND OTHER ALM MODELING CONSIDERATIONS
Moderator: Nicholas B. Brink, FSA, MAAA
Presenters: Nicholas B. Brink, FSA, MAAA; Stephen G. Smith, FSA, MAAA; Matthew Ming Zhou Zhang, FSA, CERA, MAAA

This session focused on asset modeling in a liability projection system that includes the link between asset modeling and investment strategy, the impact of modeling choices and discussion around discount rates. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-067.pdf*.)

SESSION 77PD:
POST-MODEL TRANSFORMATION … TRANSFORMATION!
Moderator: Bryan Christopher Lindsley, FSA, MAAA
Presenters: Graham Miller Bryce, FSA; Yonghai Chen, FSA; Benjamin Carl Farnsworth, FSA, CERA, MAAA

Many insurers and reinsurers have modernized/converted their models over the last five years to meet new financial reporting requirements and strengthen efficiency, controls and governance. Conversion projects are often subjected to timeline and data constraints that limit the end-state model from meeting its full potential. The panel facilitated an interactive discussion with the audience through a live survey and addressed key items that can often be improved upon post-conversion. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-077.pdf*.)

SESSION 78PD:
MODEL GOVERNANCE IN AN OPEN-SOURCE WORLD
Moderator: Sean Michael Hayward, FSA, MAAA
Presenters: Rohan Noel Alahakone, ASA, MAAA; Dorothy L. Andrews, ASA, MAAA

Many companies struggle with the decision to adopt open-source versus closed-source systems for modeling. Models are used to price products, project future profits and determine how much capital to hold, providing important financials for financial reporting as well as management decision-making and predictive modeling. An error in a model or the modeling process can lead to huge losses, penalties, loss of reputation and even financial failure.

The banking industry has mature and regulated governance processes around its models. The insurance industry has a renewed impetus to advance a mature model governance framework due to recent awareness and new valuation regulations emphasizing model governance to reduce model risk. Model risk is an important consideration when choosing between open- or closed-source systems. A common belief in the industry is that closed-source systems pose less model risk than open-source systems, and coding flexibility is sacrificed. The presenters believe this notion is flawed. The perceived model risk of open-source systems can be successfully minimized by imposing an appropriate governance framework over the modeling process to mitigate model risk without sacrificing the coding flexibility of an open-source system.

The purpose of this session was to provide the attendees with the major pros and cons of open versus closed systems to inform on decision-making when choosing between the two systems under a complete model governance framework. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-078.pdf*.)

SESSION 80PD:
PRACTICAL ANALYSIS OF PBR MORTALITY CREDIBILITY FOR TERM INSURANCE
Moderator: Mark C. Rowley, FSA, MAAA
Presenters: Steven C. Ekblad, FSA, MAAA; Jordan Edward Givan, FSA, CERA, MAAA

In determining principle-based reserves for U.S. life insurance, the credibility level of company mortality experience often has a large impact on the level of PBR deterministic reserves for term insurance. Generally, the lower the credibility of company experience, the higher the blended mortality rates since industry mortality often is higher than individual company mortality experience. In addition, the mortality margin increases with lower credibility levels of company experience. Other factors impacting the blended mortality rates are a company's own mortality experience and mortality improvement assumptions used to project reserves in future nodes needed for pricing products. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-080.pdf*.)

SESSION 87PD:
MODEL VALIDATION AND GOVERNANCE IN THE PBR WORLD
Moderator: Vikas Sharan, FSA, FIA, MAAA
Presenters: Vikas Sharan, FSA, FIA, MAAA; Uri Sobel, FSA, MAAA; Erzhe Zhang, FSA, MAAA

Most life insurance companies have spent significant time unraveling PBR requirements. As these models are rolled off the assembly line, it becomes necessary to put in place a governance and validation framework. The validation becomes complicated as the model has three independent components and involves stochastic models. Additionally, experience studies become increasingly important and a rigorous process to do data analysis to derive assumptions and govern these assumptions is required. Companies also need to create attribution reports to explain results from one time period to another.

Presenters discussed model governance, assumption governance, model validation and analysis of results. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-087.pdf*.)

SESSION 88PD:
TAX REFORM: IMPLICATIONS ON MODELS
Moderator: Melanie Dunn, FSA, MAAA
Presenters: David V. McKay, ASA, MAAA; Samuel Carter Schauf, FSA, CERA, MAAA; Yang Yu, FSA, CERA, ACIA

Tax reform took effect on Jan. 1, 2018, and included sweeping changes in the nation's taxation policy for insurance companies and individuals. Actuaries should be prepared to quickly implement the new policies in actuarial models and address any challenges. Presenters focused on understanding the implications on modeling for existing products sold by life and annuity companies. The session began with a brief overview of the tax policy changes, followed by a discussion of the implications on actuarial models. This session focused on modeling implications but could be combined with implications on financial reporting, cash flow testing, product pricing and reinsurance strategy. (See session slides at *https://www.soa.org/pd/events/2018/valact/pd-2018-08-valact-session-088.pdf*.) ■
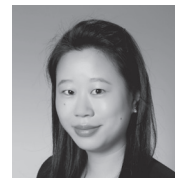
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ENDNOTES

1 National Association of Insurance Commissioners (NAIC). 2018. *Valuation Manual.* Valuation Manual 51: Experience Reporting Formats. *https://www.naic.org/documents/prod_serv_2018_valuation_manual.pd*f.

2 National Association of Insurance Commissioners (NAIC). 2018. *Valuation Manual.* Valuation Manual 20: Requirements for Principle-Based Reserves for Life Products. *https://www.naic.org/documents/prod_serv_2018_valuation_manual.pdf*.

3 National Association of Insurance Commissioners (NAIC). 2018. Valuation Manual. Valuation Manual 21: Requirements for Principle-Based Reserves for Variable Annuities. *https://www.naic.org/documents/prod_serv_2018_valuation_manual.pdf*.