Subject: Annual Research Report

Responsible Officer: Alice Underwood, Vice President – Research and Development

1. Background

   The Board of Directors receives an annual report on CAS research activities at its November meeting.

2. Information

   The 2013 Report is attached. The report consists of two components:
   A. Overview and Status of 2012-2013 CAS Research Activities
      Details on CAS research projects are provided in this attachment, organized by topic.
   B. CAS Research Commitments and Expenditures (2003-2014)
      Annual funding commitments to research projects and call paper programs are summarized in a spreadsheet.
CAS Research: 2013 Overview

During the 2012 – 2013 year the CAS Research Department completed a number of significant projects, including

- Actuarial Climate Volatility Index RFP, Phase 1 (literature review)
- Contingent Capital RFP: report published in Spring 2013 eForum
- Update of and webinar about the RPP II literature survey
- 2013 Reinsurance Call for Papers (7 papers received)
- Collection of essays on Incentive Compensation and ERM (joint with JRMS)
- Reserving Non-Technical Call for Papers: 16 papers, of which nine to be presented at Annual Meeting
- IAA Discount Rate Monograph
- Michelbacher Prize for Significant Achievement to be awarded at 2013 CAS Annual Meeting (first award since its reformulation and inclusion as a task for the Hachemeister Prize Committee)
- Tail Factors Working Party completed its report and plans to have it published
- Bornhuetter-Ferguson Initial Expected Losses Working Party presented its findings based on survey conducted in 2012 and is now working on a report.

Notable work currently in progress includes

- Actuarial Climate Volatility Index RFP, Phase 2 (construction of index)
- 2015 Ratemaking Call for Papers (7 papers in progress)
- RFP on Capital Allocation: report to be submitted December 2013
- Credit Risk Compendium: researcher selected, contract signed, research underway
- Actuarial Measures of Housing Value: paper in preparation
- Low Interest Rate Environment Working Party
- Regulatory Risk and North American Insurance Organizations (joint with NAAC)
- Several projects jointly sponsored with TAF
- Predictive Modeling two-book project: Volume I to be published Spring 2014
- Open Source Software Committee’s R wiki
- Newly launched Healthcare wiki

In addition, we have worked to streamline the R&D committee structure and wrap up or discontinue stalled projects.

- Workers Compensation Textbook project started in 2003 will officially be discontinued at year-end
- Another project started in 2003, Empirical Estimation of Dependence in a Portfolio of Insurance Claims, was completed and published in European journal
- Two long-standing Reserving Task Forces (BF LR and Tail Factor) wrapping up
- Completion of Chapters 6 and 7 of DRM Handbook
- Looking to wrap up the Economic Capital Working Party
- Currently assessing need for standing committees vs. task forces

The CAS has also continued to pursue cooperation with other actuarial organizations. We are a key partner and funder of ERM-related research through the Joint Risk Management Section, which is jointly sponsored by the CIA, SOA and the CAS. The CAS also meets regularly about research topics with members of the North American Actuarial Council. The VP-R&D participates in a regular call with GIRO and attended the 2013 GIRO
meeting in Edinburgh. A number of GIRO members are participating in the Predictive Modeling book project mentioned above and we are pursuing other opportunities for collaborative projects.

CAS Research continues to work with Professional Education to disseminate the results of research projects to the membership and to sponsor projects that will advance the technical skills of the CAS members.

2012-2013 goals and associated actions were as follows:

1. Together with Research committee chairs and staff liaisons, review and update committee charges and goals
   - Early in 2012, committee charges and goals were reviewed and updated
   - In light of discussions at the 2013 Leadership Meeting, we believe it may be appropriate to make more use of online communities and streamline the committee structure so as to have a much smaller number of standing committees, with task forces constituted for particular items
   - Together with Professional Education and Administration departments, we are putting together a task force to flesh out the idea of crowdsourcing research topics and priorities (“What’s Your Problem” campaign)

2. Establish a process for regular scan of non-CAS publications to identify research of interest and alert the relevant Research committees for action (translation, developing an application, sponsoring related research, etc.)
   - Working to make the RPPII literature scan more broadly known and to integrate its results with DARE

3. Expand promotion of current research through existing CAS publications, meetings, etc.
   - Ongoing

4. Explore possible role and feasibility of staff research actuary
   - Ideas on this topics presented to CAS Executive Director

5. Pick a recent academic research project and fund practical application/case study
   - Actuarial Measures of Housing Value project underway

Together with the CAS staff, chairs, and volunteers, I look forward to continued progress in CAS Research during the 2013-2014 year.

Sincerely,

Alice Underwood
VP – Research & Development
Status of 2013 CAS Research Activities

Research Projects by Topic

1. Climate Change
   - **Project: Actuarial Climate Volatility Index RFP, Phase 1**
     - **Project Oversight Group:** Climate Change Committee
     - **Contact:** Vijay Manghnani, Caterina Lindman
     - **Purpose/Topic:** The purpose of this project is to educate actuaries, governments, businesses, educators and the public on climate change and its related risks within North America and globally. The index is to be a resource for actuaries and others in developing predictive models for anticipated climate change related losses or opportunities as well as for risk management strategies. Actuaries might utilize the data and measures of the indicators and index in evaluating the potential risks of climate related changes to their employers. For example, a high index for increased hurricane intensity might indicate the potential for increased property damage, personal injury or death. In addition, the data and index might also be useful to the American Academy of Actuaries and others in public policy discussions. The first phase of the project is a literature review. Construction of the index is the second phase.
     - **Funding Approved:** $15,000. Funding will come from all three sponsoring organizations (SOA, CAS, CIA); CAS initially agreed to provide $10,000, with an extra $5,000 approved in February 2010.
     - **Status:** All payment has been made. Research has been conducted and Solterra Solutions Ltd. has completed the report, including changes requested by the sponsoring organizations. Report was published in November 2012 and is available on CAS Web site, as well as SOA, CIA & Solterra Web site.

   - **Project: Actuarial Climate Volatility Index RFP, Phase 2**
     - **Project Oversight Group:** Climate Change Committee
     - **Contact:** Vijay Manghnani, Caterina Lindman
     - **Purpose/Topic:** This project continues the work started in Phase 1 of the project by working to build both an Actuaries Climate Index and an Actuaries Climate Risk Index. The Actuaries Climate Index will be a global index, and will educate the general public about how Climate is changing, while the Actuaries Climate Risk Index (ACRI) will be an Index that measures economic or insured risk in Canada and the U.S.
     - **Funding Approved:** $25,000. Total funding of $63,000 will come from all three sponsoring organizations (SOA, CAS, CIA)
     - **Status:** The project was begun in August by Solterra Solutions, who completed Phase 1 of the project as well, and is expected to take six months. The group meets bi-weekly with the researchers to make sure project stays on target.

   - **Project: Call for Essays on the Impact of Climate Change on the Insurance Industry**
     - **Project Oversight Group:** Climate Change Committee
     - **Contact:** Vijay Manghnani, Betty-Jo Walke
     - **Purpose/Topic:** The Call for Essays is an attempt to capitalize on the RFPs from
the committee keep the index project in the spotlight as work on the Actuarial Climate Index and Actuaries Climate Risk Index is underway.  

**Funding Approved:** $2,000 (for prize money to recognize the best essays)  
**Publication:** Upcoming issue of CAS E-Forum  
**Status:** The project was announced in May and essays were due in August. Seven essays were turned in. The essays are under review by committee members and will be sent to the CAS Publications staff for publication later in 2013.

2. **Dynamic Risk Modeling**
   - **Project:** DRM Handbook Subcommittee  
     **Date Announced:** Announced in November 2009  
     **Project Oversight Group:** Dynamic Risk Modeling Committee  
     **Chairpersons:** Chris Diamantoukos, Ted Shalack, Barry Zurbuchen  
     **Purpose/Topic:** This subcommittee was focused on rewriting the Dynamic Financial Analysis Handbook, specifically Chapters 6 & 7, which were never finished. The Dynamic Risk Modeling Handbook is intended to provide a basic understanding and practical guidelines for the development and implementation of dynamic risk models common to the property and casualty insurance industry. In addition, it is hoped that this Handbook will become a basic reference source for the educational needs of future modelers and the practical day-to-day application needs of experienced practitioners.  
     **Presentations:** CAS Annual Meeting, November 2012  
     **Publication:** Chapters 6 & 7 are available on the CAS Web site with the other finished chapters (http://www.casact.org/research/drm/)  
     **Status:** The committee is now looking to incorporate a longer-term project with this that involves reviewing all chapters to create consistent terminology, format, and presentation. There are likely some common elements to be further introduced or subjects that should be addressed in a common area, e.g., correlation.  

   - **Project:** Public-Access DFA Model Subcommittee  
     **Date Announced/Completed:** Announced in August 2004  
     **Project Oversight Group:** Dynamic Risk Modeling Committee  
     **Contact:** Morgan Bugbee, Patrick Crowe  
     **Purpose/Topic:** This subcommittee is charged with making updates and enhancements to the public-access DFA model.  
     **Presentations:** 2005 Annual Meeting, 2006 CLRS, 2007 Spring Meeting, 2008 Spring Meeting  
     **Publication:** The DFA Model is available on the CAS Web Site.  
     **Status:** The next step is to get a greater understanding of how Dynamo works, so a demonstration WebEx is needed, at which point the subcommittee will have a better understanding of the enhancements that need to take place. The WebEx will be available to the entire committee, not just the subcommittee, so plans will be made for that to take place soon.  

   - **Project:** Economic Capital Model Working Party  
     **Date Announced:** Announced in December 2009  
     **Project Oversight Group:** Dynamic Risk Modeling Committee  
     **Chairpersons:** Sholom Feldblum, Sam Guterman
Purpose/Topic: The Economic Capital Model Working Party is charged with developing a stochastic, principles-based economic capital model that meets Solvency II objectives and can be used by insurers, rating agencies, and regulators for solvency monitoring.

Presentations: TBD
Publication: TBD

Status: The subcommittee wants to plan for a monograph to explain stochastic/capital reserving and how it can be used for solvency regulation. It is being done through the DRMC and the CAS Monograph publication committee. The lead of the subcommittee is providing an initial draft from his own company’s work, and will be moving forward with other people’s extensions on it. The potential end product is to give an actuarial structure for an RBC model based upon actuarial concepts.

- Project: Real Data for Testing
  Date Announced: Announced in August 2013
  Project Oversight Group: Dynamic Risk Modeling Committee
  Contact: Chris Diamantoukos
  Purpose/Topic: The group Chris was working with on the Reserving Chapter was very interested in getting their hands on data to have a common set, so link was sent out to the committee with an Excel spreadsheet containing 20 years’ worth of transaction-level data along several lines of business. It will serve as a good resource for the subcommittee working on this chapter.

Presentations:
Publication:

Status: Currently work in progress.

3. Enterprise Risk Management

- Project: Regulatory Risk and North American Insurance Organizations RFP
  Date Announced: Funding was awarded in February 2013
  Project Oversight Group: NAAC Collaborative Research Group
  Purpose/Topic: To examine the regulatory risk faced by insurance companies in North America and their actuaries
  Funding: $54,000 total, including $15,000 in funding from CAS
  Seminar/Meeting Presentations: TBD
  Publication: TBD
  Status: Work in progress.

- Project: 2013 ERM Call for Papers
  Date Announced: Call for Papers announced in August 2012
  Project Oversight Group: Joint Risk Management Section plus PRMIA Institute and The Actuarial Foundation.
  Contact: Steven Siegel, SOA
  Purpose/Topic: Papers that explore risk management topics.
  Funding: Three $5,000 awards were presented funded by the three sponsoring organizations.
  Seminar/Meeting Presentations: 2013 ERM Symposium, Chicago.
Publication: Papers are available from the 2013 ERM Web site (linked from CAS Web site).
Status: Completed.

- **Project:** Risk Management: Part Four - Incentive Compensation- the Critical Blind Spot in ERM Today  
  Date Announced: January 2013  
  Project Oversight Group: Joint Risk Management Section.  
  Contact: Bob Wolf and Louise Francis  
  Purpose/Topic: Submission of essays explored the misalignment between incentive compensation practices and risk management.  
  Seminar/Meeting Presentations: Webinar presented in May.  
  Publication: Papers are available on the SOA Web site (linked from CAS Web site); published in Spring 2013.  
  Status: Completed.

- **Project:** An Empirical Investigation of CDS Spreads Using a Regime Switching Default Model  
  Date Announced/Completed: Funding was awarded in April 2009.  
  Researcher(s): Andreas Milidonis  
  Topic: Recipients intend to use data on CDS spreads reported by Datastream for publicly traded companies to develop a default risk model. We believe that CAS members, in general, have an interest in this topic given our economic circumstances.  
  Funding: $9,000 ($3,000 from CAS, $6,000 from The Actuarial Foundation)  
  Status: Paper is in progress. Author has received first payment of $1,500 from CAS, (payable upon signing the letter of agreement) and the second payment of $1,000, (payable when paper was received by a refereed journal). In January 2012, researcher submitted revised paper for 2nd round review.

4. **Health Care**

- **Project:** Medicare Secondary Payer Status –The Current and Future Impact on Workers Compensation RFP  
  Date Announced/Completed: Announced in April 2013  
  Project Oversight Group: Committee on Health Care Issues  
  Contact: Steve DiCenso  
  Purpose/Topic: This project seeks the potential future financial impact to the Property & Casualty insurance and/or self-insurance industry because of Section 111 of the Medicare, Medicaid, and SCHIP Extension Act of 2007.  
  Funding Approved: $20,000  
  Status: The project was announced, proposals were received and it was decided to go with a group of researchers from Milliman. Currently, the contract is being worked out between the researchers and CAS. The project is expected to take about three months once it begins.

5. **Ratemaking**

- **Project:** 2015 Ratemaking Call for Papers  
  Date Announced/Completed: Announced in March 2013  
  Project Oversight Group: Committee on Ratemaking  
  Contact: Ben Newton  
  Purpose/Topic: Papers on all ratemaking topics are accepted.
Funding Approved: $2,500, for the best papers.
Publication: Completed papers will be published in a future issue of the eForum.
Status: Program is underway. Seven proposals were received. Two papers are progressing in a new one-year cycle while the remaining papers are on the typical two-year track. The committee is in the final stages of review for the one-year tracked papers, and a final group discussion on those will take place mid-November.

- Project: Ratemaking Practice Note
  Date Announced: September 2015.
  Contact: Ben Newton
  Topic: Every year COPLFR puts out a practice note on reserving – it is essentially the bible for reserving actuaries. It provides guidance, gives sample wordings, situations, summarizes ASOPs, etc. On the ratemaking side, there is no such animal and a few issues are starting to bubble up. One is this issue of price optimization – if more is charged than expected, is the rate actuarially sound, and is it legal (adequate, not excessive, nor unfairly discriminatory)? The idea is to gather a subcommittee from the Ratemaking Committee to brainstorm around current or best practices, and distribute a document would be helpful to the profession.
  Status: A subcommittee has been formed that will begin work on this project.

6. Reinsurance
- Project: 2013 Reinsurance Call for Papers
  Date Announced: July 2012
  Date Completed: June 2013
  Project Oversight Group: Committee on Reinsurance Research
  Contact: Mario DiCaro
  Purpose/Topic: The Committee welcomes all papers on Reinsurance topics. Areas related directly to topics of current interest were preferred: Sub-prime mortgage, moving towards International Accounting Standards, risk inflation, and risk transfer.
  Funding Approved: $2,000 for the Reinsurance Prize for the best paper
  Presentation: 2013 Seminar on Reinsurance
  Publication: 2013 Spring E-Forum, Volume 2
  Status: Seven proposals were received, four final papers were published and two were presented at the Seminar in Bermuda. The Reinsurance Prize was awarded to David Morel for his paper, “Pricing Catastrophe Excess of Loss Reinsurance Using Market Curves.”

7. Reserves
- Project: 2013 Non-Technical Reserves Call for Papers
  Date Announced: Announced in January 2013
  Date to be Completed: November 2013
  Project Oversight Group: Committee on Reserves
  Contact: Lynne Bloom
  Purpose/Topic: Papers were requested on the topics of: opinion issues; best estimates, variability, and ranges; methodologies; unique or changing exposures; and other matters affecting reserving. The twist with this year’s program is that non-technical and more practical papers were requested.
Funding Approved: $5,000
Presentations: 2013 Annual Meeting
Publication: 2013 Fall E-Forum

Status: Sixteen papers were published and nine presented. Three were awarded prize money, including first place and the Ronald Bornhuetter Loss Reserve Prize to Marc Pearl and Jeremy Smith for their paper, “An Enhanced On-Level Approach to Calculating Expected Loss Costs.” Both Bertram Horowitz and Karen Adams were recognized as runners-up for their papers called “Aggregate Loss Reserve Analysis by Accounting Date” and “Chain Ladder Reserving Methods for Liabilities with Per Occurrence Limits,” respectively.

• Project: Bornhuetter-Ferguson-Initial Expected Losses Working Party
  Date Announced/Completed: Announced in September 2004
  Project Oversight Group: Committee on Reserves
  Contact: Lynne Bloom
  Purpose/Topic: The goal of this working party is to produce a paper regarding the initial expected loss assumption in the Bornhuetter-Ferguson reserving method. The working party is not expected to engage in primary research, but instead will leverage initial expected loss approaches already in use. With many competent actuaries using the Bornhuetter-Ferguson method, there are probably many very good initial expected loss approaches already in use, but not documented.
  Presentations of Interim Reports: 2005 CLRS, 2005 Annual Meeting
  Presentation of Final Results: 2013 CLRS
  Publication: TBD
  Status: The BF working party presented the results of the 2012 survey at the 2013 CLRS in Boston. In addition, the committee has used industry Schedule P Data to test the consistency and efficacy of various BF methods over time and against actual carried industry levels for several lines of business. The main methods tested for initial expected loss ratios are prior year’s ultimate indications, Cape Cod methods, and trended loss ratio methods. These results were included in the presentation at CLRS. The presentation will be followed up by a paper outlining the results and including details of the survey and testing.

• Project: Tail Factors Working Party
  Date Announced/Completed: Announced in September 2004
  Project Oversight Group: Committee on Reserves
  Contact: Nancy Arico
  Purpose/Topic: Tail factors are widely used, have a huge impact on results, and yet there is minimal literature on the subject. The product of this working party will be a paper that will survey existing literature and then identify additional methods in use.
  Publication: 2013 Fall E-Forum
  Status: The Tail Factor Working Party has completed an extensive survey of many approaches being used in our industry to select loss development tail factors. The presentation of their findings, titled “The Estimation of Loss Development Tail Factors: A Summary Report”, will soon be published. The paper is organized by several broad classes of methods: Bondy-Type, Algebraic, Benchmark Based, Curve Fitting, Open Count Based, and other. Within each class a description, an example, advantages and disadvantages, and users of each method are presented. The examples use a common set of data and an excel spreadsheet will be available that
provides the reader the ability to easily follow formulas and delve deeper into the mechanics of the method. Although it’s been a long and slow birthing process, the document should prove to be a valuable aid to the reserving actuary. A presentation at the 2013 CLRS provided an overview of the paper.

- **Project: 2014 Reserves Call for Papers**
  - **Date Announced:** Announced in October 2013
  - **Date to be Completed:** September 2014
  - **Project Oversight Group:** Committee on Reserves
  - **Contact:** Lynne Bloom, Denise Ambrogio
  - **Purpose/Topic:** Papers were requested on the topics of: opinion issues; best estimates, variability, and ranges; methodologies; unique or changing exposures; and other matters affecting reserving.
  - **Funding Approved:** $6,000 ($5,000 for the best papers and $1,000 for the best practical tool)
  - **Presentations:** 2014 Casualty Loss Reserve Seminar
  - **Publication:** Upcoming 2014 issue of E-Forum.
  - **Status:** Call Paper Program just approved by Executive Council and will be announced soon to CAS membership. Proposals will be due in December.

- **Project: Incorporate the Dependence Structure in Estimating Loss Reserves**
  - **Date Announced/Completed:** Funding was awarded in April 2010.
  - **Researcher(s):** Dr. Jun Zhou
  - **Topic:** The project will establish a model to incorporate the dependence structure in loss reserving process.
  - **Funding Approved:** $14,000 ($5,000 from CAS, $9,000 from The Actuarial Foundation)
  - **Status:** The paper is in progress. The author has received the first allotment of the payment, due when a signed copy of the agreement was made. Researcher requested extension until Dec 2011 or Jan 2012. In February, the title was changed to: Incorporate the Dependence Structure in Estimating Pure Premium. Mr. Zhou believes this study will have a more significant impact if we use that in pricing instead of reserving.

  - **Date Announced/Completed:** Funding was awarded in February 2008.
  - **Researcher(s):** Katrien Antonio, Universiteit van Amsterdam
  - **Topic:** Put focus on the development of three issues in stochastic reserving: micro models for run off, incorporating expert opinion in reserving techniques and the interaction of reserving techniques with extreme value methodology.
  - **Funding:** $7,500 ($2,500 from CAS, $2,500 from The Actuarial Foundation and $2,500 from the SOA’s Committee on Knowledge Extension Research)
  - **Status:** Paper is in progress. Author has received first payment of $833 from CAS, (payable upon signing the letter of agreement) and the second payment of $666.67, (payable when paper was received by a refereed journal). In September 2011 the paper was rejected by JASA. They advised them to submit to an Actuarial Journal. It will be submitted to NAAJ. The paper won the annual prize of the Dutch actuarial association for the best scientific work in actuarial science. See this link:
8. Risk Theory

- **Project: Empirical Estimation of Dependence in a Portfolio of Insurance Claims**
  - **Date Announced/Completed:** Funding was awarded in June 2003.
  - **Researcher(s):** Emiliano Valdez, Andrew Chernih
  - **Topic:** To investigate the presence of “dependencies” in individual claims in a portfolio of insurance policies. The researcher will be using motor vehicle claim information from Singapore to attempt to fit a copula.
  - **Funding:** $12,000 ($6,000 from CAS, $6,000 from AERF)
  - **Status:** The final report has been completed, but final payment is still outstanding until paper is accepted by a peer-reviewed publication. *Variance* conditionally accepted the paper, pending revisions, but the researchers are also interested in submitting paper to *Insurance: Mathematics & Economics*. *Variance* is still interested if revisions are made. An addendum was signed in early 2013 with a deadline of June 30, 2013. Dr. Valdez did not meet the deadline so final payment was cancelled. He requested permission to submit final paper to the European Actuarial Journal. Both TAF and CAS approved of this plan. Dr. Valdez will notify us if it is accepted. No payments will be made since the paper was not completed or submitted to *Variance* per the addendum.

- **Project: Risk Premium Project Update RFP**
  - **Date:** August 2009
  - **Project Oversight Group:** Committee on Theory of Risk
  - **Contact:** Ed Bradford
  - **Purpose/Topic:** The CAS wishes to capitalize on the extensive review of the actuarial and financial literature review by the Risk Premium Project through 2000 by updating that review. Prof. Eling has agreed to continually update the project at a cost of $10,000 for two years.
  - **Funding:** $10,000
  - **Presentations:** Webinar in September 2013
  - **Publication:** Available on CAS Website; seeking to publish in the ARIA publication Risk Management and Insurance Review.
  - **Status:** Prof. Eling provided the second series of updates in 2013 and presented the updates via a CAS Webinar in September that was made available to all CAS members. The committee plans to have Eling provide another set of updates for the following two years pending EC approval. They hope to have the next update in 2014.

- **Project: RFP on Capital Allocation**
  - **Date:** August 2012
  - **Project Oversight Group:** Committee on Theory of Risk
  - **Contact:** Ed Bradford
  - **Purpose/Topic:** The principal objective of this consulting project is to advance the understanding of the concepts and practical methods of calculating the capital costs appropriate for lines and sub-lines as presented in the Management Summary and Thematic Category of “Allocation of Capital” found in the Risk Premium Project 2 Report. Specifically, the consultant should address the suggested Allocation of Capital research description and be familiar with the general thrust of the allocation
November 3, 2013

of capital literature as listed in the RPP2 Thematic category and found in the RPP2 database under Risk Management, Allocation of Capital category. An analysis of several reasonable allocation methods on a common set of property casualty insurance data, including both short and long-tailed lines would be required. In the event that actual data are unavailable, realistic simulated data for several lines, both short and long-tailed lines may be used.

Funding: $30,000
Presentations: TBD
Publication: TBD

Status: The committee approved an RFP for one topic from the Future Research section of the RPP2 Management Summary, specifically Capital Allocation and the EC approved the issuance of an RFP by COTOR. A proposal was accepted, the contract between the researchers and the CAS was signed, and research is currently underway. Due to some unforeseen circumstances regarding the health of one of the researches, the deadline for the project was extended. An interim payment of $15,000 was made in July 2013, and the final report is due December 2013, at which point the final payment will be rendered.

9. Open-Source Software Committee
   • Project: R Workshop at 2014 RPM Seminar
     Date Announced: Announced October 2014
     Contact: Lee Bowron
     Purpose/Topic: The Committee is organizing a one-day workshop that will focus on producing educational materials and tools that can be used to introduce CAS members to the widely used open source software tool R, which is especially useful in doing advanced analytics.
     Presentations: 2013 RPM, 2013 CLRS
     Publications: TBD
     Status: The 2014 workshop will focus on the practical issues involved in using R in typical types of actuarial analysis and beyond. In addition to mastering the fundamentals of R, attendees will practice working with various packages related to common actuarial work, reading and exporting data to and from R, building predictive models, as well as using R for loss development.

10. Accounting Changes Committee
    • Project: FASB and IASB Papers
        Date Announced: January 2013
        Contact: Orin Linden
        Purpose/Topic: The committee will work on the drafts of the FASB and IASB papers and provide updates to them.
        Presentations: 2013 CLRS
        Publications: TBD
        Status: After many years in development, the FASB and IASB released new proposals of Insurance Contracts accounting standards in June 2013, with a comment deadline in late October 2013. The proposals are likely to change how P&C loss and LAE reserves are established and described in disclosures. Discounting and risk margins have been key elements of the Boards' discussions. Members of the committee will review the latest proposals, the outlook for timing, and potential effects on P&C reserving.
11. Valuation, Finance & Investments

- **Project: Low Interest Rate Environment Working Party**
  - **Date Announced/Completed:** Announced in November 2011
  - **Project Oversight Group:** Committee on Valuation, Finance and Investments
  - **Contact:** Chris Gross
  - **Purpose/Topic:** Working Party is studying the following: how is the property casualty industry poised to handle the challenges that this low interest rate environment poses? A survey to solicit feedback regarding concerns and actions surrounding the current low interest rate environment was given to CAS members in the fall of 2012. The working party is using the results from the survey, along with other data gathered to write a report that will be published in late 2013.
  - **Presentations of Results:** N/A
  - **Publication:** TBD
  - **Status:** The Low Interest Rate Environment Working Party is in the final stages of review on its report. The report will cover a number of related questions, including:
    - How is insurance pricing responding to reduced new-money rates across the industry?
    - Are companies changing investment strategy in an attempt to increase investment returns? Are they taking additional investment risk as a result?
    - What would the impact be to the industry if interest rates were to quickly return to longer term average levels, potentially coupled with higher inflation as well? Would decreased value of assets pose a significant risk to solvency?
    - Are companies increasing their use of debt to take advantage of lower rates?
    - What would the likely impacts be to the industry from a prolonged period of currently low or even lower rates?
    - What impacts, if any, does the interest rate environment have for the use of self-insurance, captive formation, etc. versus traditional insurance.
    - Other issues related to operating in a low interest rate environment.
    - Once published, this report will be a valuable source of information to actuaries.

- **Project: Credit Risk Resources Compendium and Application of Property-Casualty Actuarial Methodologies to Credit Risk: Development of a Theory and Model RFP**
  - **Date Announced/Completed:** Funding was awarded in May 2012.
  - **Researcher(s):** Mathieu Boudreault and Jean-Philippe Boucher, University of Quebec at Montreal.
  - **Project Oversight Group:** Committee on Valuation, Finance & Investments
  - **Contact:** Rasa McKean
  - **Purpose/Topic:** The two goals of this project are: (1), to develop an organized set of resources on credit risk for the practicing actuary. The resources will be tailored to actuarial applications such as reinsurance credit risk, mortgage guaranty insurance and actuarial modeling of fundamental credit risk of assets/investments for cash flow modeling, intrinsic valuations of structured credits, and enterprise risk management purposes. (2), to describe the general US P&C actuarial approach to mortgage credit risk management, by surveying knowledgeable CAS members and consolidating their responses. Identified members will be asked how they would apply an “actuarial approach” if they had risk management responsibility for mortgage credit risk,
primarily in the context of mortgage insurance. Other mortgage credit risk contexts (e.g., bonds, other investments including derivatives, reinsurance) may also be considered provided actuarial methods have been applied by the survey respondents.

**Funding:** $32,500  
**Status:** Agreement signed with researchers in September 2012. Survey created and emailed to certain CAS members in October 2013.

- **Project: Contingent Capital RFP**  
  **Date Announced/Completed:** Funding was awarded in December 2011.  
  **Researcher(s):** Kailan Shang, Manulife Financial  
  **Project Oversight Group:** Committee on Valuation, Finance & Investments  
  **Contact:** Rasa McKean  
  **Purpose/Topic:** The goal of this project is to extend the theory and actuarial tools currently available to evaluate and structure alternative risk capital forms to traditional reinsurance and equity or hybrid capital.  
  **Funding:** $17,500  
  **Status:** Completed in February 2013 and published in Spring *E-Forum*.

- **Project: Establishing Actuarial Values of Housing Markets**  
  **Date Announced/Completed:** Funding was awarded in January 2013.  
  **Researcher(s):** Shaun Wang, Risk Lighthouse  
  **Project Oversight Group:** Committee on Valuation, Finance & Investments  
  **Contact:** Rasa McKean  
  **Purpose/Topic:** The goal of this project is to establish actuarial measures of property values that can help actuaries offer valuable professional services to the appraisal industry and the lenders. Knowing the relative relationship of actuarial measures and market values can help regulators to effectively manage systemic risks for the housing market, and their impacts on other sectors of the economy.  
  **Funding:** $50,000  
  **Status:** Report submitted in August 2013 to project review group. Will be sent to VFIC in November 2013.

12. Other Topics

- **Project: IAA Discount Rate Monograph**  
  **Date Announced:** August 2010  
  **Purpose/Topic:** The EC passed a motion to approve a maximum contribution of $15,000 for development of the IAA educational monograph on issues associated with the determination of discount rates for financial reporting purposes, with the condition that the CAS is allowed representation on the project oversight group.  
  **Status:** Completed. The monograph is now complete and officially available through the IAA

- **Project: Sequential Analysis of Actuarial Risks and Credibility**  
  **Date Announced/Completed:** Funding was awarded in April 2010.  
  **Researcher(s):** Dr. Michael Baron  
  **Topic:** This project focuses on the development of rigorous sequential statistical tools for the assessment of actuarial risks and credibility.  
  **Funding Approved:** $10,000
**Status:** The paper is in progress. The author has received the first allotment of the payment, due when a signed copy of the agreement was made. The author received the second payment in August 2012, when the CAS received evidence that the paper had been received by a referred journal, in this case *Variance*. It is being reviewed by *Variance*.

- **Project: Robust-Efficient Methods for Regression Credibility**
  - **Date Announced/Completed:** Funding was awarded in April 2010.
  - **Researcher(s):** Vytaras Brazauskas
  - **Topic:** The purpose of this research project is to robustify regression-type credibility models.
  - **Funding Approved:** $27,000
  - **Status:** The paper is in progress. The author has received the first allotment of the payment, due when a signed copy of the agreement was made. The author received the second payment in June 2011, when the CAS received evidence that the paper had been received by a referred journal, in this case *Variance*. They have received two referee reports in June 2012; they require substantial revision. The paper has been revised and re-submitted to *Variance*.

- **Project: Micro-econometric Modeling of Personal Lines Insurance**
  - **Date Announced/Completed:** Funding was awarded in April 2010.
  - **Researcher(s):** Dr. Jed Frees, M. Yunjie Sun
  - **Topic:** This project will assess the joint effects of auto and homeowner claims. Modeling these two types of claims jointly will enable the examination of the complicated relationships using underlying characteristics of a household (such as the risk taking preference). Both the frequency and severity of the claims in the multivariate framework will be modeled.
  - **Funding Approved:** $15,000 ($10,000 from CAS, $5,000 from The Actuarial Foundation)
  - **Status:** The paper is in progress. The author has received the first allotment of the payment, due when a signed copy of the agreement was made. Ms. Sun graduated and relocated to Germany. She has been unable to complete her paper. The project manager requested that she complete the work.

- **Project: Nonparametric Regression in the Presence of Missing Data**
  - **Date Announced:** June 2011
  - **Researcher(s):** Sam Efromovich
  - **Topic:** This paper focuses on developing innovative statistical theory, methodology and methods of data-driven nonparametric estimation of multivariate regression with missing continuous and categorical data, motivated by and tested on actuarial applications with the main one being the fair usage of credit scoring as a rating variable.
  - **Funding Sources:** $25,000 ($8,500 TAF, $8,000 CAS, $8,500 CKER)
  - **Status:** The paper is in progress. The authors have received the first allotment of the payment, due when a signed copy of the agreement was made. The authors have received the second payment when they submitted evidence that the paper had been received at a refereed journal.

- **Project: Flexible Predictive Model for Pure Premium Estimation**
  - **Date Announced:** June 2011
**Researcher(s):** John B. Henry, III, and Edward Yorty  
**Topic:** To present theoretical and empirical arguments for how a new pricing model outperforms GLMs.  
**Funding Sources:** $22,000 (CAS)  
**Status:** The paper is in progress. The authors have received the first allotment of the payment, due when a signed copy of the agreement was made.

- **Project: IAA Educational Monograph**  
  **Date Announced:** August 2011  
  **Purpose/Topic:** The EC passed a motion to approve a maximum contribution of $15,000, contingent on the project’s addressing P&C issues, for development of the IAA educational monograph on issues associated with the application of risk and uncertainty to the measurement of the liability of insurance contracts in the context of general purpose accounting as adopted by the IASB.  
  **Status:** The CAS received an invoice for only $8,550, as that is all that is needed by the researchers from the CAS. The project is progressing, albeit somewhat slower than what had originally been hoped for. Its status was discussed at the IAA’s upcoming meeting in Nassau, The Bahamas, in November 2012. The work is being reviewed as of October 2013.

- **Project: Mixed Erlang moment-based approximation: applications in actuarial science and risk management**  
  **Date Announced/Completed:** Funding was awarded in May 2012  
  **Researcher(s):** Hélène Cossette, David Landiault, Etienne Marceau.  
  **Topic:** To approximate the mixed Erlang distribution function by a member of this class using moment-matching method.  
  **Funding Sources:** $22,500 ($6,250 TAF, $10,000 CAS, $6,250 CKER)  
  **Status:** The paper is in progress. The authors have received the first allotment of the payment, due when a signed copy of the agreement was made.

- **Project: Conditional Tail Expectation for Portfolio Losses with Applications to Credit Risk Management**  
  **Date Announced/Completed:** Funding was awarded in May 2012  
  **Researcher(s):** Qihe Tang and Zhongyi Yuan.  
  **Topic:** Model portfolio losses in the presence of asymptotically dependent extreme risks, derive exact asymptotic formulas for the CTE, develop hybrid method, and apply results to risk management.  
  **Funding Sources:** $24,200 ($8,200 TAF and $16,000 CAS)  
  **Status:** Complete. The authors have received the first allotment of the payment, due when a signed copy of the agreement was made. Delivered presentations at IME, International conference on Quantitative Finance and Risk Management, ARC. Submitted to NAAJ in October 2012. Accepted by NAAJ in July 2013.

- **Project: Bounds on the expected payments of insurance instruments: A novel computational approach.**  
  **Date Announced/Completed:** Funding was awarded in June 2012  
  **Researcher(s):** Luis Zuluaga, and others.  
  **Topic:** to develop a novel, yet simple optimization-based procedure to compute semi-parametric bounds on the expected payments of general insurance instruments on a single underlying loss (or many losses that can be compounded into a single
total loss).

**Funding Sources:** $18,000 (CAS)

**Status:** The paper is in progress. The authors have received the first allotment of the payment, due when a signed copy of the agreement was made. It is being reviewed by *Variance*.

- **Project: Predictive Modeling Two-volume Book Project**
  
  **Date:** October 2011
  
  **Project Oversight Group:** Research Oversight Committee
  
  **Contact:** Richard Derrig

  **Purpose/Topic:** The first volume would be introductory with basic concepts and a wide range of techniques designed to acquaint actuaries with this sector of problem solving techniques. The second volume would be a collection of applications to P&C problems, written by authors who are well aware of the advantages and disadvantages of the first volume techniques but who can explore relevant applications in detail with positive results.

  **Funding:** $30,000

  **Status:** The first Volume of the Predictive Modeling Book is nearing completion. It’s been sent to the publisher and has an expected publication date of March, 2014, with sixteen chapters completed. Volume 2, which will focus on case studies to use those techniques and make both code and data available online related to the book, is in the preliminary stages.