

October 26, 2010

**Information Paper
for
CAS Board of Directors**

Subject: Annual Research Report

Responsible Officer: Louise Francis

1. Background

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

2. Information

The 2010 Report is attached. The report consists of two components:

A. Overview and Status of 2009-2010 CAS Research Activities

Details on CAS research projects are provided in this attachment, organized by topic.

B. CAS Research Commitments and Expenditures (2003-2011)

Annual funding commitments to research projects and call paper programs are summarized in a spreadsheet.

Overview

During the 2009 – 2010 year, the CAS Research Department completed a number of significant projects and initiated a number of new projects and working parties.

Among the projects completed were:

- a claim simulator¹ that simulates claim level data for use in reserving research
- Phase 1 of a project to review and analyze procedures for accounting for risk in property and casualty loss and loss adjustment expenses
- results of a joint CAS/GIRO/IAA Australia Ratemaking survey have been presented at the 2010 GIRO meeting and will be presented at the CAS November Annual meeting
- papers using the CAS's public access DFA model were presented at the 2010 ERM symposium and one of the papers received an award

The Research activities undertaken this year emphasized:

-- continuing to build the relationships with North American and non-North American actuarial organizations and to undertake collaborative projects

-- focusing research resources on projects that will produce a practical, usable outcome for CAS members, including research projects intended to enhance the technical skills of practicing members

-- continue current research efforts while developing innovative approaches to research and sponsoring research on leading edge topics

The main activities that funds were spent on were: working parties, call paper programs, request for proposals, and individual grant-winning papers. However, within these categories there is a new emphasis on producing practical tools such as spreadsheets and software for use by the CAS members. In addition, Research is making increased use of the RFP approach.

A new working party, the Health Economics Working Party, and a new task force, the Accounting Changes Task Force, were formed in the past year. The Health Economics Working Party is researching the drivers of medical costs, with emphasis on those that affect P&C lines, while the Accounting Changes Task Force is performing research to support the AAA on proposed accounting changes. In addition, the Ratemaking Survey Working Party has been collaborating with counterparts in the UK and Australia to develop and distribute a Ratemaking survey to members.

The Climate Change Committee, along with the Image of the Actuary Advisory Group (a multi-organization actuarial collaboration), distributed an RFP for a significant research project to develop an actuarial Climate Volatility Index.

Research continued the development of international relations and the expansion of international research collaborations. The GIRO leadership assisted the CAS in placing a GIRO

¹ The tool was developed by the LSMWP (Loss Simulation Model Working Party). The working party's name may cause some confusion as to what its project and tool are.

member on all CAS research committees. The CAS will recruit CAS members to participate on the newly forming 2010-2011 GIRO working parties.

The CAS has also continued to pursue cooperation and collaboration with other North American actuarial organizations. The CAS continues to be 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. CAS members are actively involved in decisions about the awarding of funds to projects and participate in the JRMS project oversight groups. One of the current JRMS projects is a call for essays on the financial crisis. The call is a sequel to the very successful 2008 call for essays on the financial crisis. The CAS also meets regularly about Research topics with members of the North American Actuarial Council. This year the NAAC research group sponsored its first research collaboration with an RFP for research on Severe Inflation/Deflation.

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. The Research and PE chairs met in September and suggested expanding the use “hands-on” sessions at meetings where attendees bring a computer and work through structured exercises. In addition we will explore bringing the “hands-on” approach to webinars.

Going forward, a goal of the Research Department is to identify important new Research projects to work on. This will include using surveys to get input from MAP on the importance of potential projects recommended by the BOD at a March brainstorming session. In addition, Research plans to close out a couple of Research projects that have been lingering, i.e., taking far longer to complete than expected.

Status of 2010 CAS Research Activities

Research Projects by Topic

1. Climate Change

a. Project: Actuarial Climate Volatility Index RFP

Project Oversight Group: Climate Change Committee

Contact: Susan Woerner, 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.

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: The RFP was released in late 2009. Ongoing discussions with the preferred vendor over intellectual property issues have taken place throughout 2010. Progress has been made and a contract will likely be signed before the end of 2010, with work expected to take 10 months.

2. Data Management

a. Project: 2010 Call for Data Management/Data Quality/Data Technology Papers

Date Announced: December 2008

Date Completed: March 2010

Project Oversight Group: Committee on Management Data and Information

Contact: Rudy Palenik

Purpose/Topic: The purpose of this program is to develop a source of literature on data topics important to casualty actuaries.

Funding Approved: \$2,500 to the best papers

Presentation: March 2010 RPM Seminar

Publication: Spring 2010 *eForum*.

Status: Completed. 5 papers were published, 3 papers were presented at the RPM Seminar. \$1500 was awarded to "Data & Disaster: The Role of Data in the Financial Crisis" by Francis & Prevosto for Best Paper.

3. Dynamic Risk Modeling

- a. **Project: DRM Handbook Working Party**
Date Announced: Announced in November 2009
Project Oversight Group: Dynamic Risk Modeling Committee
Chairpersons: Chris Diamantoukos, Ted Shalack, Barry Zurbuchen
Purpose/Topic: This Working Party is 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: TBD
Publication: When finished, Chapters 6 & 7 will be available on the CAS Web site with the other finished chapters (<http://www.casact.org/research/drm/>)
Status: Work in Progress.
- b. **Project: Public-Access DFA Model Working Party**
Date Announced/Completed: Announced in August 2004
Project Oversight Group: Dynamic Risk Modeling Committee
Contact: Morgan Bugbee, Patrick Crowe
Purpose/Topic: This working party has two charges. First, the working party will make short-term updates and enhancements to the public-access DFA model. Second, the working party will develop a plan for possibly ultimately evolving this model into an open-source framework. In this format, it is envisioned that the model would be posted on the CAS Web Site, and CAS members or others could propose independent updates and enhancements to the model. The new version would be submitted to the Dynamic Risk Modeling Committee (DRMC) with a description of the updates; the DRMC would review the model and documentation and, if appropriate, post the new version on the CAS Web Site.
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 DFA Model is completed. The Working Party published one paper from its 2009 Call Paper Program and plan to launch the 2012 Call in early 2011.
- c. **Project: Solving Problems Using a Dynamic Risk Modeling Process Call Paper Program**
Date Announced/Completed: To be announced in January 2011
Project Oversight Group: Public-Access DFA Model Working Party
Chairpersons: Bob Bear, Morgan Bugbee, Patrick Crowe
Purpose/Topic: This call for papers is intended to foster the use of Dynamo 4.1 and to generate publicly available improvements to the model.
Funding Approved: \$5,000
Presentation: 2012 Spring Meeting
Publication: Completed papers will be published in a future issue of the *eForum*
Status: Approved by EC, will be announced in January 2011

- d. Project: Economic Capital Model Working Party**
Date Announced: Announced in December 2009
Project Oversight Group: Dynamic Risk Modeling Committee
Chairpersons: Sholom Feldblum, Sam Gutterman
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. The Working Party is also preparing a white paper and presentation for insurers, rating agencies, and regulators to explain how to apply such a stochastic model. This paper will provide input to the American Academy of Actuaries, which in turn will provide input to the NAIC.
Presentations: TBD
Publication: TBD
Status: Work in Progress
- e. Project: Loss Simulation Model Working Party**
Date Announced/Completed: Announced in December 2005
Project Oversight Group: Committee on Dynamic Risk Modeling
Chairpersons: Mark Shapland, Robert Bear
Purpose/Topic: This Working Party will focus on creating a simulation model that will generate claims (both individually and in bulk) that can be summarized into loss development triangles and complete rectangles. The model will be able to generate triangles by layer, by different type of claim information (e.g., paid, incurred, Salv & Sub, exposures, claim counts, etc.), by hazard, by line of business, etc. One of the primary purposes for these simulated loss development triangles will be to test various loss development methods and models, including tail factor methods. The working party will not be focusing on actual testing of methods and models, but will focus on creating the simulated data sets for future research related to testing. Accordingly, a primary criterion for judging the quality of this model will be to evaluate the simulated data to make sure that it is realistic - i.e., it cannot be distinguished statistically from real data sets. Prior to setting up the model, the group will develop criteria for using simulated data for evaluating different methods and models in order to both provide initial guidance on how future research might proceed and to make sure that the model is sufficiently robust to support that testing.
Presentations: 2006 CLRS, 2007 Seminar on Reinsurance, 2007 Spring Meeting, 2007 CLRS, 2008 Spring Meeting, 2008 CLRS, 2009 CLRS
Publication: The Simulator and related documents are available on the CAS Web Site.
Status: Work completed. Working Party to be disbanded after publication of final paper and disbursement of final RFP funding.
- f. Project: Request for Proposal Creation of Public Loss Simulation Model(s)**
Date Announced: September 2008
Project Oversight Group: Committee on Dynamic Risk Modeling, Loss Simulation Model Working Party
Contact: Robert Bear
Purpose/Topic: The Loss Simulation Model Working Party has created a simulation model prototype in the APL programming language, but has not been able to make significant progress using other languages such as Visual Basic, R or J. While the

current APL prototype works as it was intended, the programming language is not readily conducive to other educational and research opportunities compared to other languages. For example, using Visual Basic it is anticipated that most actuaries would be able to readily view, understand and learn from the code as well as be able to offer code to enhance the model. The Committee on Dynamic Risk Modeling requests proposals from qualified developers to produce a public access loss simulation model in a free or inexpensive software environment such as Visual Basic, R or J. The open source loss simulation model will be available to all CAS members along with the APL prototype now available on the CAS web site at www.casact.org/research/lsmwp. The model will include the basic features in the prototype as well as additional features approved by the CAS after reviewing cost estimates. (This web site includes a seminar presenting a progress report, components of an eventual Working Party paper, APL loss simulation model source and run time programs along with program instructions.) Appendix A to this RFP summarizes basic features of the APL Prototype, while Appendix B summarizes additional features that could be included in the scope of the project if the CAS agrees based upon cost estimates. Appendix C summarizes initial LSMWP work in developing a model in Visual Basic that will be at the disposal of the responders to this proposal.

Funding: \$25,000

Seminar/Meeting Presentations: 2010 CLRS

Publication: A finished paper will be published in an upcoming issue of the *eForum*.

Status: The work has recently been completed by Hai You, the VP-Technology, at Gooouon Actuarial Solutions, and the final sum of \$24,054 has been awarded.

g. Project: 2011 Call for Papers on Testing Loss Reserving Methods, Models and Data Using the Loss Simulation Model

Date Announced: October 2010

Project Oversight Group: Committee on Dynamic Risk Modeling and Committee on Reserves

Contact: Bob Bear, Mark Shapland, Joe Marker

Purpose/Topic: Participants are asked to work with the completed Loss Simulation Model to develop enhancements to the model, perform additional testing, and apply the model to test alternative loss reserving methods and models.

Funding Approved: \$10,000 for the best paper and/or tool submissions

Seminar/Meeting Presentations: 2011 Casualty Loss Reserve Seminar.

Publication: Completed papers will be published in a future issue of the *eForum*

Status: Just announced. Proposals are being accepted.

h. Project: Estimating Allocated Capital using the Bootstrap

Date Announced/Completed: Funding was awarded in February 2008.

Researcher(s): Dr. Joseph Hyun-Tae Kim, University of Waterloo

Topic: Propose the use of the non-parametric bootstrap technique to estimate risk measures and simultaneously model dependency.

Funding: \$15,000 (split equally between CAS, The Actuarial Foundation and the SOA's Committee on Knowledge Extension Research)

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. Ultimately, the paper was to be submitted for publication to the *North American Actuarial Journal* no later than November 30, 2008 and will receive the second payment at that time. When and

if his paper is accepted and published by the *North American Actuarial Journal*, he will receive his final payment.

4. Enterprise Risk Management

- a. **Project: Risk of Severe Inflation and Deflation on North American Financial Security Systems & Industries RFP**
Date Announced: May 2010
Project Oversight Group: NAAC Collaborative Research Group
Purpose/Topic: To examine the risks of severe inflation or deflation on financial security systems across North America.
Funding: \$40,000 total, including \$15,000 in funding from CAS
Seminar/Meeting Presentations: TBD
Publication: TBD
Status: Proposals have come in, oversight group reviewing proposals

- b. **Project: 2010 ERM Call for Papers**
Date Announced: Call for Papers announced in August 2009
Project Oversight Group: Joint Risk Management Section plus PRMIA Institute
Contact: Steven Siegel, SOA
Purpose/Topic: Papers that explore risk management topics.
Funding: Joint Risk Management Section to provide possible prize funding
Seminar/Meeting Presentations: 2010 ERM Symposium, Chicago
Publication: Papers available at ERM Web site (linked from CAS Web site).
Status: 23 completed papers were published and presented at 2010 ERM Symposium.

- c. **Project: 2011 ERM Call for Papers**
Date Announced: Call for Papers announced in August 2010
Project Oversight Group: Joint Risk Management Section plus PRMIA Institute
Contact: Steven Siegel, SOA
Purpose/Topic: Papers that explore risk management topics.
Funding: Joint Risk Management Section to provide possible prize funding
Seminar/Meeting Presentations: 2011 ERM Symposium, Chicago
Publication: Papers will be available from the ERM Web site (linked from CAS Web site).
Status: In Progress. Proposal deadline of October 21, 2010 just passed.

- d. **Project: Risk Management: Part Two - Systemic Risk, Financial Reform, and Moving Forward from the Financial Crisis**
Date Announced: August 2010
Project Oversight Group: Joint Risk Management Section.
Contact: Bob Wolf
Purpose/Topic: Submission of essays expected to address various questions regarding systemic risk and financial reform as well as offering thought leadership on the ERM discipline and the essential elements needed to maintain risk transfer systems in times of unusual stresses and unlikely events.

Seminar/Meeting Presentations: TBD

Publication: Papers will be available on the SOA Web site (linked from CAS Web site); expected date of publication is Fall 2010.

Status: In Progress. Essay submissions were due October 1.

e. Project: Regime Switching Models: Applications to Mortality Modeling & Pricing

Date Announced/Completed: Funding was awarded in April 2009.

Researcher(s): Andreas Milidonis, Samuel Cox, Yijia Lin

Topic: This project would provide benefit to actuaries that must reflect mortality and longevity risks. The authors make the point that mortality and longevity risks are not typically modeled together. Since the mortality process is affected by both risks, they will model these risks together in their regime-switching model.

Funding: \$18,000 (\$4,000 from CAS, \$14,000 from the SOA's Committee on Knowledge Extension Research)

Status: Completed. Paper has been accepted for publication in the *North American Actuarial Journal* and all funding has been awarded.

f. 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).

g. Project: Copula Regression

Date Announced/Completed: Funding was awarded in April 2009.

Researcher(s): Rahul Parsa, Drake University

Topic: Project will detail the formulas and algorithms necessary for a copula regression analysis as well as provide the code for such. The final formulas and algorithms will be compared to Ordinary Least Squares and Generalized Linear Models analyses.

Funding: \$11,812 (\$5,000 from CAS, \$6,812 from the SOA's Committee on Knowledge Extension Research)

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 \$1,500, (payable when paper was received by a refereed journal).

5. Health Care

- a. **Project: Health Economics Working Party**
Date Announced/Completed: Announced in June 2010
Project Oversight Group: Committee on Health Care Issues
Contact: Derek Jones
Purpose/Topic: The Health Economics Working Party will research the impact of health care costs on casualty insurance coverages. Through the preparation of a research paper, or perhaps a series of papers, that addresses the impact of medical cost drivers on the prices of casualty coverages (e.g., auto liability, medical professional liability, workers compensation), this Working Party will educate the membership and promote the CAS's profile related to health care issues. A longer term goal would be to address behavioral issues of casualty carriers in response to U.S. health care reform.
Presentations: TBD
Publications: TBD
Status: Work is just getting started.

6. Ratemaking

- a. **Project: R Working Party**
Date Announced/Completed: Announced in June 2009
Project Oversight Group: Committee on Ratemaking, Committee on Reserves
Contact: Lee Bowron, Thomas Kolde
Purpose/Topic: The Working Party 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. The Working Party's work will ideally help inspire members to move beyond spreadsheets and augment their traditional tool set.
Presentations: The Working Party put on a membership-wide Webinar in August 2010 entitled "aRm Yourself for the Future – An Introduction to the R Statistical Computing Environment."
Publications: TBD
Status: Work in Progress.

- b. **Ratemaking Survey Working Party**
Date Announced/Completed: Announced in January 2010
Project Oversight Group: Committee on Ratemaking
Contact: John Lewandowski
Purpose/Topic: This Working Party intends to compile an online survey on Ratemaking topics, covering all aspects of pricing: Personal lines, Commercial Lines, London market and Reinsurance. The data will be analyzed locally and globally and the results shared with the profession.
Presentations of Results: 2010 GIRO Meeting, 2010 Annual Meeting
Publication: TBD
Status: Work is progressing, near completion.

- c. **Project: 2011 Ratemaking Call for Papers**
Date Announced/Completed: Announced in June 2009

Project Oversight Group: Committee on Ratemaking

Contact: Todd Lehmann

Purpose/Topic: Papers on all ratemaking topics are accepted.

Funding Approved: \$2,500, for the best papers.

Seminar/Meeting Presentations: Ratemaking & Product Management Seminar, March 2011.

Publication: Completed papers will be published in a future issue of the *eForum*.

Status: Papers are in process. 19 proposals were received. 9 papers are progressing towards final drafts.

d. Project: Workers Compensation Ratemaking: A Textbook for the Practicing Actuary

Date Announced/Completed: Funding was awarded in July 2003.

Researcher: Sholom Feldblum

Project Oversight Group: Committee on Ratemaking, on behalf of AERF

Contact: David Smith

Purpose/Topic: To update the Feldblum Workers Compensation ratemaking textbook published in 1992. The textbook will serve an educational and reference role, and cover all aspects of ratemaking (the 1992 edition focused on classification ratemaking only).

Funding: \$16,000 (\$8,000 from CAS, \$8,000 from AERF)

Status: Still in progress. The draft textbook is too large to be reviewed by the two reviewers initially identified. The author is working with CAS staff to make the textbook available to a larger pool of reviewers. Completed chapters will be posted to a page on the CAS Web Site. There are 17 chapters of the textbook, plus student exercises. When all the chapters have been posted (three chapters are still under development), an announcement will be sent inviting members to review the textbook. The chapters that are completed can be found at the CAS website at the following link: <http://www.casact.org/library/wcratemaking/>.

e. Project: Theory, Methodology and Methods of Multivariate Conditional Density Estimation and its Application to the Analysis of a Credit Scoring as a Fair Rating Variable

Date Announced/Completed: Funding was awarded in February 2007

Researcher: Sam Efromovich

Purpose/Topic: To contribute to actuarial theory and practice with a method of evaluation of the conditional probability distribution of risks as a function of traditional actuarial variables and credit scoring. To contribute to changing current policy which will allow the insurance industry and politicians to evaluate the effect of a credit scoring policy on unfair discrimination, intentional discrimination and disproportionate impact

Funding: \$20,000 (\$10,000 from CAS and \$10,000 from The Actuarial Foundation)

Status: Completed. Paper was accepted by the *Journal of the American Statistical Association* and all funding has been awarded.

f. Project: Modeling Driver Culpability in Multiple-Vehicle Collisions Using Conditional Regression

Date Announced/Completed: Funding was awarded in April 2009.

Researcher(s): Eric Weibel

Topic: The objectives of the project are to introduce actuaries to the Fatal Accident Reporting System, to introduce actuaries to Conditional Regression Analysis, and to analyze driver Accident Risk Factors in conjunction with the author's other work.

Funding: \$7,200 from CAS

Status: Paper is in progress. Author has received the first payment of \$2,000 (payable upon signing the letter of agreement) and the second payment of \$1,000 (payable upon evidence that the outlines of the paper are complete).

7. Reinsurance

a. Project: 2011 Reinsurance Call for Papers

Date Announced: August 2010

Date to be Completed: May 2011

Project Oversight Group: Committee on Reinsurance Research

Contact: Gary Blumsohn, Mario DiCaro

Purpose/Topic: The Committee welcomed 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: 2011 Seminar on Reinsurance

Publication: Completed papers will be published in a future issue of the *eForum*

Status: Proposals being accepted until October 15.

b. Project: Optimal Layers for Excess Catastrophe Loss Reinsurance

Date Announced/Completed: Funding was awarded in February 2008.

Researcher(s): Luyang Fu, State Auto Insurance

Topic: An improved method to determine the optimal reinsurance layer, based on data generated from ISO's AIR catastrophe models.

Funding: \$9,600 (\$5,000 from CAS, \$4,600 from The Actuarial Foundation)

Status: Completed. The paper has been accepted for publication by *Variance* and the author received all funding.

8. Reserves

a. Project: Bornhuetter-Ferguson-Initial Expected Losses Working Party

Date Announced/Completed: Announced in September 2004

Project Oversight Group: Committee on Reserves

Contact: Mark Shapland, 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: TBD

Publication: TBD
Status: Work in progress.

b. Project: Tail Factors Working Party

Date Announced/Completed: Announced in September 2004

Project Oversight Group: Committee on Reserves

Contact: Mark Shapland

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.

Presentations of Results: 2005 CLRS, 2005 Annual Meeting, 2007 CLRS

Publication: TBD

Status: Work in progress.

c. Project: 2010 Reserves Call for Papers

Date Announced: Announced in July 2009

Project Oversight Group: Committee on Reserves

Contact: Jon Michelson, Mark Shapland

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: \$5,000, including up to \$1,500 awarded to the winner of the Ronald Bornhuetter Loss Reserve Prize, and the best software applications

Presentations: 2010 Casualty Loss Reserve Seminar

Publication: 2010 Fall *eForum*

Status: Completed. 11 final papers published. "On the Accuracy of Loss Reserving Methodology" by Boles & Staudt awarded \$1500 for best paper, "On Small Sample s and the Use of Robust Estimators in Loss Reserving" by Jeng awarded \$750 for second place. No award for best software given out.

d. 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.

e. Project: Stochastic Claims Reserving: Micro Models for Run-Off, Incorporating Expert Opinion, and the Interaction with Extreme Value Methodology

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).

9. Risk Theory

a. **Project: Data for Predictive Modeling Applications**

Date Announced/Completed: Funding was approved in August 2006; project announced in December 2006 to no response and again in June 2007 to no response.

Project Oversight Group: Committee on Theory of Risk

Contact: Louise Francis

Purpose/Topic: Predictive modeling and data mining include a variety of techniques used by actuaries to predict outcomes of interest to insurance company managements such as claim frequency, claim severity and the likelihood that a claim is a fraud or abuse claim. Predictive modeling techniques are typically applied to large complex databases. The databases used for predictive modeling typically contain tens of thousands (and often millions) of records and hundreds of variables. However such large complex databases are not available publicly for use by academic researchers and members of the profession. The purpose of the project is to acquire a database that can be used by CAS members and others, such as members of the academic community, for predictive modeling research. Two key types of applications are underwriting applications using policyholder and claims databases and claims applications such as fraud prediction which may only use claims databases.

Funding: \$50,000 was committed for the project.

Status: Project was cancelled in 2010 after no suitable proposals came in.

b. **Project: Bounds for Ruin Probabilities and Value at Risk**

Date: Funding was awarded in February 2007.

Researcher(s): Yijia Lin, Dr. Samuel H. Cox, Ruilin Tian, and Dr. Luis Zuluaga

Purpose/Topic: The models underlying risk-based capital and enterprise risk management decisions necessarily involve several random variables. Often, the focus is on extremes of the distribution where there is little data to rely upon. The objective is to cast this as a moment problem in order to apply some recent results in optimization research.

Funding: \$15,000 (\$7,500 from CAS, \$7,500 from The Actuarial Foundation)

Status: Completed. Paper was published in *Variance* and all funding has been awarded.

c. **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 instead submitting paper to *Insurance: Mathematics & Economics*.

d. Project: Risk Premium Project Update RFP

Date: August 2009

Project Oversight Group: Committee on Theory of Risk

Contact: Richard Derrig

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

Funding: \$50,000 (CAS initially agreed to provide \$20,000, with an extra \$30,000 approved in May 2010); an additional \$2,500 was approved in October 2010 for authors to travel to the 2010 Annual Meeting to present their report

Presentations: 2010 Annual Meeting

Publication: TBD

Status: Project is in progress. Contract was awarded to Martin Eling & Hato Schmeiser, who are nearing completion of the project.

e. Project: Putting Mark to Market Accounting on a Going Concern Basis RFP

Date: July 2009

Project Oversight Group: Committee on Theory of Risk

Contact: Richard Derrig

Purpose/Topic: The CAS is looking for a research team to compile a comprehensive research bibliography on various topics related to mark-to-market accounting principles

Funding: \$30,000

Status: Project was cancelled in 2010 after no suitable proposals came in.

10. Valuation, Finance & Investments

a. Project: Risk Margins RFP

Date: August 2009

Project Oversight Group: Committee on Valuation, Finance & Investments

Contact: Jason Russ

Purpose/Topic: The CAS is looking to produce a paper that: 1.) Provides a background summarizing the issues surrounding the IASB insurance contracts project; 2.) Provides a background summarizing the valuation of liabilities under the standards being promulgated; and 3.) Addresses the area of risk margins in depth

Funding: \$25,000

Status: Work in Progress. Project has been awarded to a group from Milliman and a first draft of the paper has been written and reviewed by the Committee. No funding has been awarded yet.

b. Project: 2010 Call for Papers: Parameters of a Financial Crisis

Date Announced: November 2009

Date to be Completed: November 2010

Project Oversight Group: Committee on Valuation, Finance & Investments

Contact: Jason Russ

Purpose/Topic: The Committee welcomed all papers on valuation topics related to the 2008 financial crisis and its implications for the Property-Casualty industry.

Funding: \$4,000 for the Emerging Issues Prize for best paper

Presentation: 2010 Annual Meeting

Publication: Completed papers will be published in a future issue of the *eForum*

Status: Six final papers were completed, with four to be presented at the 2010 Annual Meeting. Prizewinner(s) is still being determined.

c. Project: Testing of Insurance Liability Valuation Models RFP

Date: October 2009

Project Oversight Group: Committee on Valuation, Finance & Investments

Contact: Jason Russ

Purpose/Topic: The purpose of this RFP is to solicit research that tests whether or not existing theoretical valuation methods actually predict real market pricing, or aspects thereof. While the researchers may propose a method for testing, the RFP would be pre-disposed to existing well-documented theoretical models.

Funding: \$25,000

Status: Project was cancelled in 2010 after no suitable proposals came in.

11. Other Topics

a. 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: Work in progress by the IAA.

b. 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.

c. Project: Capital Allocation in the Property-Liability Insurance Industry

Date Announced/Completed: Funding was awarded in April 2010.

Researcher(s): Dr. Stephen D'Arcy

Topic: This project has two components. The first component will be an educational tool for use in university and professional education programs that provides a hands-

on tool for applying the different capital allocation methods to a hypothetical property-liability insurer. The second component of this project will be to expand on the shared asset approach of Ruhm, Mango and Kreps to consider different impacts of calls on capital depending on the circumstances facing the insurer.

Funding Approved: \$33,400 (\$10,000 from CAS, \$23,400 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.

d. Project: Robust-Efficient Methods for Regression Credibility

Date Announced/Completed: Funding was awarded in April 2010.

Researcher(s): Vytautas 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.

e. 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.

CAS Research Commitments and Expenditures (2003-2011)

FY 2011 (Budgeted to Research Fund: \$184,148)

Sponsor	Project / Researcher	Original Commitment	Expense to Date	Commitment Balance
Dynamic Risk Modeling & Reserves	2011 Call Paper Prize	10,000.00	-	10,000.00
Ratemaking	2011 Call Paper Prize	2,500.00	-	2,500.00
Reinsurance	2011 Call Paper Prize	2,000.00	-	2,000.00
TOTAL		\$ 14,500.00	-	\$ 14,500.00

FY 2010 (Budgeted to Research Fund: \$100,000)

Sponsor	Project / Researcher	Original Commitment	Expense to Date	Commitment Balance
IAA	Funding for Discount Rate book	15,000.00	-	15,000.00
CAS	NAAC Research Project - Risk of Severe Inflation and Deflation on North American Financial Security Systems and Industries RFP	15,000.00	-	15,000.00
CAS	Brazauskas - "Robust-Efficient Methods for Regression Credibility"	27,000.00	10,000.00	17,000.00
CAS/TAF	Fress/Sun - "Micro-econometric Modeling of Personal Lines Insurance"	10,000.00	3,000.00	7,000.00
CAS/TAF	D'Arcy - "Capital Allocation in the Property-Liability Insurance Industry"	10,000.00	6,000.00	4,000.00
CAS	Baron - "Sequential Analysis of Actuarial Risks and Credibility"	10,000.00	3,000.00	7,000.00
CAS/TAF	Zhou - "Incorporate the Dependence Structure in Estimating Loss Reserves"	5,000.00	1,500.00	3,500.00
Professional Education Program Committee	Annual Meeting Assistance - 2007 Variance Prize Winner Travel to Boston	1,500.00	1,500.00	-
Professional Education Program Committee	Annual Meeting Assistance - Introduction to R Tutorial Speakers	5,000.00	5,000.00	-
Management Data	2010 Call Paper Prize <i>(Note: Not all prize money awarded.)</i>	2,500.00	1,500.00	-
VFIC	2010 Call Paper Prize	4,000.00	-	4,000.00
Reserves	2010 Call Paper Prize <i>(Note: Not all prize money awarded.)</i>	5,000.00	2,250.00	-
TOTAL		\$ 110,000.00	33,750.00	\$ 72,500.00

FY 2009 (Budgeted to Research Fund: \$169,540)

Sponsor	Project / Researcher	Original Commitment	Expense to Date	Commitment Balance
Reinsurance Research	2009 Call Paper Prize	2,000.00	2,000.00	-
Institute of Actuaries of Australia Dependency Working Party	University of Wisconsin Data Extraction	5,000.00	5,000.00	-
Climate Change Committee	Actuarial Climate Volatility Index RFP (<i>An additional \$5,000 was approved Feb. 2010</i>)	15,000.00		15,000.00
Theory of Risk	Risk Premium Project Update RFP (<i>Note: Additional funding was approved May 2010. Actual funding is 38,000 Euros. Funding of up to \$2,500 was approved in October 2010 to send researchers to CAS Annual Meeting</i>)	52,500.00	-	52,500.00
Theory of Risk	Putting Mark to Market Accounting on a Going Concern Basis RFP [<i>Note: Committee decided not to pursue.</i>]	30,000.00	-	-
VFIC	Testing of Insurance Liability Valuation Models RFP	25,000.00	-	-
VFIC	Risk Margins RFP	25,000.00	-	25,000.00
Dynamic Risk Modeling	2009 Call Paper Prize (<i>Note: Not all prize money awarded.</i>)	5,000.00	2,500.00	-
Dynamic Risk Modeling	Loss Simulation Model RFP	25,000.00	24,054.00	-
Health Care Issues	2009 Call Paper Prize (<i>Note: No prize money awarded.</i>)	2,500.00	-	-
CAS/SOA	Cox, Lin, Milidonis - Regime Switching Models: Applications to Mortality Modeling and Pricing	4,000.00	4,000.00	-
CAS/AERF/SOA	Milidonis - An Empirical Investigation of CDS Spreads using a Regime Switching Default Risk Model	3,000.00	2,500.00	500.00
CAS/CKER	Parsa - Copula Regression	5,000.00	3,000.00	2,000.00
CAS	Weibel - Modeling Driver Culpability in Multiple-Vehicle Collisions Using Conditional Regression	7,200.00	3,000.00	4,200.00
Ratemaking	2009 Call Paper Prize (<i>Note: No prize money awarded.</i>)	2,500.00	-	-
TOTAL		\$ 208,700.00	\$ 46,054.00	\$99,200.00

FY 2008 (Budgeted to Research Fund: \$75,000)

Sponsor	Project / Researcher	Original Commitment	Expense to Date	Commitment Balance
Reserves	2008 Call Paper Prize <i>(Note: Not all prize money awarded)</i>	2,500.00	2,000.00	-
Management Data	2008 Call Paper Prize	2,500.00	2,500.00	-
CAS/AERF/SOA	Antonio - Stochastic Claims Reserving	2,500.00	1,499.67	1,000.33
CAS/AERF/SOA	AERF Project: Robust and Efficient Methods for Quantitative Risk Management; Brazauskas	5,000.00	5,000.00	-
CAS/AERF	Fu - Optimal Layers for Excess Catastrophe Loss Reinsurance	5,000.00	5,000.00	-
CAS/AERF	Kim - Estimating Allocated Capital Using the Bootstrap	5,000.00	2,666.00	2,334.00
CAS/AERF	AERF Project: New Goodness-of-Fit Tests for Pareto Distribution; Rizzo	5,000.00	5,000.00	-
TOTAL		27,500.00	23,665.67	3,334.33

FY 2007 (Budgeted to Research Fund: \$50,000)

Sponsor	Project / Researcher	Original Commitment	Expense to Date	Commitment Balance
Ratemaking	2007 Call Paper Prize <i>(Note: No prize awarded.)</i>	2,500.00	-	-
CAS/AERF	AERF Project: Property-Liability Insurance Loss Reserve Ranges Based on Economic Value, D'Arcy <i>(Note: Not all approved money was provided to author.)</i>	20,000.00	15,000.00	-
CAS/AERF	AERF Project: Multivariate Conditional Density Estimation, Efromovich	10,000.00	10,000.00	-
CAS/AERF	AERF Project: Bounds for Ruin Probabilities and Value at Risk, Cox	7,500.00	7,500.00	-
IAA	IAA Project: Stochastic Methods Used in Actuarial Science	15,000.00	15,000.00	-
CAS/SOA	Ph.D. Grants Program – Jun Zhou	10,000.00	-	10,000.00
TOTAL		65,000.00	47,500.00	10,000.00

FY 2006 (Budgeted to Research Fund: \$50,000)

Sponsor	Project / Researcher	Original Commitment	Expense to Date	Commitment Balance
COTOR	RFP for Facilitator Handbook for Class on Modeling Loss Reserves <i>(engaged consultant for \$9,600 fee)</i>	10,000.00	9,600.00	-
COTOR	RFP for Data for Predictive Modeling Applications <i>(Note: Committee decided not to pursue.)</i>	50,000.00	-	-

CAS-RMS	ERM Analysis of P/C Insurance Companies	10,000.00	10,000.00	-
Reserves	2006 Call Paper Prize (<i>Note: \$1,000 not awarded.</i>)	2,500.00	1,500.00	-
Management Data	2006 Call Paper Prize	2,500.00	2,500.00	-
TOTAL		75,000.00	23,600.00	-

FY 2005 (Budgeted to Research Fund: \$50,000)

Sponsor	Project / Researcher	Original Commitment	Expense to Date	Commitment Balance
CAS	American Risk and Insurance Association Prize	1,000.00	1,000.00	-
Rate-making	2005 Call Paper Prize (<i>Note: No prize awarded.</i>)	2,500.00	-	-
Reinsurance	2005 Call Paper Prize (to augment Ferguson Reinsurance Prize Fund)	1,000.00	1,000.00	-
Management Data	2005 Call Paper Prize (<i>Note: \$250 not awarded.</i>)	2,500.00	2,250.00	-
CAS-CKER	Brazauskas study of Robust and Efficient Methods for Credibility	9,500.00	9,500.00	-
TOTAL		16,500.00	13,750.00	-

FY 2004 (Budgeted to Research Fund: \$25,000)

Sponsor	Project / Researcher	Original Commitment	Expense to Date	Commitment Balance
CAS	American Risk and Insurance Association Prize	1,000.00	1,000.00	-
Rate-making	2004 Call Paper Prize (<i>Note: No prize awarded.</i>)	2,500.00	-	-
Reserves	2004 Call Paper Prize (<i>Note: \$1,000 not awarded.</i>)	2,500.00	1,500.00	-
Dynamic Risk Modeling	Review and Comparison of Rating Agency Capital Models (<i>Note: Researchers performed this work for free.</i>)	20,000.00	-	-
CAS/SOA	Ph.D. Grants Program – Y. Lu	10,000.00	10,000.00	-
TOTAL		36,000.00	12,500.00	-

FY 2003 (Budgeted to Research Fund: \$50,000)

Sponsor	Project / Researcher	Original Commitment	Expense to Date	Commitment Balance
CAS	American Risk and Insurance Association Prize	1,000.00	1,000.00	-
Rate-making	2003 Call Paper Prize (<i>Note: \$1,000 not awarded.</i>)	2,500.00	1,500.00	-

Management Data	2003 Call Paper Prize	1,000.00	1,000.00	-
Reserves	2003 Call Paper Prize (<i>Note: \$1,000 not awarded.</i>)	2,500.00	1,500.00	-
ERM/DFA	2003 Call Paper Prize (<i>Note: No prize awarded.</i>)	5,000.00	-	-
ERM	Value Creation through ERM – Non-Insurance Company Commercial Enterprises (<i>Note: Project discontinued after \$6,000 initial study.</i>)	40,000.00	6,000.00	-
CAS	2003 Bowles Symposium (<i>Note: \$2,500 not awarded.</i>)	12,500.00	10,000.00	-
CAS/AERF	AERF Project: Workers' Compensation Ratemaking: A Textbook for the Practicing Actuary; Feldblum	8,000.00	2,500.00	5,500.00
CAS/AERF	AERF Project: Empirical Estimation of Dependence in a Portfolio of Insurance Claims; Valdez	6,000.00	3,000.00	3,000.00
CAS/SOA	Ph.D. Grants Program – M. Wen	10,000.00	10,000.00	-
CAS	Fair Value Research Project	50,000.00	50,000.00	-
TOTAL		138,500.00	86,500.00	8,500.00