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INTRODUCTION

The Centre for Actuarial Studies is a teaching and research unit located within the Department of Economics. The majority of undergraduate and Masters students study to become actuaries, but a number of our students find employment in banking or investments; in particular, a number of our PhD students have research topics in financial mathematics. The Centre attracts high achieving students; many of the faculty’s participants in the prestigious Chancellor’s Scholars Program (admission to which is based on university entrance score) are students majoring in actuarial studies.

The Centre for Actuarial Studies is fully accredited by the Actuaries Institute, meaning that its students can obtain exemptions from all of Parts I and II of the Institute’s examinations. With regard to research, members of the Centre are experts in their fields and are internationally recognised for their work in actuarial science, financial mathematics, probability and statistics. The Centre has eight full-time academic staff and several part-time lecturers from the Melbourne actuarial community.

The Centre for Actuarial Studies continues to be the focal point for actuarial education in Victoria. It has the support of the actuarial profession in Australia and produces research of high quality. It also maintains strong international links and contributes to the local actuarial community.

Professor David Dickson was Director of the Centre for 2014. Professor Mark Joshi will be Director in 2015. Professor Dickson was also Deputy Head of the Department of Economics.

Dr Zhuo Jin qualified as an Associate of the Society of Actuaries. Dr Jin was Editor of the Newsletter of the SIAM Activity Group on Control and Systems Theory, and is one of the chief investigators who were awarded a research grant of 80,000 yuan by the Fundamental Research Funds for the Central Universities (China) for a collaborative research project with Huazhong University of Science and Technology entitled “Regime Switching”.

Deans’ certificates for research excellence for 2013 were awarded to Dr Ping Chen, Professor David Dickson, Dr Zhuo Jin and Associate Professor Shuanming Li. These awards were based on publications in 2013.

Professor David Dickson is an editor of ASTIN Bulletin, an associate editor of Insurance: Mathematics & Economics and Annals of Actuarial Science, a member of the editorial board of North American Actuarial Journal, and an Adjunct Professor at the University of Waterloo.

Associate Professor Shuanming Li was a member of the Organising Committee for the 18th International Congress on Insurance: Mathematics & Economics, held in Shanghai in July. He was also an External Reviewer for the journal Insurance Markets and Companies: Analyses and Actuarial Computations.

After consultation with internal and external parties, it was decided to disband the Centre’s Advisory Board as the Centre has changed considerably since the establishment of the Advisory Board in 1992. Many thanks to all members of the Advisory Board, past and present, who have generously given their time to the Centre. The strategic direction of the Centre will now be an internal matter for the Faculty of Business and Economics.

TEACHING

Overall enrolments dropped slightly from the level in previous years. This was largely due a much smaller intake into the honours year compared with recent years. Enrolments at Masters level remain steady. The Centre introduced the M.Com (Actuarial Studies) degree as an alternative to honours for students completing the B.Com degree. Students on this degree can complete advanced subjects in actuarial studies and related disciplines.

Dr Enrique Calderín completed the Melbourne Teaching Certificate in the second semester. This is a professional development course dealing with practical issues in teaching. Teaching was supported by a number of external lecturers including Mr Richard Fitzherbert (Actuarial Practice and Control III), Dr Jules Gribble, Mr David Heath, Mr Andrew Gale and Mr Donald Campbell (Actuarial Practice and Control I and II).

KNOWLEDGE TRANSFER

Professor Mark Joshi produced a new release of the Kooderive open-source project for pricing derivative products using GPU technology. He also continued to support the xlw open source project for interfacing EXCEL with C++.

PROFESSIONAL ACTIVITIES

Professor David Dickson and Dr Enrique Calderín both attended and presented at the 6th Australasian Actuarial Education and Research Symposium at Curtin University in December.

Mr Richard Fitzherbert is a member of the Research Council Committee of the Actuaries Institute.
VISITORS
Ms Başak Bulut Karageyik, a research student from Hacettepe University in Turkey, visited for 6 months from March.
Professor Felisa Vázquez-Abad, from City University of New York, visited the Centre in January and February.
Associate Professor Hongmei Zhang, from Huazhong Agricultural University, China, was a visitor from January until September.
Professor Emilio Gómez-Déniz, from Universidad de Las Palmas de Gran Canaria, visited in July.
Associate Professor Hui Meng, from the Central University of Finance and Economics, Beijing, visited from August to November.
Dr. Chi Chung Siu, from the University of Technology in Sydney, visited during September and October.
Associate Professor Yi Lu, from Simon Fraser University, Canada, visited in October and November.

Seminars were given as follows:
Dr Benjamin Avanzi (UNSW): On optimal periodic dividend strategies in the dual model with diffusion
Professor Emilio Gómez-Déniz: Bivariate regression models for studying the number of crashes and fatalities in Spanish road blackspots
Dr. Chi Chung Siu: A class of nonzero-sum stochastic differential investment and reinsurance games
Associate Professor Yi Lu: Multidimensional Bühlmann-Straub credibility models with spatial dependence among risks

TEACHING
Undergraduate & Honours Class Sizes

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<th>Subject</th>
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Total Enrolments | 1219 | 1216 | 1132 |

Honours Grades over the Last Five Years

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Honours Essay And Project Topics
The following students successfully completed a Bachelor of Commerce (Honours) with a specialisation in Actuarial Studies
Beatrice Chan, Jessica Dimovski, Mengxiao Feng, Lili Guo, Vernon Hu, Sibin Huang, Pham Le, Charlie Li, Qin Liu, Rongbin Ou, Kenny Quach, Richard Sin, Xin Tian, Hongzhu Zha, Xueting Zhang, Ying Zhang, Ruoyu Zhao
Masters Class Sizes

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<td><strong>Total Enrolments</strong></td>
<td><strong>124</strong></td>
<td><strong>125</strong></td>
<td><strong>127</strong></td>
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</table>

An Honours research essay has about 10,000 words and counts for 25% of the final assessment for a student’s Honours grade. Three Honours students wrote an essay in 2014, and the topics were:

- Regime switching with time-varying transition probabilities on stock returns
- Some studies of the no claims discount and ruin probability
- On the convergence of European vanilla and digital option prices in the multinomial tree model

The majority of Honours students do three research projects instead of the essay. In 2014 the topics of those projects were:

- Application of regime switching models
- Ruin probability and no claims discount
- Stochastic mortality models
Student Prize Winners

**Actuaries Institute Prize**
for Research Essay and Projects
Pham Le

**Communique Prize**
for Introduction to Actuarial Studies
Huiwen Shen

**Deloitte Actuaries & Consulting Prize**
for Actuarial Practice and Control I and II
Beatrice Chan

**Honours Medal in Actuarial Studies**
Beatrice Chan, Pham Le (shared)

**Trimantium Capital Award**
for Financial Mathematics III
Yaozhong Qiu

**Martin Jilovsky Prize**
for best third year results by an Australian student
Yaozhong Qiu

**Taylor Fry Prize**
for Actuarial Statistics
Annie Chen, Chengyue Meng (shared)

**Towers Watson Prize**
for Risk Theory I and II
Beatrice Chan

PhD Students and Research Topics

**Xiang Cheng**
Optimal control and Monte Carlo

**Can Jin**
On some generalisations of the expected discounted penalty function in some insurance risk models

**Joan Nakoto**
Superannuation: Its challenges and recommendations

**Navin Ranasinghe**
Volatility derivatives

**Marjan Qazvini**
Risk models with capital injections

**Miao Zhang**
Continuous time mean-variance model for portfolio selection

**Nan Zhang**
Some optimal reinsurance problems

**Dan Zhu**
On fast and efficient computations of second order Greeks for financial products

Completed their PhDs:
**Evan Hariyanto**
Mortality and disability modelling with an application to the pricing of a reverse mortgage contract

**Jingchao Li**
Ruin related quantities in insurance risk models
**Publications and Other Research Activities**

**REFEREED JOURNAL ARTICLES**


**OTHER PUBLICATIONS**


**CONFERENCE AND SEMINAR PRESENTATIONS**
Calderín, Enrique


Chen, Ping
“A revisit to the mean-variance portfolio selection with no-shorting constraint by the Riccati equation approach”. The 18th International Conference on Insurance: Mathematics & Economics, Shanghai, July.

Dickson, David
“Better together”. 6th Australasian Actuarial Education and Research Symposium, Curtin University, December.


Dufresne, Daniel

“Change of measure for the square-root process”. Hunter College, New York, November.

“A two-dimensional extension of Bougerol’s identity and a tribute to Marc Yor”. Concordia University, Montreal, November.

“Series formulas for option prices”. Hunter College, New York, November.


Jin, Zhuo
“Numerical methods for optimal investment and dividend payment strategies with capital injections”. International Workshop on Risk Analysis, Ruin and Extremes, Nankai University, Tianjin, July.

“A numerical approach for optimal investment and dividend payment strategies with capital injections”. The 18th International Congress on Insurance: Mathematics & Economics, Shanghai, July.
Publications and Other Research Activities

Joshi, Mark
“Upper bounds for early exercisable products without sub-simulations”. UNSW, May.
“Flipping the classroom when teaching financial mathematics”. The Innovations and Excellence in Learning and Teaching Conference, University of Melbourne, December.

Li, Shuanming
“The duration of surplus in a certain state before ruin in a Markov-modulated risk model”. International Workshop on Risk Analysis, Ruin and Extremes, Nankai University, Tianjin, July.

Wu, Xueyuan
“On a discrete-time risk model with claim correlated premiums”. International Workshop on Risk Analysis, Ruin and Extremes, Nankai University, Tianjin, July.

Other Activities
Staff of the Centre examined a PhD thesis submitted at Macquarie University, and acted as reviewers of research grant applications for the Israel Science Foundation and the Natural Sciences and Engineering Research Council of Canada (NSERC). Three members of the Centre, Dr Zhuo Jin, Associate Professor Shuanming Li and Dr Xueyuan Wu, were reviewers for American Mathematical Reviews.

Involvement as Referees
Staff of the Centre acted as referees for the following journals:
Acta Mathematica Applicatae Sinica
Annals of Actuarial Science
Applied Stochastic Models in Business and Industry
Asia-Pacific Journal of Risk and Insurance
ASTIN Bulletin
Colombian Journal of Statistics
Communications in Statistics – Theory and Methods
Economic Modelling
Expert Review of Pharmacoconomics & Outcomes Research
Finance and Stochastics
Frontiers of Mathematics in China
Hacettepe Journal of Mathematics and Statistics
IMA Journal of Management Mathematics
Insurance: Mathematics & Economics
Journal of Applied Mathematics
Journal of Applied Statistics
Journal of Computational and Applied Mathematics
Journal of Economic Dynamics and Control
Journal of Industrial and Management Optimization
Journal of Systems Science and Complexity
Mathematical Methods of Operations Research
Methodology and Computing in Applied Probability
North American Actuarial Journal
Operations Research
Scandinavian Actuarial Journal
Science in China Mathematics
Statistical Methodology
Statistics and Probability Letters

Research Paper Series
The Centre has an established Research Paper Series. Titles of the papers added in 2014 are given below. Electronic versions of all papers are available at the following address: http://fbe.unimelb.edu.au/economics/ACT/workingpapers

No. 236: Joshi, M.S. – Kooderive: multi-core graphics cards, the LIBOR market model, least-squares Monte Carlo and the pricing of cancellable swaps.
No. 237: Joshi, M.S. – Analyzing the bias in the primal-dual upper bound method for early exercisable derivatives: bounds, estimation and removal.
No. 238: Li, J., Dickson, D.C.M., Li, S. – A note on the distribution of the aggregate claim amount at ruin.
No. 239: Li, J., Dickson, D.C.M., Li, S. – Finite time ruin problems for the Markov-modulated risk model.
No. 241: Li, S., Lu, Y. – On the time and number of claims when the surplus drops below a certain level.
No. 242: Calderín, E., Kwok, C.F. – Modelling large claims with composite Stoppa models.
Staff and Advisory Board

STAFF

Professors of Actuarial Studies
DAVID DICKSON: BSc (Hons), PhD (Heriot-Watt), FFA, FIAA
Research interests: Aggregate claims distributions, renewal risk processes, recursive methods in risk theory.
DANIEL DUFRESNE: BSc (Hons) (Montreal), PhD (The City University), FSA
Research interests: Financial mathematics, actuarial science, probability.
MARK JOSHI: BA (Hons) (Oxford), PhD (MIT)
Research interests: Financial mathematics

Associate Professor in Actuarial Studies
SHUANMING LI: BSc (Tianjin), MSc (Renmin), PhD (Concordia)
Research interests: Risk and ruin theory, stochastic modelling in insurance and finance, actuarial science.

Senior Lecturer in Actuarial Studies
XUEYUAN WU: BS, MS (Nankai), PhD (Hong Kong)
Research interests: Risk and ruin theory, discrete-time risk models, phase-type distribution in risk theory

Lecturers in Actuarial Studies
PING CHEN: BAM (Qufu), MSc (CAS), PhD (Hong Kong)
Research interests: Actuarial science, financial mathematics, statistics and information
ENRIQUE JAVIER CALDERIN: BS, MS (UNED, Spain), PhD (ULPGC, Spain)
Research interests: Bayesian inference, statistical robustness, distribution theory, actuarial statistics
ZHOU JIN: BS, MS (HUST), MA, PhD (WSU)
Research interests: Numerical methods for stochastic systems, mathematical finance, actuarial science

Honorary Senior Fellows
RICHARD FITZHERBERT: BSc (Sydney), FIAA, FFin
JULES GRIBBLE: BSc (Hons), PhD St Andrews, FIA, FCIA, FSA
DAVID HEATH: BEc (Hons) (Monash), FIAA, CPA, FFin

External Lecturers
ANDREW BROWN: BSc, DipEd (Melbourne), FIAA, FFin
DONALD CAMPBELL: BCom (Melbourne), FIAA
ANDREW GALE: BSc (Melbourne), FIAA

External Examiners for Part II
MARTIN FRY and ANDREW GALE (Actuarial Practice and Control I and II)
MIKE BARKER (Actuarial Practice and Control III)

ADVISORY BOARD

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Mr David McNiece
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Mr Chris White

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Dean, Faculty of Economics and Commerce
Professor Bill Griffiths,
Head of Department (Economics)
Professor David Dickson,
Centre for Actuarial Studies
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Professor Mark Joshi,
Centre for Actuarial Studies
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Department of Economics
Staff

Dr. Zhuo Jin
Professor Mark Joshi
Associate Professor Shuanming Li
Dr. Xueyuan Wu