School of
Risk & Actuarial Studies

2014 School Report
School End of Year Event - Clovelly to Bondi Coastal Walk
Tamarama Beach, 5 December 2014
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Strategy Statement: School of Risk and Actuarial Studies

To be recognised internationally as a leader in research and teaching of the mathematics, economics and finance of insurance and superannuation and the disciplinary area of actuarial studies.

Research: excellence in actuarial science, from publication in leading international discipline journals and excellence in population ageing research through engagement with CEPAR.

Teaching: excellence in undergraduate and postgraduate actuarial studies programs, including superannuation and retirement incomes, supported by recognition from actuarial professional bodies of our programs through accreditation of the UNSW Core Technical, Part II and CERA courses. To contribute to UNSW Business School programs through teaching of courses unique to our expertise. To produce graduates with analytical and business skills for professional careers in the financial services industry.

Engagement: to interact with industry with the support of our Industry Advisory Board, through teaching and learning and research interactions with guest lectures, course reviews, support of the Actuarial Studies Co-op program, industry grants and ARC Linkage grants, and research dissemination and to develop research links with leading international universities.

Our area of excellence is actuarial studies, established over a long period at UNSW, through our undergraduate program attracting the highest quality students from High School, our Co-op program attracting the support of leading employers, our postgraduate actuarial program attracting high quality international students to meet the needs of a growing international demand for rigorously trained actuarial graduates and our Linkage grants with leading industry partners. We have professional accreditation from the Actuarial profession in Australia, UK and USA.

Our teaching and research is based on the application of mathematics, economics and finance to insurance and superannuation research issues. It draws on insurance economics, financial economics, mathematical finance, risk theory, risk modelling, risk decisions and quantitative risk management.

Introduction from Head of School

The School of Risk and Actuarial Studies had another productive year in aspects of our activities - teaching, research, and engagement with the broader community.

The research output for the year was outstanding, with many publications and acceptances in top ranked journals, a successful ARC Linkage application led by Professor Michael Sherris and Professor Hazel Bateman, several research grants awarded by the Centre for International Finance and Regulation (CIFR) and the Actuaries Institute, two successful applications for Business School research funding (Dr Jonathan Ziveyi and Dr Kevin Liu), the commencement of 3 new PhD students, and an excellent outcome from the 4th year Honours students, with 3 out of the 5 students achieving First Class Honours and one awarded the University Medal.

The stand-alone Bachelor of Actuarial Studies, introduced in 2014, continues to attract the very best of the undergraduate students at UNSW, with the joint program with the Bachelor of Commerce particularly popular. The Actuarial Co-op Program welcomed the National Disability Insurance Scheme (NDIS) as a new sponsor.

The life of the school was enhanced with the conduct of three regular seminar series, an active academic visitors program, the staging of a major international conference and a research open day. The 22nd Annual Colloquium of Superannuation Researchers, hosted jointly with CEPAR, was held in mid-July and included over 40 papers presented to over 100 superannuation, pension and retirement researchers from academia, industry and government from Australia and overseas. The Risk and Actuarial Research Day, held in November 2014, brought together academics, research students and practitioners to discuss recent research topics and issues, as well as strategies for enhancing research engagement.
Finally, I would like to congratulate Dr Katja Ignatieva, Dr Jinxia Zhu and Dr Jonathan Ziveyi who were all promoted to Senior Lecturer during the year.

I invite you to read on. We are very proud of our achievements in 2014.

Professor Hazel Bateman  
Head, School of Risk and Actuarial Studies  
February 2015
Staff

Academic

Professors

Hazel Bateman

BEcon (Hons), Queensland
PhD (Economics), UNSW

Hazel Bateman is a Professor of Economics and Head of the School of Risk and Actuarial Studies. She is an Associate Investigator with the ARC Centre of Excellence in Population Ageing Research (CEPAR) and from 2007-2013 was Director of the Centre for Pensions and Superannuation. She has research interests in the areas of public and private provision for retirement. Current research investigates retirement saving, investment and benefit decisions; the structure, governance and performance of pension and superannuation funds; and effective public policy for an ageing society. Prior to joining the University of New South Wales, Hazel worked as an economist in the Australian Treasury.

Hazel has been a consultant on retirement income issues to a range of Australian and international organisations including the OECD, the World Bank, the Social Insurance Administration (China), APEC and KIHASA. Hazel is a member of UniSuper’s Consultative Committee and in 2012-13 was a member of the Australian Government’s Superannuation Roundtable.

Michael Sherris

BA (Hons) Macquarie
MBA, Sydney
FIAA, FIA, UK
FSA
Accreditation Actuary

Michael Sherris is Professor of Actuarial Studies and a Chief Investigator with the ARC Centre of Excellence in Population Ageing Research (CEPAR). His research sits at the intersection of actuarial science and financial economics, and has attracted a number of international and Australian awards. He has published in leading international risk and actuarial studies journals including Journal of Risk and Insurance, Insurance: Mathematics and Economics, Journal of Economic Dynamics and Control and Geneva Papers on Risk and Insurance. He is on the editorial Board of the Annals of Actuarial Science and served on the editorial board of the North American Actuarial Journal.

Prior to becoming an academic he worked in the banking and finance industry for a number of major banks and a life insurance company. He has been an active member of the Australian actuarial profession having served on the Council of the Institute of Actuaries of Australia. He was President (2008-2009) of the Asia Pacific Risk and Insurance Association and a Board and Executive Member of the Enterprise Risk Management Institute International (ERMII). He was named Australian Actuary of the Year 2007 in recognition of his contributions to actuarial research and education both internationally and within Australia.
Associate Professors

Anthony Asher

B Bus Sc, Cape Town
PhD (Actuarial Science), Witwatersrand
FIA, UK
FIAAust
FASSA

Anthony Asher joined the School of Risk and Actuarial Studies at the University of New South Wales in 2011. Living in Australia since 2003, he previously worked for the Australian Prudential Regulation Authority and as a consulting actuary with Deloitte. Prior to that, he was the Professor of Actuarial Science at the University of the Witwatersrand, Johannesburg and worked for life insurance companies. He has also served as non-executive director on a variety of financial service companies and investment committees in South Africa and Australia. He is active in the actuarial profession, and was rewarded by the Murray Medal, the highest award for service given by the Actuarial Society of South Africa, in 2002.

Anthony has published extensively in professional journals particularly and currently serves on the editorial committees of the Australian Journal of Actuarial Practice and the South African Actuarial Journal. His current research is focused on the development of life annuities in Australia, including convening the Retirement Incomes Working Group of the Actuaries Institute and the development of financial planning calculators; incorporating virtue into actuarial education; and governance related issues in the superannuation and investment markets.

Ramaprasad Bhar

BSc (Hons), Calcutta
BTe, Calcutta
MTech, Calcutta
MASC, Waterloo
MBA, UTS
PhD (Finance), UTS

Ram Bhar completed his PhD in quantitative finance in 1997 from UTS on non-Markovian term structure of interest rate modelling. Prior to joining academia in 1992, Ram worked in System Software development for several years in various capacities in India, Australia, and The Netherlands. Ram studied computer science at the University of Waterloo, Canada with a scholarship from the Canadian Government. His industry experience includes multinational firms like Credit Lyonnais, Nederland and Unisys, U.S.A. He has published three research intensive books with Springer in 2004 and 2005 jointly with S. Hamori, Kobe University, Japan. Ram was awarded the fellowship of the Japan Society for the Promotion of Science in 2005. These two books have been adopted for some postgraduate courses at the Courant Institute of Mathematical Sciences, New York University, and University of Memphis. The third book on Stochastic Filtering (sole author) was published in August 2010.

Ram's current research interests include: commodity derivatives pricing in jump diffusion setting; hidden Markov models; estimation of stochastic volatility models; state space models with Markov switching; non-fundamental component of asset price; dynamic Bayesian algorithm; portfolio flows and its impact on asset prices; independent component analysis for factor models; credit risk modelling; and use of copulas in asset pricing.
Katja Ignatieva  

MSc (Statistics), Free University and Humboldt University, Germany  
MSc (Mathematics), Humboldt University, Germany  
MSc (R) (Statistics), Glasgow, UK  
PhD (Finance) Macquarie University, Sydney  

Katja joined the University of New South Wales in November 2011. Katja obtained a PhD in Finance from Goethe University, Frankfurt, Germany in February 2012. She has also completed a (Cotutelle) Ph.D. from Macquarie University, Sydney in April 2013.

Katja’s research interests include derivative pricing, empirical research in derivative markets, asset pricing, longevity risk modelling and longevity risk management, valuation of long dated insurance and pension contracts. Katja has published papers to the leading international journals in the field of banking and finance, quantitative finance and statistics. She has also presented her work at Australian and overseas universities and her papers have been accepted for presentation at various top-tier international conferences. Her recent areas of research have focused on applications of quantitative finance techniques to insurance pricing, and in particular, stochastic mortality modelling.

Bernard Wong  

BCom (Hons), Macquarie University  
PhD, ANU  
FIAA  

Bernard joined the University of New South Wales in January 2003. Prior to his return to academia, Bernard worked in the Sydney office of Actuarial Consultants Tillinghast-Towers Perrin, and his contributions to the profession during this period were recognized by the Institute of Actuaries of Australia by the award of the Melville Practitioner’s Prize. He has also been awarded the A M Parker and Jackson Prizes for his research contributions to the profession. He is a Fellow of the Institute of Actuaries of Australia. Bernard is a Fulbright Scholar and has a PhD (2007) from the Australian National University. His current research interests span three main areas: optimal asset allocation and asset liability management, optimal dividend and capitalisation policy for risk business, the modelling of dependence in stochastic processes, as well as the interaction between the aforementioned problems.

Jinxia Zhu  

BSc, Lanzhou, China  
MSc, Lanzhou, China  
PhD, Hong Kong  

Jinxia Zhu was promoted to Senior Lecturer in the School of Risk and Actuarial Studies in 2014. She holds a PhD degree in Actuarial Science from the University of Hong Kong, and MSc and BA in Mathematics from Lanzhou University in China. Her research interests lie in the areas of optimal control in insurance and finance, insurance risk models and risk theory. She has published in top international journals in the field of Actuarial Science and probability and statistics including ASTIN Bulletin, Insurance: Mathematics and Economics, Journal of Applied Probability, Scandinavian Actuarial Journal, and Stochastic Processes and their Applications.
Jonathan Ziveyi joined the School of Risk and Actuarial Studies in June 2010 after finishing his PhD in Quantitative Finance at the University of Technology, Sydney. Jonathan’s PhD thesis was on the evaluation of early exercise exotic options where he devised various numerical algorithms for pricing American style options on multiple underlying assets whose dynamics evolve under more realistic frameworks such as stochastic volatility. Prior to his PhD studies, Jonathan worked for the Reserve Bank of Zimbabwe as a fixed income strategist where he was responsible for devising inflation-linked debt instruments such as inflation-linked bonds and their derivatives.

Jonathan’s research interests covers various areas which include derivative pricing, interest rate term structure modelling, counterparty credit risk modelling, high frequency trading longevity risk management and portfolio management. He also provides consulting services in areas of derivative pricing, pricing and hedging of longevity risk and designing of retirement products such as variable annuities.

Lecturers

Brian Chu

Brian was appointed to the School of Risk and Actuarial Studies in 2011. He has over 10 years of higher education teaching experience. His research interests include the valuation, financial reporting and incentive effects of performance stocks in executive remuneration, problem-based learning in actuarial studies education, business cycles and its effects on the global investment market and the modelling of return to work in workers’ compensation schemes. In July 2014 Brian resigned from the School to take up a position at Macquarie University, Sydney.

Kevin Liu

Kevin Liu joined the School of Risk and Actuarial Studies in 2011. Kevin has research interests in the areas of superannuation and retirement income policy. Current research interests include the operation, structure and performance of superannuation funds, the governance and regulation of superannuation and pension funds, systemic risk in retirement systems, retirement saving and investment decisions, and pension reform in China.

Prior to joining UNSW, Kevin worked in the research department at the Australian Prudential Regulation Authority (APRA), focusing on policy-oriented empirical research into superannuation. Kevin has also served on two APRA working groups on investment and trustee governance in conjunction with the post-Cooper Review (Super System Review) superannuation reform.
### Research Associates

**Craig Blackburn**

BSc (Hons) LSE, MEng(R), JCU, BEng (Hons) QUT, MAct UNSW, PhD Actuarial, UNSW

Craig Blackburn is a Research Fellow at the ARC Centre of Excellence in Population Ageing Research (CEPAR), UNSW. Craig joined CEPAR full-time in May 2013 after completing a PhD in Actuarial Studies at the University of New South Wales. While studying for his PhD, Craig received scholarships from the UNSW Business School and CEPAR. He is also an Associate member of the Institute of Actuaries Australia.

His research interests include longevity modelling, pricing, and risk management, including the effects of Solvency II on an insurer’s firm value. Craig has published articles in the Journal of Insurance: Mathematics and Economics. His current research projects involve: multiple cohort population modelling and hedging, and risk minimisation of longevity risk in an incomplete market.

**Yang Chang**

BSc Honours, University of Technology, Sydney, PhD, University of Technology, Sydney

Yang Chang joined UNSW in February 2014 as a Research Fellow. Yang completed his PhD in Quantitative Finance at University of Technology, Sydney (UTS) in March 2014. Prior to completing his PhD, Yang was awarded the Bachelor of Science (Mathematics and Finance), first class honours at the University of Technology, Sydney in 2010.

Yang’s PhD thesis focusses on the anomalies in the fixed income and foreign exchange market after the Global Financial Crisis and proposes a consistent approach to modelling such anomalies. At UNSW, Yang has been working on the research project of longevity risk management. This project develops a new cohort-based value index that is designed to allow insurers to better assess and manage longevity risk. The value index captures both longevity risk and interest rate risk.

**Adam Wenqiang Shao**

PhD (Actuarial Studies), UNSW, MEc (Actuarial Studies), Central University of Finance and Economics, BEc (Finance), Beijing International Studies University

Adam Wenqiang Shao is a Research Fellow at ARC Centre of Excellence in Population Ageing Research (CEPAR), UNSW. He holds a PhD degree from the school of Risk and Actuarial Studies, UNSW. Adam’s research interests include idiosyncratic house price modelling, longevity risk, solvency capital requirements, and pricing and risk analysis of post retirement financing products such as equity release products and long-term care insurance.

More recently, Adam has been investigating the dynamics of population health and their impact on the demand for post-retirement financing products under a life-cycle model framework.
Yang Shen

BE Insurance, East China Normal University; M.Sc. Applied Mathematics, Peking University; PhD Applied Finance and Actuarial Studies, Macquarie University

Yang Shen joined the ARC Centre of Excellence in Population Ageing Research (CEPAR) at the UNSW Business School, as a Research Fellow in 2013. He received his PhD degree in Applied Finance and Actuarial Studies from Macquarie University and his MSc degree in Applied Mathematics and BEc degree in Insurance Science from Peking University and East China Normal University in 2011 and 2009, respectively. His current research interests include financial mathematics, actuarial science, stochastic control, and regime-switching models.

Ralph Stevens

BSc (Econometrics and OR), Tilburg MSc (Quantitative Finance and Actuarial Science), Tilburg MPhil (Finance), Tilburg, CentER Graduate School; PhD (Econometrics), Tilburg, CentER Graduate School

Ralph Stevens is a Research Fellow at ARC Centre for Excellence in Population Ageing Research (CEPAR). Ralph’s current research focuses on the effect of systematic longevity risk on annuities. This includes managing and measuring systematic longevity risk in a portfolio of life insurance and pension products and the capital reserves for systematic longevity risk.

Prior to joining CEPAR he was a Lecturer in the School of Risk and Actuarial Studies. Ralph is a former student of Tilburg University in the Netherlands and is a current Netspar Fellow.

Adjunct Associate Professors

Benjamin Avanzi

PhD University of Lausanne
Lic. University of Lausanne

Andries Terblanche

Chair of Financial Services at KPMG
HK University of Science and Technology
NYU Stern
University of Johannesburg
University of Pretoria
University of Witwatersrand

Greg Taylor

PhD Macquarie
FIA, UK
FIAA, Australia
FIMA
CMath
AO
Professional Staff

School Manager
Alison Richards (0.5) until May 2014
Alana Parker (0.7) from May 2014

Administration Officer
Sanchia Yip (0.6) reclassified from Admin Assistant in October 2014

Administration Assistant
Anne Aylmer (0.6) until October 2014

Staff Changes

Promotions
Katja Ignatieva to Senior Lecturer
Jinxia Zhu to Senior Lecturer
Jonathan Ziveyi to Senior Lecturer

Resignations
Anne Aylmer
Brian Chu
John Evans

Staff on leave
Jinxia Zhu – Maternity leave (Semester 1)
Katja Ignatieva – Maternity leave (Semester 2)

Teaching

The School offers educational programs and has an internationally recognised research reputation in the areas of actuarial studies, risk management, superannuation and population ageing. Our actuarial programs are professionally accredited for the actuarial Part I and Part II courses as well as the Part III module C7A.

Undergraduate Teaching Program

In 2013 the School introduced a stand-alone Bachelor of Actuarial Studies degree. Previously actuarial studies had been offered as a major in the Bachelor of Commerce.

The Bachelor of Actuarial Studies serves as a foundation for students who wish to enter the actuarial profession. Students who achieve the required academic standard in their Actuarial Studies courses will gain exemption from Part I of The Institute of Actuaries of Australia professional examinations, the Core Technical courses of the Institute and Faculty of Actuaries (UK) professional examinations and the Validation by Educational Experience credit for the Society of Actuaries (USA).

The Actuarial Studies degree can be enhanced with a second major in Accounting, Economics or Finance, as well as Mathematics or Statistics. As well, the Bachelor of Actuarial Studies can be taken as a combined program with the Bachelor of Commerce, Bachelor of Economics, Bachelor of Science, Bachelor of Science (Advanced) and Bachelor of Laws. This option provides an opportunity for students to gain exemption from Part I and Part II of the Institute of Actuaries of Australia professional examinations.

Superannuation courses

The school also offers two superannuation courses to undergraduate students as electives in the Bachelor of Actuarial Studies, Bachelor of Commerce and Bachelor of Economics degrees.
Co-op Program

The School participates in the UNSW Co-op Program. The Actuarial Studies Co-op Program is a four year scholarship program combining the Bachelor of Actuarial Studies with up to eighteen months of industry training.

Students completing the program at the required academic standard may receive exemptions from Part I and Part II of The Institute of Actuaries of Australia professional examinations.

The 2014 Co-op sponsors in the actuarial program were:
- Allianz
- Australian Prudential Regulation Authority (APRA)
- Baycorp
- Ernst & Young
- Finity Consulting
- KPMG
- Macquarie Bank
- Metlife Insurance
- PwC
- Russell Investments
- Suncorp Bank
- TAL
- Westpac Bank

The National Disability insurance Scheme (NDIS) will join the program as a sponsor from 2015.

Undergraduate Student Prizes

The School of Risk and Actuarial Studies recognises student excellence through a prizes program for academic performance in individual courses. Scholarship and prize winners are presented with their award by the Donor or corporate representative at an awards ceremony which is held in June each year.

Deloitte Actuaries & Consultants Prize
Donated by Deloitte Actuaries and Consultants
Awarded for the best performance in ACTL2131 Probability and Mathematical Statistics
2014 winner: Pratik Risbud Value: $500

Finity Consulting Prize
Donated by Finity Consulting
Awarded for the best performance in the courses ACTL4001, ACTL4002, ACTL4303 or ACTL5100, ACTL5200 and ACTL5303
2014 winner: Stephen Goh Value: $1000

The Actuaries Institute Prize
Donated by Actuaries Institute
Awarded for the best performance in ACTL1101 Introduction to Actuarial Studies
2014 winner: Dilan Sridaran Value: $500

Insureware Prize
Donated by Insureware
2014 winner: Andrew Song Value: $1000
The E S Wolfenden Memorial Prize
Donated by William Wolfenden in memory of his grandfather who was Australia’s first actuary
Awarded for the best performance in Actuarial Studies Honours Year (Coursework and Thesis).
2014 winner: Jichen Li  Value: $1000

Towers Watson Prize
Donated by Towers Watson
Awarded for the highest aggregate in ACTL3001 Actuarial Studies, ACTL3002 Life Insurance and Superannuation Models, ACTL3003 Insurance Risk Models and ACTL3004 Financial Economics for Insurance and Superannuation by a graduating student in the Bachelor of Commerce.
2014 joint winners: Jordan Pedder & Sameep Sandhu  Value: $500

UniSuper Prize
Donated by UniSuper
Awarded for the best performance in ACTL3191/ECON3114 Superannuation and Retirement Benefits
2014 winner: Jichen Li  Value: $500

Honours Program
Students with above average grades in their Actuarial Studies courses are invited to join the Actuarial Honours program, requiring an additional year of study. An Honours year adds extra value to an undergraduate degree by developing research, analytical and communication skills. It is also highly regarded by employers and industry. Details of the 2014 cohort of Honours students are listed below.

First Class Honours, University Medal
Jichen (William) Li
Regional Differences in Life Expectancy in Mainland China
Supervisor: Professor Hazel Bateman and Dr Kevin Liu

First Class Honours
Ruizhu (Yolanda) Li
Perceived Value of using Superannuation for Purchasing a Family Home
Supervisors: Dr Kevin Liu and Dr Ralph Stevens

Changyu (Estelle) Liu
Hedging and Immunization of Longevity Risk
Supervisor: Professor Michael Sherris

Second Class Honours, Division 1
Shahin Elliin
A Trend-Change Extension to the Lee Carter Model with Applications to Annuities Valuation
Supervisors: Dr Katja Ignatieva and Dr Ralph Stevens

Clement Yeung
Revisiting Claims Modelling: In view of Superimposed Inflation
Supervisors: Associate Professor Benjamin Avanzi, Professor Greg Taylor and Dr Bernard Wong
Postgraduate Coursework Programs

The School of Risk and Actuarial Studies offers three Masters level coursework programs: the Master of Actuarial Studies, the Master of Actuarial Studies (Extension) and the Master of Risk Management.

Master of Actuarial Studies/ Master of Actuarial Studies (Extension): These degrees combine studies in actuarial studies, economics, finance and mathematics, and provides the necessary analytical, statistical and modelling skills needed to pursue an actuarial profession. Students who achieve the required academic standard will gain exemptions from Part I and/or Part II of the Institute of Actuaries of Australia professional examinations, as well as the core technical subjects of the Institute and Faculty of Actuaries (UK) professional examinations. From 2013 students in the Master of Actuarial Studies and Master of Actuarial Studies (Extension) are further able to achieve professional exemption from the professional Part III course on enterprise risk management (C7A).

Master of Risk Management (MRM): The Master of Risk Management (MRM) is a new integrated postgraduate program. It provides up-to-date knowledge and skills in the management of a broad spectrum of risks that organisations are confronted with in the context of the fast changing, increasingly global business environment. The program helps students develop a broad perspective on risks and their management frameworks. It aims to extend students' knowledge on the use of risk analysis and decision tools and their applications in practice across a range of fields. Learning about risks, pointing to limitations of current risk models and challenging students to think of novel approaches to manage risks in complex systems are key aspects of the Masters degree.

Other postgraduate coursework participation: As well as offering postgraduate coursework programs, the School of Risk and Actuarial Studies offers superannuation, retirement planning and risk management courses as electives in the Master of Commerce, Master of Economics and management degrees offered by the AGSM. A particular innovation is the development of a new course in retirement planning designed in conjunction with Challenger and Smart Sparrow. It was taught in face-to-face mode in 2014 and will be offered in an interactive online format from mid-2015.

Postgraduate Research Programs

The higher degree research programs offered within the School of Risk and Actuarial Studies are the Master of Philosophy (MPhil) and the Doctor of Philosophy (PhD). Research degree supervision is available in a variety of areas including actuarial science, risk management, population ageing and superannuation.

The 2014 PhD graduates and current higher degree research students are listed below;

Theses Completed

PhD

Simon Fung  Pricing and risk management of long term contracts in finance and insurance
Supervisors: Professor Michael Sherris & Dr Katja Ignatieva

Dominic Ho  The application of multi-criteria decision methods in portfolio management of insurance link securities and common stocks
Supervisor: Professor Michael Sherris

Adam Shao  Pricing and risk management of equity release products
Supervisors: Professor Michael Sherris & Dr Katja Hanewald

MPhil

Mary Easson  Present at the Creation: The Origins of the Australian System of Superannuation
Supervisor: Professor Hazel Bateman
Theses Completed External to the School - PhD Supervision by School Academic

PhD

Department of Business and Management, LUISS Guido Carli University, Rome, Italy

Monika Hartmann  Business Model Innovation: Antecedents of Business Model Innovation and Effects on Firm Performance  
Supervisors: Professor Raffaele Oriani and Professor Hazel Bateman

School of Economics, UNSW Australia Business School

Jun Feng  Saving for Retirement: An Investigation of Contributions to Superannuation in Australia  
Supervisors: Professor Hazel Bateman and Dr Shiko Maruyama

School of Banking & Finance, UNSW Australia Business School

Chengwu Shao  Essays on Stochastic Models of the US Natural Gas Market  
Supervisors: Associate Professor Ramaprasad Bhar and Dr David Colwell

MPhil

School of Banking & Finance, UNSW Australia Business School

Bao Huy Doan  The Copula Based Method for Financial Derivatives  
Supervisors: Associate Professor Ramaprasad Bhar and Dr David Colwell

Theses Continuing

PhD

Phuong Anh Vu  Dynamic Modelling in Stochastic Loss Reserving with Dependence  
Supervisors: Dr Bernard Wong & Adjunct Associate Professor Benjamin Avanzi

David Bell  Return Prediction and Utility Maximising Portfolio Construction  
Supervisors: Professor Hazel Bateman & Associate Professor Anthony Asher

Nikolay Gudkov  Pricing and Hedging under Stochastic Interest Rate and Mortality  
Supervisors: Dr Katja Ignatieva & Dr Jonathan Ziveyi

John Livanas  Behavioural finance implications for investment management and superannuation fund risk management  
Supervisor: Professor Michael Sherris

Patricia Pascuzzo  An Investigation of the Impact of Superannuation Trustee Governance on Performance  
Supervisors: Professor Hazel Bateman & Dr Kevin Liu

Vincent Tu  On Periodic and Continuous Controls in a Dual Risk Model with Diffusion under Transaction Costs  
Supervisors: Dr Bernard Wong & Adjunct Associate Professor Benjamin Avanzi

Shang Wu  Essays on the Demand Side of Life Care Annuity  
Supervisors: Professor Hazel Bateman, Dr Ralph Stevens & Professor Susan Thorp (UTS)
Research

The School has an active research environment which includes three regular research seminar series, an academic visitor program, and hosting of the Annual Colloquium of Superannuation Researchers and specialist workshops and seminars. Research activities and outputs for 2014 are detailed below.

Research Seminars

The seminar series provides an excellent opportunity to network with scholars from Australia and overseas who are acknowledged as leaders in their field or undertaking cutting edge research. We invite attendance of participants from other universities and from industry who are interested in both theoretical and applied research in actuarial studies, risk management, and superannuation.

2014 External School Seminars

28 March  
Volatility-Equity Option Pricing within Affine Stochastic Volatility Models  
Jose Da Fonseca, Department of Finance, Auckland University, New Zealand

23 May  
Effective Sub-Simulation-Free Upper Bounds for the Monte Carlo Pricing of Callable Derivatives and Various Improvements to Existing Methodologies  
Mark Joshi, University of Melbourne

27 June  
A Consistent Framework for Modelling Basis Spreads in Tenor Swaps  
Yang Chang, Centre for Population and Aging Research (CEPAR), UNSW Australia

22 August  
General Approach to the Optimal Portfolio Selection  
Zinoviy Landsman, Department of Statistics, University of Haifa, Israel

12 September  
The Effect of Objective Formulation on Retirement Decision Making  
Garry Khemka, Australian National University

24 October  
Transitions on Aged Care: Analysis from the First Pathways in Aged Care Study  
Bridget Browne, Australian National University

7 November  
The Litigation Cost of Cross-Listing in the United States  
Martin Boyer, Finance Department, HEC Montreal (Montreal University), Canada

28 November  
Bias in Variance of Portfolios  
Vitali Alexeey, University of Tasmania
2014 CPS (Pensions and Superannuation) Research Group Seminars (jointly hosted with CEPAR)

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Speaker/Institution</th>
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<tr>
<td>6 March</td>
<td>Family Size and Health</td>
<td>Simen Markussen, Ragnar Frisch Centre for Economic Research, Oslo</td>
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<td>27 March</td>
<td>New Evidence on Pension Incentives and the Retirement Decisions of Couples</td>
<td>Kadir Atalay, Department of Economics, Sydney University</td>
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<td>9 April</td>
<td>Ambiguity Aversion and Household Portfolio Choice: Empirical Evidence</td>
<td>Kim Peijnenburg, Department of Finance, Bocconi University</td>
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<tr>
<td>17 April</td>
<td>Flexibility versus Prescription - Pension reform and labor supply</td>
<td>Erik Hernas, Ragnar Frisch Centre for Economic Research, Oslo</td>
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<td>1 May</td>
<td>The Dynamic Fiscal Effects of Demographic Shift: The Case of Australia</td>
<td>George Kudrna, CEPAR, UNSW Australia</td>
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<td>15 May</td>
<td>Forward Mortality Modelling of Multiple Populations</td>
<td>Craig Blackburn, CEPAR, UNSW Australia</td>
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<td>21 August</td>
<td>Superannuation Governance</td>
<td>Elisabeth Ooi, Monash University</td>
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<td>28 August</td>
<td>Long Term and Informal Care in China</td>
<td>Luc Bei, CEPAR, UNSW Australia</td>
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<td>4 September</td>
<td>Financial Literacy of Retirees and their Decisions about Retirement Village</td>
<td>Timothy Kyng, Macquarie University</td>
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<td>2 October</td>
<td>How much do Means-Tested Benefits Reduce the Demand for Annuities?</td>
<td>Monika Butler, University of St Gallen</td>
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<td>16 October</td>
<td>Trade-Offs in Means Tested Pension Design</td>
<td>Alan Woodland, School of Economics, UNSW Australia</td>
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<td>20 November</td>
<td>Governance and Performance of Private Pension Funds: Australian Evidence</td>
<td>Kevin Liu, School of Risk &amp; Actuarial Studies, UNSW Australia</td>
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<td>4 December</td>
<td>Long Term Care Insurance Reform in the United States</td>
<td>Elena Capatina, CEPAR, UNSW Australia</td>
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Internal PhD Seminars

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<th>Date</th>
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<tr>
<td>14 March</td>
<td>Managing Mortality Risk in Life Annuities: An Application of Longevity Derivatives</td>
<td>Simon Fung, School of Risk &amp; Actuarial Studies, UNSW Australia</td>
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<td>11 April</td>
<td>On Optimal Periodic Dividend Strategies in the Dual Model With Diffusion</td>
<td>Vincent Tu, School of Risk &amp; Actuarial Studies, UNSW Australia</td>
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<td>9 May</td>
<td>Adjusting Performance Vesting to Address Perverse Incentives</td>
<td>Brian Chu, School of Risk &amp; Actuarial Studies, UNSW Australia</td>
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<td>29 August</td>
<td>Product Pricing and Solvency Capital Requirements for Long-Term Care Insurance</td>
<td>Adam Shao, School of Risk &amp; Actuarial Studies, UNSW Australia</td>
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26 September On the Interplay of Periodic and Continuous Strategies in the Optimal Dividend Problem
Vincent Tu, School of Risk & Actuarial Studies, UNSW Australia

31 October Modelling Multivariate Claims Counts Based on Micro-Level Information – A Cox Process Approach
Xinda Yang, School of Risk & Actuarial Studies, UNSW Australia

14 November Optimal Portfolio Allocation with Health Contingent Income Products: The Value of Life Care Annuity
Shang Wu, School of Risk & Actuarial Studies, UNSW Australia

28 November Return Prediction and Utility Maximising Portfolio Construction
David Bell, School of Risk & Actuarial Studies, UNSW Australia

Conferences hosted by School

22nd Annual Colloquium of Superannuation Researchers

For the past 22 years the Annual Colloquium of Superannuation Researchers has brought together researchers in superannuation, pensions and retirement from academe, the financial services industry and the public sector.

Jointly hosted by CEPAR and the School of Risk & Actuarial Studies, the 22nd Annual Colloquium was held at UNSW on Monday 7th and Tuesday 8th July 2014. Full program as below;

Session 1: Plenary session
Challenges for retirement incomes
Chair: Hazel Bateman (Risk & Actuarial Studies, UNSW)
1. Olivia S. Mitchell (Pension Research Council, Wharton)
2. Cai Fang (CASS)
3. Chris Cuffe (Chair, UniSuper)

Session 2A: Retirement benefits (Supply-side)
Chair: Ralph Stevens (CEPAR, UNSW)
1. Adam Shao (CEPAR, UNSW), Reverse Mortgage Pricing and Risk Analysis Allowing for Idiosyncratic House Price Risk and Longevity Risk
2. Jonathan Ziveyi (Risk & Actuarial Studies, UNSW), Valuing Variable Annuity Guarantees on Multiple Assets
3. Ralph Stevens (CEPAR, UNSW), Value Hedging of Annuities with an Uncertain Market Price of Longevity Risk

Session 2B: Economy-wide
Chair: George Kudrna (CEPAR, UNSW)
1. Carsten Murawski (University of Melbourne), Measuring Adequacy of Retirement Savings
2. George Kudrna (CEPAR, UNSW) The Dynamic Fiscal Effects of Demographic Shift: The Case of Australia
3. Margaret Claire Dale (University of Auckland), Turning Silver to Gold: policies for an ageing population

Session 2C: Superannuation industry (1)
Chair: Scott Donald (Law, UNSW)
1. Scott Donald (Law, UNSW), Introduction and the Decentralisation of Superannuation Decision Making
2. Kevin Liu (Risk & Actuarial Studies, UNSW), Linkages in Australian Superannuation: transactions, information and homogeneity
3. Rob Nicholls (Law, UNSW), It's a Small World, After All
4. Panel session

Session 3: Plenary session - Decumulation
Chair: John Piggott (CEPAR, UNSW)
1. Jeremy Cooper (Challenger), Your Money or your Life? Is either certain for Retirees?
2. Robert Holzmann (University of Malaya) Addressing Longevity Risk through Private Annuities: Issues and Options

**Session 4A: Retirement benefits (Demand-side)**
Chair: George Kudrna (CEPAR, UNSW)
1. Shang Wu (Risk & Actuarial Studies, UNSW), Asset Drawdown in Retirement: Analysis of Centrelink Data
2. Stuart Anderson (Department of Social Services), Examination of age pensioners with and without an account-based income stream from 2008 to 2012
3. Benedict Davies (UniSuper), Defined Benefit vs Defined Contribution or is there a third way? Defined Ambition Schemes: An Alternative Approach to Risk Sharing

**Session 4B: Consumer behaviour**
Chair: Ralph Stevens (CEPAR, UNSW)
1. Alex Zerba (QUT), Optimal Investment and Consumption with a Means Tested Aged Pension
2. Jun Feng (Monash University), Patterns of Voluntary Contributions: A Longitudinal Analysis
3. Eileen O’Leary (Victoria University, Melbourne), Optimisation of Retirement Benefits for Australians

**Session 4C: Superannuation industry (2)**
Chair: Kevin Liu (Risk & Actuarial Studies, UNSW)
1. Elizabeth Ooi (Monash University), Super Connected Directors: An Examination of Pension Funds
2. Scott Donald (Law, UNSW), Custodians in Australian Superannuation: certainty, stability and risk
3. Rob Nicholls (Law, UNSW), On the Smell of an Oily Rag: member benefit administration in Australia’s superannuation sector

**Session 5: Plenary session - Benefit decisions and policy**
Chair: John Piggott (CEPAR, UNSW)
1. Olivia S. Mitchell (Pension Research Council, Wharton, University of Pennsylvania), How Family Status and Social Security Claiming Options Shape Optimal Life Cycle Portfolios
2. David McCarthy (National Treasury, South Africa), Retirement Policy Challenges in South Africa
3. Susan Thorp (Finance, UTS), Default and Diversification Heuristics in Annuity Choice

**Session 6A: Defaults and member behaviour 1**
Chair: Ralph Stevens (CEPAR, UNSW)
1. Xiaodong Fan (CEPAR, UNSW), Retirement Savings: A Tale of Decisions and Defaults
2. Susan St John (University of Auckland), New Zealand KiwiSaver: Automatic Enrolment Experiences - Lessons for the UK, Ireland and US.
3. David Williams (mylongevity.com.au), Is Longevity Awareness even more important than Financial Literacy?
4. Jeanette Deetlefs (Marketing, UNSW), Derailing Defaults

**Session 6B: Retirement Modelling**
Chair: George Kudrna (CEPAR, UNSW)
1. Mengyi Xu (Risk & Actuarial Studies and CEPAR, UNSW), Modelling the Mortality of Heterogeneous Populations
2. Fedor Iskhakov (CEPAR, UNSW), Bequest Motives in a Life-Cycle Model with Intergenerational Interactions
3. Superannuation industry
5. Sacha Vidler (ISA), Super and Sovereign Credit Rates

**Session 6C: Governance and Regulation**
Chair: Kevin Liu (Risk & Actuarial Studies, UNSW)
1. Rosalie Degabriele (Finance, UTS), Independent Directors in a Trustee Structure
2. Ramani Venkatramani, Occupational Constraints of the Prudential Regulator
Session 7: Plenary session - Current policy issues

Chair: Hazel Bateman (Risk & Actuarial Studies, UNSW)

1. George Rothman (Treasury), Assessing the Impacts of Changing the Eligibility Age for Age Pensions
2. Ross Clare (ASFA), New Evidence on the Equity and Sustainability of Superannuation
3. Bernard Casey (University of Warwick), Pension Fund Investment in Infrastructure: a Europe and Australia comparison
4. Kevin Liu (Risk & Actuarial Studies, UNSW), Performance and Governance of Australian Superannuation Funds
5. Geoff Warren (CIFR), MySuper and the Superannuation System: Views from Super Fund Managers

Risk & Actuarial UNSW Research Open Day

The School of Risk and Actuarial Studies hosted a Research Open Day on Wednesday 26th November 2014. The day consisted of research presentations by School academics and research students as well as industry practitioners. It was also an opportunity for the School to showcase its research and to promote future research collaborations.

Details of the presentations and panel sessions are listed below.

Research Presentations

Longevity Risk, Health Status and Annuity Pricing
Professor Michael Sherris (with Qiming Zhou)

Benefits and drawback of increasing Age Pension by linking it to life expectancy
Dr Ralph Stevens

Modelling Multivariate Claims Counts Based on Micro-level Information: A Cox Process Approach
Mr Xinda Yang

Existence and uniqueness of chain ladder solutions
Professor Greg Taylor

Optimal Investment-consumption-insurance with Random Parameters
Dr Yang Shen

Managing Systematic Mortality Risk in Life Annuities: An application of Longevity Derivatives
Dr Simon Fung

UNSW Honours students – 5 minute thesis

Academic Presentations

On the Risk of Hedging Longevity: Model, Basis & Population
Martin Boyer (HEC Montréal)

Industry Presentations

Application of Research in Industry
The Actuarial “Investment Approach” to the Welfare System underway in New Zealand
Hugh Miller (Taylor Fry)

Holistic Individual Financial Planning Research
Wade Matterson and Zoe Yang (Milliman)

Panel – How to make research make a difference
Hazel Bateman (Chair), Anthony Asher (UNSW), Wade Matterson (Milliman), Martin Boyer (HEC Montréal)
**Research Grants**

**Current Research Grants – External**

- **Anthony Asher**
  - Centre for International Finance and Regulation (CIFR), *Developing coherent and usable decision support systems to improve financial wellbeing over an individual’s lifecycle* (Joint Chief Investigator with A Butt, G Khemka, U Kayande), $112,996, 2014

- **Anthony Asher**
  - Actuaries Institute, *Investigation into retirement account drawings*, $13,000, 2014

- **Hazel Bateman**
  - Financial Literacy Grant funded by Australian Securities and Investments Commission (ASIC), *Developing new financial literacy survey questions to better link financial knowledge to outcomes* (Joint Chief Investigator with C Eckert, J Louviere and S Thorp), $120,000, 2014

- **Hazel Bateman**
  - ARC Discovery Grant, *Endgame: managing superannuation in later life* (Joint Chief Investigator with G Kingston, L Fisher, S Thorp and G Milunovich), $170,000 over 3 years, 2012-2014

- **Hazel Bateman**
  - ARC Discovery Grant, *The paradox of choice: Unravelling complex superannuation decisions* (Joint Chief Investigator with J Louviere, S Thorp, C Eckert, T Islam, S Satchell), $960,000 over 5 years, 2010-2014

- **Hazel Bateman & Michael Sherris**
  - ARC Linkage Grant (with Netspar, AMP, APG and, Booz and company), *Mandatory pre-funded retirement income schemes: best policy and practice* (Joint Chief Investigators with J Piggott, R Stevens, T Njyman, L Bovenberg, J Deane, J Twaddle and E Ponds), $493,000 (matched by industry partner cash and in kind) over 3 years, 2014 – 2017

- **Hazel Bateman & Kevin Liu**
  - Centre for International Finance and Regulation (CIFR), *Identifying, monitoring and managing systemic risks in Australia’s superannuation system* (Joint Chief Investigators with S Donald, R Buckley and B Arnold) $200,800, 2013-2014

- **Katja Ignatieva**
  - Accounting and Finance Association of Australia and New Zealand (AFAANZ) Research Grant (Joint Chief Investigator with Vitali Alexeev from UTAS) $4,000, 2014

- **Katja Ignatieva, Michael Sherris & Jonathan Ziveyi**
  - Institute of Actuaries of Australia Research Grant on “Longevity Risk Management”, $15,000, 2013-14

- **Michael Sherris**
  - ARC Centre of Excellence in Population Ageing (CEPAR) - $12.7 million (universities $6.6 million, industry partners $1.4 million) with Professor JR Piggott, University of New South Wales CD, CI’s, Professor KJ Anstey, Australian National University, Professor RG Cumming, University of Sydney, Professor MP Keane, University of New South Wales, Professor HL Kendig, University of Sydney, Professor PF McDonald, Australian National University and Professor AD Woodland, University of New South Wales, ARC Centre of Excellence in Population Ageing. 2011 - 2018

- **Michael Sherris**
Bernard Wong  ARC Linkage Project (with Partner Organisations; Allianz Australia, Insurance Australia Group, and Suncorp), *Modelling claim dependencies for the general insurance industry with economic capital in view: An innovative approach with stochastic processes* (Joint Chief Investigator with Benjamin Avanzi and Greg Taylor), $320,861, 2013-2016

Bernard Wong  Actuaries Institute, Australian Actuarial Research Grant, *General forms of dependency in chain ladder structures* (Joint Chief Investigator with Benjamin Avanzi and Greg Taylor), $10,000, 2014-2015

Research Grants – Internal


Research Publications

Book Chapters


Journal Refereed


Refereed Edited Volume


School Working Papers
(available at: https://www.business.unsw.edu.au/about/schools/risk-actuarial/research/publications )

Avanzi B, Tao J, Wong B, and Yang X, ‘Capturing Non-Exchangeable Dependence in Multivariate Loss Processes with Nested Archimedean Lévy Copulas’


Bateman H and Liu K, ‘Pension Reform in China: Racing Against the Demographic Clock’.


Iskhakov F, Thorp S and Bateman H, ‘Optimal Annuity Purchases for Australian Retirees’.

Liu, K. ‘Governance and Performance of Private Pension Funds: Australian Evidence’.

Li, J., Bateman, H. and Liu, K. ‘China’s Regional Difference in Life Expectancy’.

Nicholls, R., Liu, K. and Bateman, H. ‘Linkages in Australian Superannuation: Transactions, Information and Homogeneity’


Shen Y and Sherris M, ‘Lifetime asset allocation with idiosyncratic and systematic mortality’.


Ziveyi J, Sherris M and Shen Y, ‘Valuation of variable annuities embedded with guarantees with surrender options’.

**Editorial Board Members**

Anthony Asher: Assistant Editor, Australian Journal of Actuarial Practice

Editorial Advisory Panel of the South African Actuarial Journal

Hazel Bateman: Joint Editor, Economic and Labour Relations Review

Editorial Board, Journal of Pension Economics and Finance


Advisory Editorial Board, Emerald Journal, Economic and Administrative Sciences

Michael Sherris: Editorial Board and Associate Editor, Annals of Actuarial Science

Associate Editor, Asia Pacific Journal of Risk and Insurance

**Professional and Community Relations**

Anthony Asher: Actuaries Institute: Represents the Life Insurance and Wealth Management Practice Committee on the Research Council Committee, Convenor of the Retirement Incomes Working Group and member of the Equity Risk Premium Research Group

Hazel Bateman: Member, Academic Advisory Council, Menzies Research Centre

Member, Research Advisory Committee, Monash-CSIRO Superannuation Cluster

Member, Expert Reference Group, Melbourne Mercer Global Pension Index

UNSW Academic Representative, UniSuper Consultative Committee

Ramaprasad Bhar: Assessor for Australian Research Council Grants

Member, Executive Committee, AsiaPacific Institute of Advanced Research

Michael Sherris: Assessor for Australian Research Council Grants

International Actuarial Association AFIR/ERM Section Committee

Bernard Wong: Member, Exemptions Sub-Committee, Actuaries Institute

**Alumni Event 2014**

The School held an Alumni event on Thursday 16th October 2014 to celebrate 15 years of the Actuarial Program at UNSW. Our guest speaker Sarah Johnson (Scheme Actuary at the National Disability Insurance Scheme) spoke about her career highlights so far and provided valuable insights into current reforms in the human services sector.

**Industry Advisory Board**

The School’s Industry Advisory Board (IAB) comprises external leaders in industry and government who contribute their expertise and experience to facilitate and enable the School’s mission and objectives and to support the School, recognising that business, government and management generally are important stakeholders in its success.
Industry members of the IAB, including the Chair and Deputy Chair, are appointed on a pro-bono basis for three year terms.

Established in 2013, industry membership is as follows:

**Chair:** James Collier, Partner, KPMG

**Deputy Chair:** Tony Bofinger, CFO and Appointed Actuary, Challenger Limited

**Members:**
- Nick Basile, Chief Investment Officer, Suncorp
- David Bell, Chief Executive Officer, Actuaries Institute
- Wayne Brael, Head of Actuarial - Product and Insurance Risk Management, AMP Financial Services
- Marlon Chan, Quantitative Analyst, Colonial First State Investments
- Warrick Gard, Partner, Financial Services at Ernst & Young
- David Hole, Chief Actuary and Appointed Actuary, MetLife Australia
- Jennifer Lang, Chief Actuary, NAB Wealth at National Australia Bank
- Brett Riley, Actuary, Finity Consulting
- Nick Sherry, International Pensions Consultant
- Andrew Smith, Partner, PwC
- Dean Stewart, Executive Director, Macquarie Funds Management Ltd
- David Su, Head of Capital, Westpac Banking Corporation
- Angela Tatarow, Head of Actuarial, Market Risk Product, National Australia Bank
- Andries Terblanche, Chair of Financial Services, KPMG
- Robert Thompson, Head of Actuarial Services, APRA
- Pauline Vamos, Chief Executive Officer, ASFA
- Gloria Yu, Director – Actuaries & Consultants, Deloitte Australia

Three IAB working groups were established in 2014 - Research, Education and Engagement. Each working group consists of four or five members, a mix of IAB members and Alumni. Members are expected to attend regular meetings and report back to IAB meetings every six months.

1. **Research working group** - Tony Bofinger, Nick Sherry, Luke Cassar
   - Key objectives;
     - To provide guidance on School research areas particularly PhD & Honours student topics
     - Facilitate industry input into research parameters
     - Increase industry participation at events and student exposure to the workplace
     - Link School PhD & Honours students with industry mentors via IAB connections – students present academically to mentor and practically in the mentor’s workplace

2. **Education working group** - David Hole, Brett Riley, Chao Qiao, John Jeaitani
   - Key objectives;
     - To provide industry input into the School curriculum and ensure that course content is up-to-date and covers the latest technical aspects of the industry
     - Facilitate appropriate guest lecturers to present at School courses
     - Help to ensure School courses provide what students need to succeed in the workplace
     - Assist with the design of appropriate assessment tasks – how students should present results and put theory into practice

3. **Engagement working group** - Nick Sherry, Gloria Yu, Wayne Brael, David Bell, Andrew Smith
   - Key objectives;
     - To actively promote the connection between the School and industry
     - Increase involvement of industry representatives in School activities
     - Provide guidance on how to communicate School research papers to people working in the industry
     - Facilitate interaction between researchers and industry
     - Build greater awareness of School activities
Undergraduate Statistical Highlights

273 Undergraduate Students enrolled in Bachelor of Actuarial Programs in 2014

Undergraduate Students 2014

- 61% Local Male
- 20% Local Female
- 11% International Male
- 8% International Female

Undergraduate Student Numbers Program Breakdown

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<td>3155 - Actuarial Studies / Commerce</td>
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<td>3587 - Actuarial Studies (Co-op)</td>
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<td>3586 - Actuarial Studies</td>
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3586 - Actuarial Studies

- 35% Local Female
- 30% Local Male
- 12% International Male
- 23% International Female

3587 - Actuarial Studies (Co-op)

- 15% Local Female
- 85% Local Male
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<td><strong>1,396</strong></td>
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Postgraduate Statistical Highlights

94 Postgraduate Students in 2014

Postgraduate Students

Postgraduate Student Numbers by Program

8428 - Risk Management: 28
8416 - Actuarial Studies (Extension): 23
8411 - Actuarial Studies: 43

8411 - Actuarial Studies

8416 - Actuarial Studies (Extension)

8428 - Risk Management
### Postgraduate Actuarial Course Student Numbers

<table>
<thead>
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<tr>
<td><img src="image9" alt="Course Name 5" /></td>
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### Postgraduate Actuarial Research Student Numbers

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