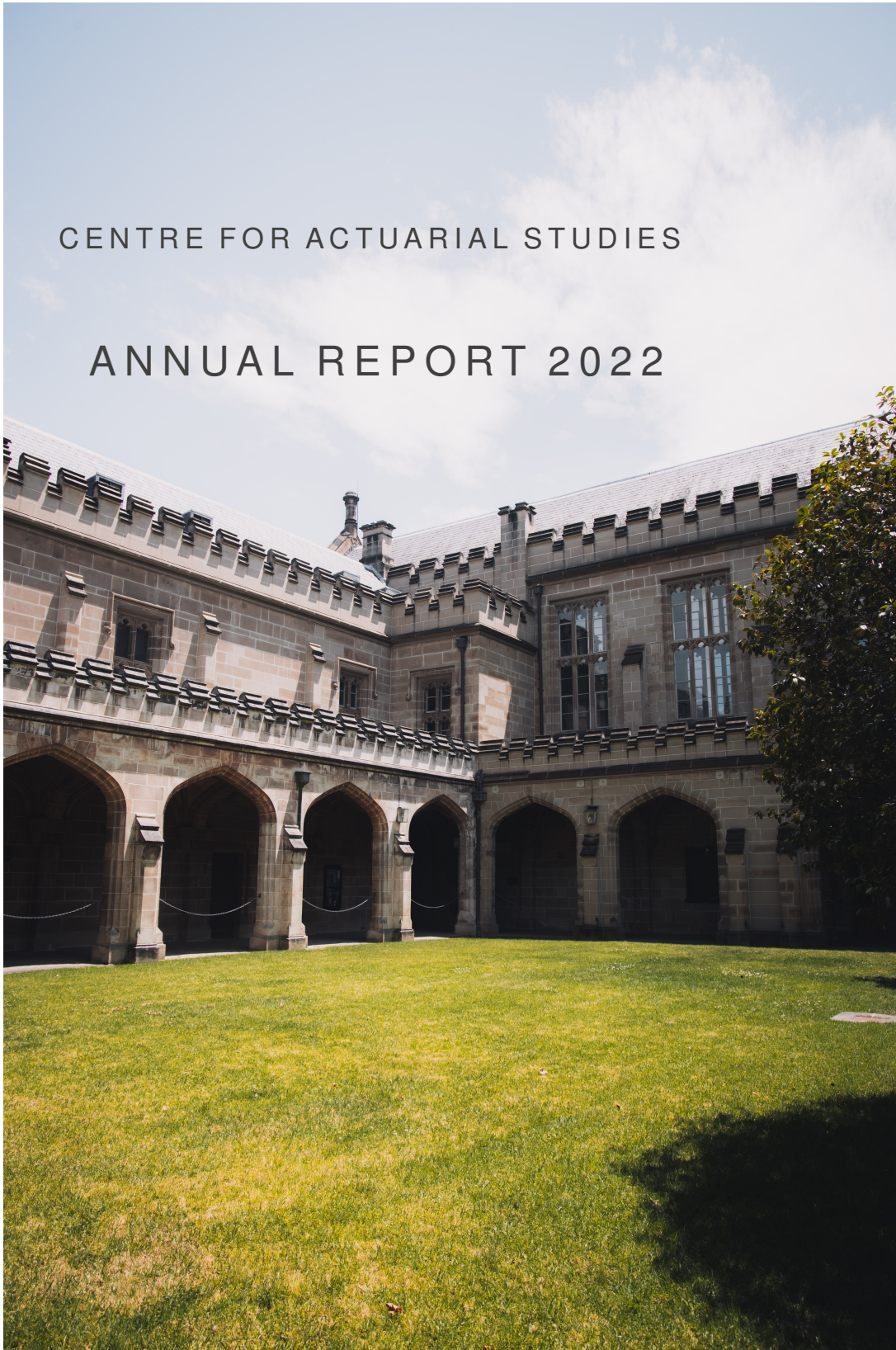


THE UNIVERSITY OF MELBOURNE

CENTRE FOR ACTUARIAL STUDIES

ANNUAL REPORT 2022



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The Year in Review

Introduction

THE CENTRE FOR ACTUARIAL STUDIES¹ is a teaching and research unit located within the Department of Economics, Faculty of Business and Economics at the University of Melbourne. 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.

OUR UNDERGRADUATE AND MASTERS STUDENTS primarily study to become actuaries, but a number of our students find employment in the banking or investment sector. Our PhD students have research topics in general insurance, risk theory, investment models, survival analysis, financial mathematics, derivative pricing and applied probability. 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.

WE ARE FULLY ACCREDITED by the Australian Actuaries Institute, meaning that its students can obtain exemptions from all of the "Foundation" program and university components of the "Actuary Program" required for qualification as an actuary.

The University of Melbourne's actuarial studies program has been a Society of Actuaries (SOA) Center of Actuarial Excellence (CAE) since 2015. Actuarial science school programs must meet eight rigorous criteria and specific CAE requirements to qualify for the CAE designation. These criteria involve the degree, curriculum, graduate count, faculty composition, graduate quality, appropriate integration, and connection to industry and research/scholarship. Only 37 colleges and universities around the world have attained the CAE designation, amongst which 4 are in Australia.

¹ Centre website



OUR STAFF are globally recognised for their contribution to actuarial scholarship. The Centre has nine full-time academic positions and several part-time lecturers from the Melbourne actuarial community.



Staff News

MOVEMENTS:

- Professor David Pitt became Director of the Centre for Actuarial Studies in 2022. The leadership and commitment of Professor Shuanming Li is gratefully acknowledged.
- Associate Professor Zhuo Jin left the Centre in January 2022 to join Macquarie University. We wish him the best for the remainder of his career.
- Associate Professor Han Li joined the Centre in January 2022.
- Dr Ping Chen was promoted to Associate Professor effective from 1 January 2022.

Research Highlights

IN 2022, staff were able to resume international travel and collaboration to pre-pandemic levels. Our seminar series also went back to usual levels, with face to face presentations of research from Australia and overseas.

THE CENTRE WAS RANKED NUMBER 3 on the *Business School Actuarial Science worldwide rankings* by the University of Nebraska-Lincoln² for the period 2018–2022. This ranking is consistent with recent rankings as exhibited in the margin.

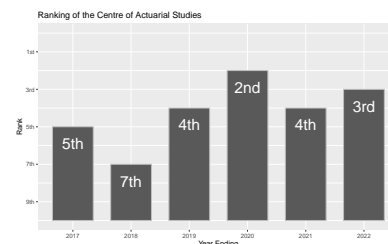
This ranking is based on publications in *Insurance: Mathematics and Economics*, the *ASTIN Bulletin*, the *Scandinavian Actuarial Journal*, and the *North American Actuarial Journal*.

CENTRE STAFF PUBLISHED 19 journal articles, with 3 in the above-mentioned list of top 4 actuarial journals, of which 1 in the top actuarial journal *Insurance: Mathematics and Economics* (A* in the Australian Business Deans' Council Journal Quality List). They also published in top journals in other (connected) fields (e.g., *International Journal of Forecasting*).

NEWLY AWARDED COMPETITIVE RESEARCH GRANTS included:

- Associate Professor Han Li is a Chief Investigator on Australian Research Council (ARC) 2022-2025 Discovery Project DP200100090 entitled "Quantitative Analysis of Systemic Risk in Insurance" (AUD 390,258).
- Dr Enrique Calderin is a Co-Investigator on a Ministry of Science and Innovation of Spain 2022-2024 grant entitled "Economic Assessment and Meta-Analysis: Bayesian Solutions in health economics" (EUR 76,230).

On 9 December 2022, Associate Professor Han Li and Professor Benjamin Avanzi organised an open event entitled "Uncertainty in decision-making: game-theoretic and machine learning approaches" with internationally acclaimed Professors Jose Blanchet (Stanford) and Henry Lam (Columbia).



² [Link to UNL actuarial rankings](#)

Teaching Highlights

IN 2022 most subjects were taught in a hybrid mode, both on campus and on Zoom (often simultaneously). A significant number of students took subjects from overseas.



Teaching

IN THIS CHAPTER we will provide some more details about the teaching activities in the Centre for Actuarial Studies in 2022:

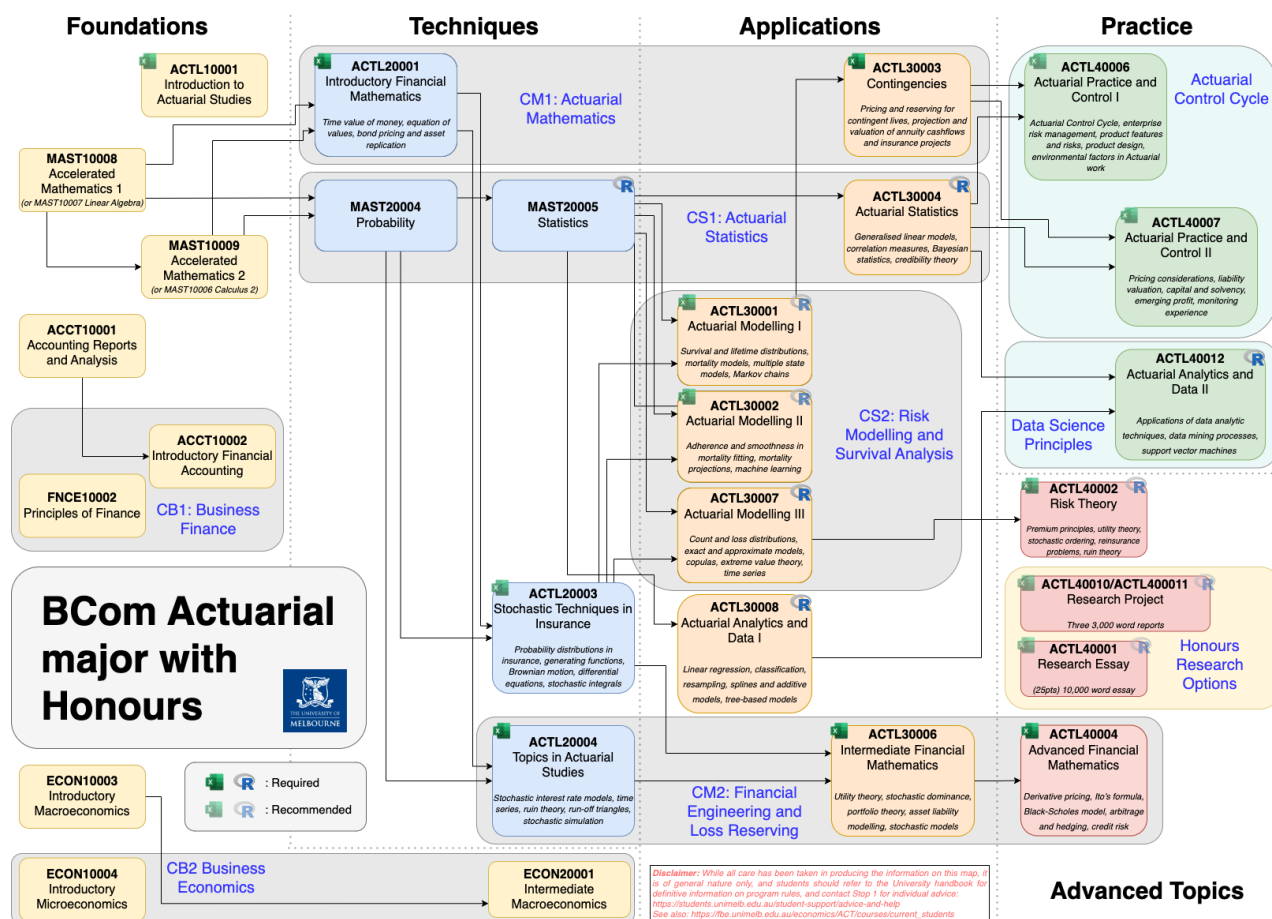
- current curriculum structure;
- undergraduate and honours enrolment data;
- honours results;
- masters enrolment data;
- research topics for honours and masters research components;
- student prize winners;
- guest lectures.

Current curriculum structure

UNDER THE CURRENT ACTUARIES INSTITUTE PROFESSIONAL CURRICULUM, the Foundation Program is composed of the following six subjects: **CB1 Business Finance**, **CB2 Business Economics**, **CS1 Actuarial Statistics**, **CS2 Risk Modelling and Survival Analysis**, **CM1 Actuarial Mathematics**, and **CM2 Financial Engineering and Loss Reserving**.

Furthermore, the professional subjects (**CS1**, **CS2**, **CM1**, **CM2**) include computer-based learning outcomes.

A map of the current actuarial undergraduate structure is provided below:



The fourth column (“Practice”) would typically be covered during an honours degree (when completed at the undergraduate level).

AT THE POSTGRADUATE LEVEL, the Centre for Actuarial Studies offers two coursework degrees:

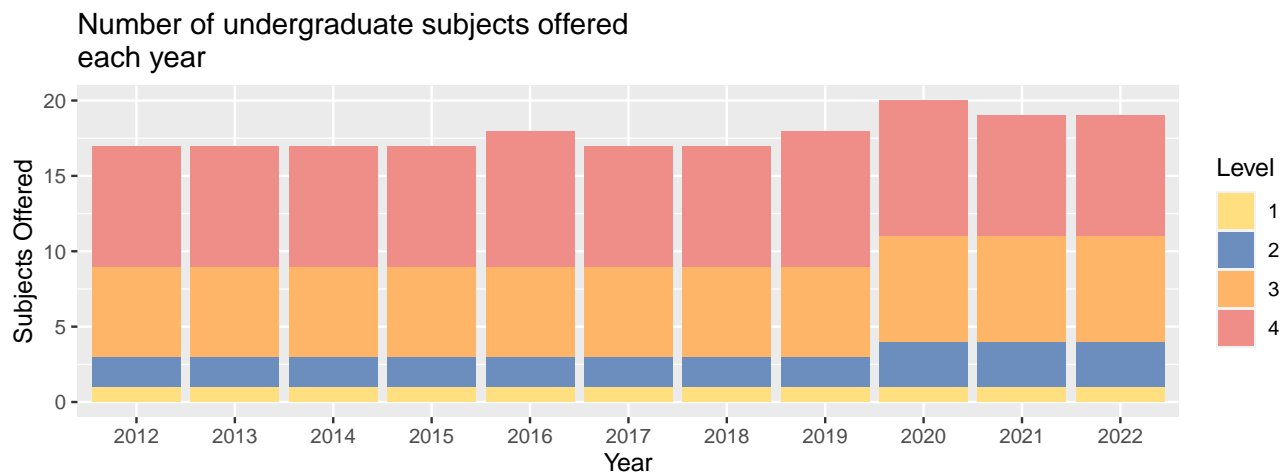
- Master of Actuarial Science
- Master of Commerce (Actuarial Studies)

While the Master of Actuarial Studies allows students from a different background to complete the “Foundation Program”, the Master of Commerce (Actuarial Studies) is targeted at students who already have an actuarial background, and who wish to complete the university components of the “Actuary Program” (leading to the “Actuary” designation) and acquire deeper knowledge in actuarial studies and related disciplines.

Undergraduate and Honours enrolment data

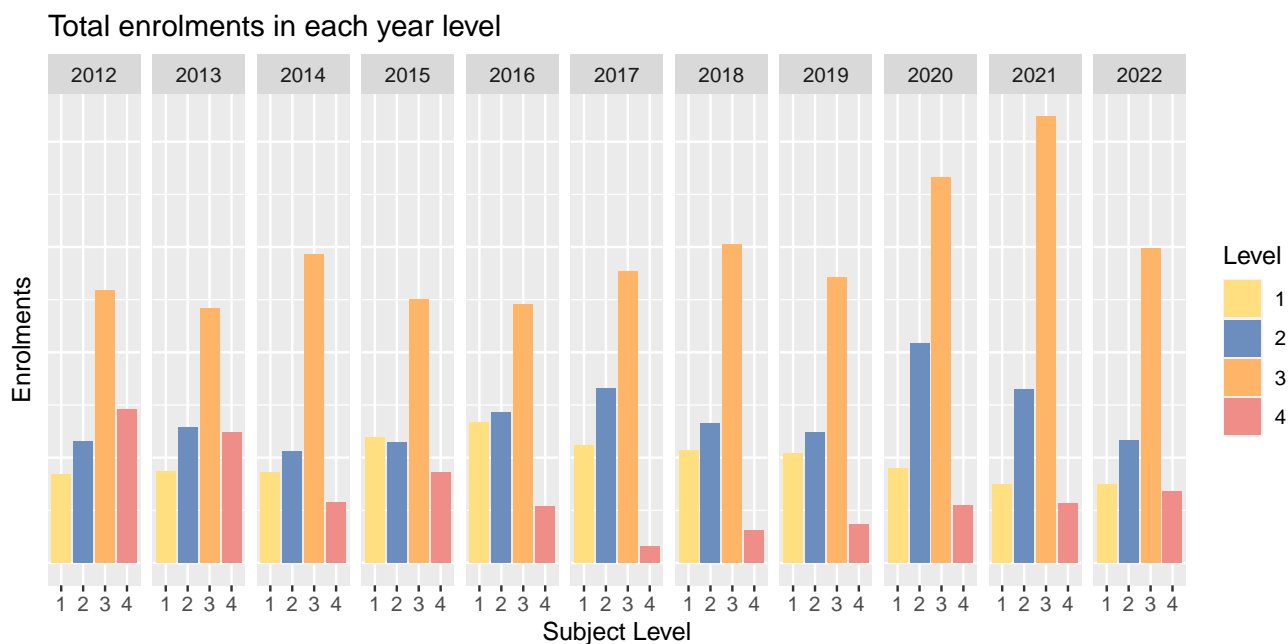
Number of undergraduate subjects offered

As a direct result of new accreditation requirements, the number of subjects that the Centre offered increased significantly since 2019.



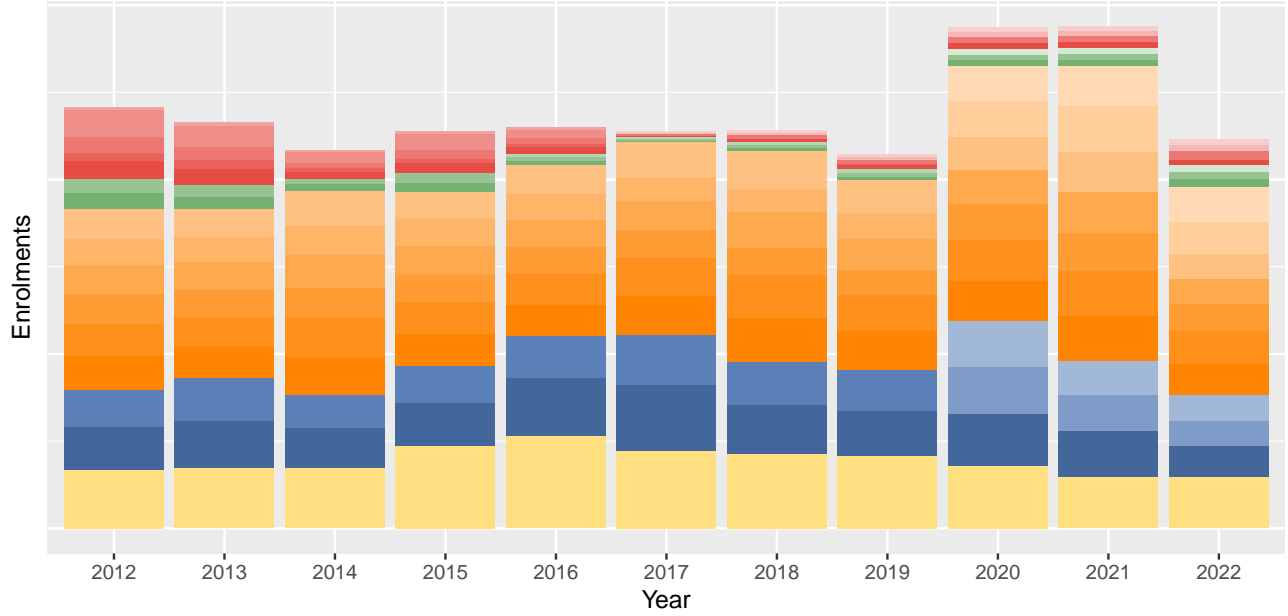
Total undergraduate enrolments

In the following graph one can see the evolution of enrolment per year level.



This is then displayed here by subject (note a full table of subjects with codes and titles is available at the end of this report).

Enrolments in each Undergraduate subject over time



ACTL10001	ACTL30001	ACTL30006	ACTL40009	ACTL40004
ACTL20001	ACTL30002	ACTL30007	ACTL40012	ACTL40005
ACTL20002	ACTL30003	ACTL30008	ACTL40001	ACTL40008
ACTL20003	ACTL30004	ACTL40006	ACTL40002	ACTL40010
ACTL20004	ACTL30005	ACTL40007	ACTL40003	ACTL40011

In 2020: ACTL20003, ACTL20004, ACTL30007, ACTL30008, ACTL40012 were introduced, and ACTL20002, ACTL30005 and ACTL40008 were discontinued.

Completion rates

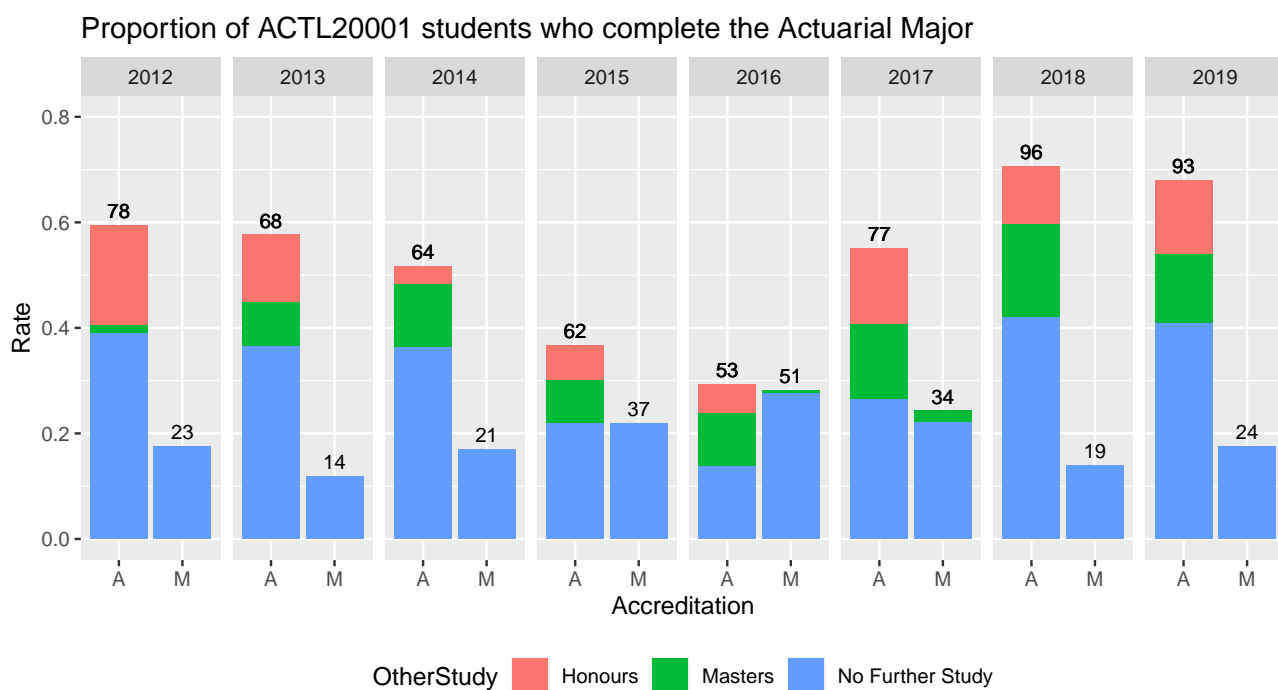
Students completing an actuarial major in the Bachelor of Commerce must complete ACTL20001, and hence it is interesting to see how many of those students eventually complete the actuarial major.

There are two possible types of completion:

- *accredited* actuarial major, which means that all level 3 subjects are completed;
- *non-accredited* actuarial major, which means that the major is completed according to the university requirements, but some subjects may be missing for full recognition by the Actuaries Institute.

Furthermore, for each type of completion, students may continue on to do an Honours or a Masters degree. These are usually students with an accredited major. Data are provided in the following graph.

Note that while the columns below correspond to aggregate percentages, the numbers on top of the columns are head counts.



A: Accredited actuarial major (all level 3 subjects completed)

M: Non-accredited actuarial major

Note: Passing all level 3 subjects does not necessarily equate to receiving exemptions from the corresponding professional actuarial examinations

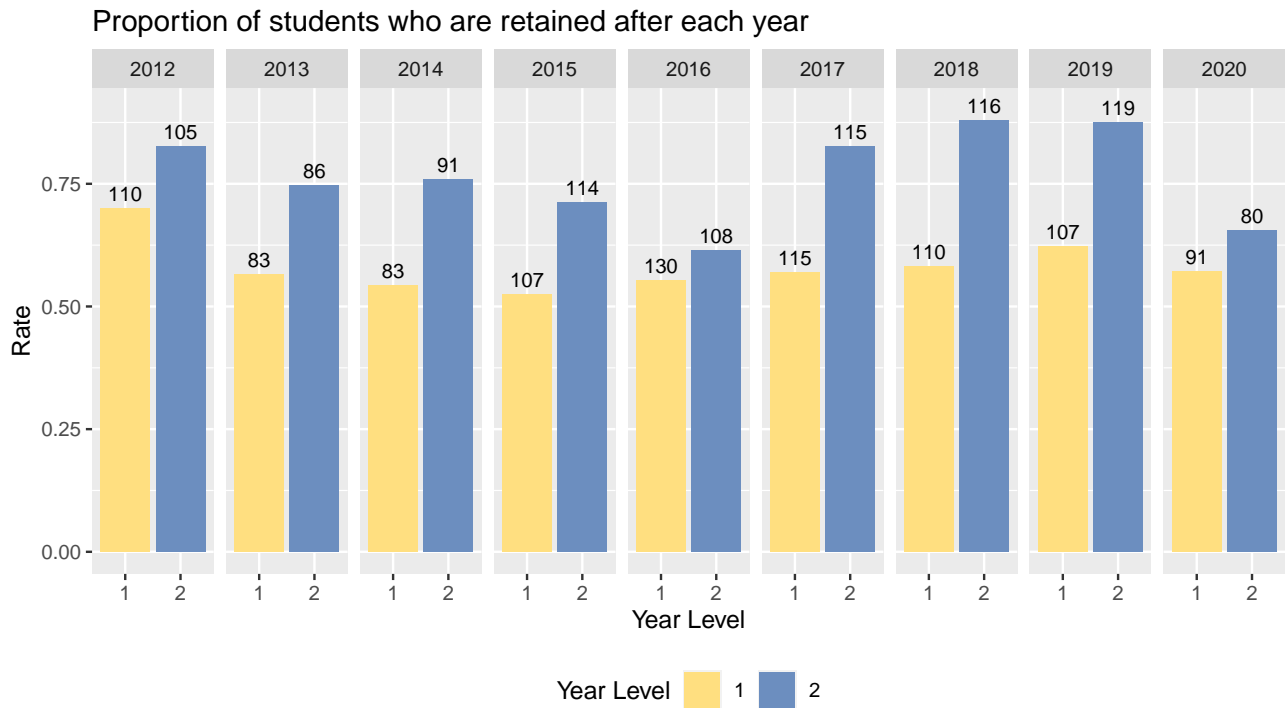
We see that the proportion of students completing an accredited major has increased from the 2016 cohort to the 2018 cohort, suggesting higher retention rates amongst students completing ACTL20001.

The proportion remains high for 2019.

Retention rates between year levels

Here, we are interested in tracking retention (or progression) rates:

- from Year 1 to Year 2: proportion of students who attempted ACTL10001 and who continued and passed ACTL20001 (note we excluded students who are enrolled in ACTL10001 as “breadth” students—typically from other faculties);
- from Year 2 to Year 3: proportion of students who passed ACTL20001 and who subsequently passed *any* level 3 ACTL subject.



*Notes:
 1: BCom ACTL10001 students (non-breadth) who complete ACTL20001
 2: ACTL20001 students who complete a Level 3 ACTL subject

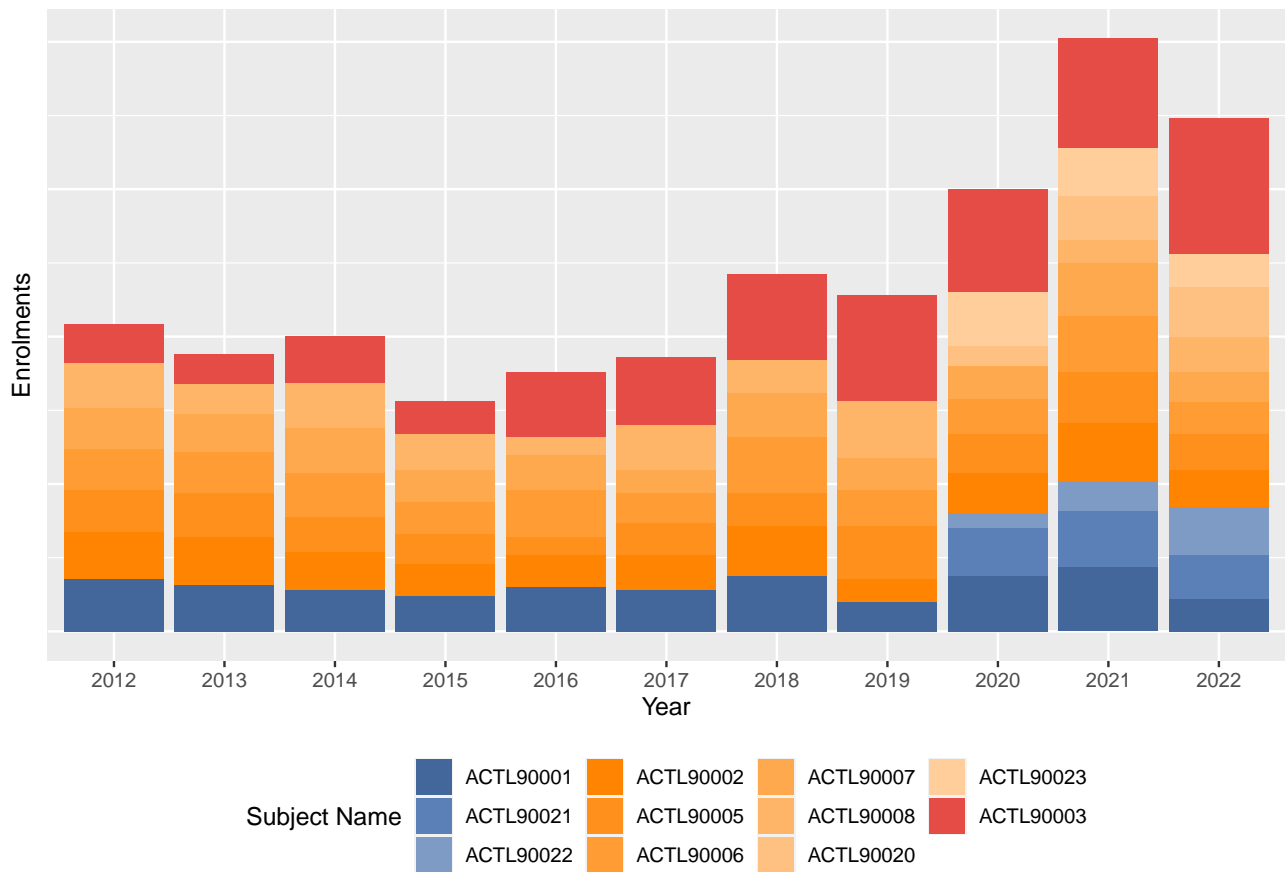
Proportions are quite stable, except for the second year retention rate, perhaps due to COVID-19 disruptions.

Masters enrolment data

Total postgraduate enrolments

For the Master of Actuarial Science (which covers the “Foundation Program” and university components of the “Actuary Program”), enrolments evolved in the following way.

Enrolments in each Master of Actuarial Science subject over time

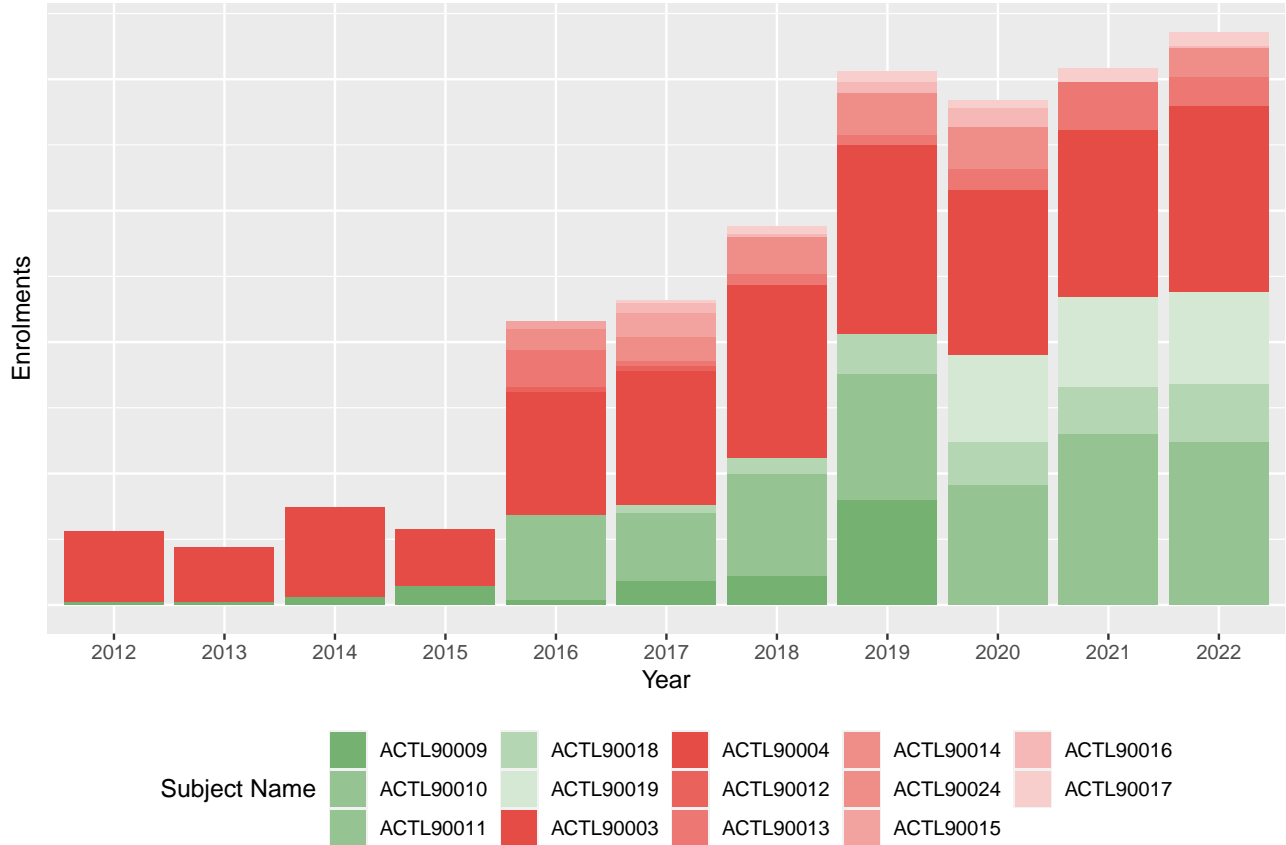


In 2020: ACTL90020, ACTL90021, ACTL90022, ACTL90023 were introduced.

We can observe a large increase, with enrolments almost doubling from 2019 to 2021, and a subsequent stabilisation.

The Master of Commerce (Actuarial Science) allows students with existing actuarial training to continue their actuarial studies. Enrolments evolved as follows.

Enrolments in each Master of Commerce (Actuarial Science) subject over time



In 2020: ACTL90019 was introduced, and ACTL900015 was discontinued.

Here, the increase in enrolments happened in 2019, and has remained stable since then.

Essay and Project Topics

There were 20 students who successfully completed a Bachelor of Commerce (Honours) with a specialisation in Actuarial Studies. In 2022, 17 students completed three research projects:

- Member outcomes and superannuation fund sustainability
- Persona matching between life insurance agents and customers
- Home insurer to offer landlord insurance

The essay counts 25% towards the Honours grade. Four Honours and two Masters students wrote an essay in 2022, and the topics were:

Name	Degree	Supervisor	Thesis title
Zixuan Chen	Honours	Li, S	A synchronous approach to forecasting risk measures with vine copula models
Tony Chen	Honours	Li, S.	A Synchronous Approach to Forecasting Risk Measures with Vine Copula Models
Siyue Gao	Masters	Zhou, R.	Long-term Climate-driven Trends in Daily Precipitation
Zherui Li	Masters	Chen, P.	Stochastic Control in a Tontine-like Annuity Fund: Optimal Tontine Payout and Investment with Diffusion Approximation to Pool Size Dynamics
Jiacheng Min	Honours	Wu, X.	Applications of generalised linear mixed models in motor insurance
Lintao Wang	Honours	Calderin, E. and Chen, P.	Non-parametric Regression using Bernstein Polynomial Density Estimation With Application to Insurance Data

Student Prize Winners

The UniSuper Prize

for Introduction to Actuarial Studies

Anmol TENDULKAR and Harry DAVISON PETCH

The Martin Jilovsky Prize

for best third year results by an Australian student

Lewis DE FELICE

The Mark Joshi Memorial Prize

for Intermediate Financial Mathematics and Advanced Financial Mathematics (UG students) or Mathematics of Finance II and Mathematics of Finance III (PG students)

Theresiana ZULKIFLIE

Deloitte Actuaries & Consulting Prize

for Actuarial Practice and Control

Jinghan YU and Lintao WANG

Honours Medal in Actuarial Studies

for overall performance in the BCom(Hons) program with a major in Actuarial Studies

Lintao WANG

Research and Engagement

IN THIS CHAPTER, after an overview of the research conducted in the Centre, we will provide some more details about its research activities in 2022:

- refereed journal publications;
- other publications;
- active competitive external research funding;
- PhD students and their research topics;
- Editorial activities;
- Journal article reviews;
- Conference and seminar presentations;
- Engagement and professional activities.

Overview of research activities in the Centre

Centre members are actively researching in most areas of actuarial studies, with particular strengths as follows:

- statistical modelling of risks (e.g. dependence modelling, robust estimation, grouped data)
- climate risk (e.g. mortality, extreme value theory, heavy tails, applications of climate indices)
- cyber (e.g. reporting delays, pricing)
- reserving
- portfolio risk analysis (risk aggregation, risk measure, diversification, stochastic comparison)
- applications of stochastic optimisation (e.g. optimal reinsurance, portfolio management)
- applications of machine learning (e.g. reserving, discrimination free pricing)

We have members in the *Actuaries Institute (AI) COVID-19 Mortality Working Group*, the *Institute and Faculty of Actuaries (IFoA) Statistical Learning in Actuarial Applications Working Party*, and the *Spanish Statistics and Research Society (SEIO) Risk Analysis working group*.

Future projects, including a number of major grant applications, are connected with the challenges imposed by climate change and climate risk in general.

Formal projects with funding include:

- collaborations with leading actuarial groups in the world
 - joint PhD project with KU Leuven, which consists of a package of 6 projects and 2-3 PhD students in emerging and global actuarial risks (from 2021)
- *Australian Research Council (ARC) discovery projects*
 - “EVT approaches to insurance in a catastrophic environment” (from 2020)
 - “Quantitative analysis of systemic risk in insurance” (from 2022)
- International competitive grants from:
 - *Ministerio de Ciencia en Innovación, Spain*
 - *Natural Science Foundation of China*
- Research contracts

Refereed journal articles

Authors	Publication
Al-Mudafer, MT., Avanzi, B. , Taylor, G., Wong, B.	<i>Stochastic loss reserving with mixture density neural networks</i> <u>INSURANCE MATHEMATICS & ECONOMICS</u> , Vol. 105, pp. 144-174 https://dx.doi.org/10.1016/j.insmatheco.2022.03.010
Avanzi, B. , Taylor, G., Wang, M.	<i>SPLICE: a synthetic paid loss and incurred cost experience simulator</i> <u>ANNALS OF ACTUARIAL SCIENCE</u> , https://dx.doi.org/10.1017/S1748499522000057
Calderin-Ojeda, E. , Lopez-Campos, G., Gomez-Deniz, E.	<i>A Copula Type-Model for Examining the Role of Microbiome as a Potential Tool in Diagnosis</i> <u>MATHEMATICAL PROBLEMS IN ENGINEERING</u> , Vol. 2022 https://dx.doi.org/10.1155/2022/8033806
Gomez-Deniz, E., Calderin-Ojeda, E. , Gomez, HW.	<i>Asymmetric versus Symmetric Binary Regresion: A New Proposal with Applications</i> <u>SYMMETRY-BASEL</u> , Vol. 14, Issue 4 https://dx.doi.org/10.3390/sym14040733
Gómez-Déniz, E., Calderín-Ojeda, E. , Gómez, HW.	<i>Symmetric and Asymmetric Distributions: Theoretical Developments and Applications III</i> <u>Symmetry</u> , Vol. 14, Issue 10 https://dx.doi.org/10.3390/sym14102143
Gomez-Deniz, E., Calderin-Ojeda, E. , Maria, Sarabia.	<i>The arctan family of distributions: New results with applications</i> <u>CHILEAN JOURNAL OF STATISTICS</u> , Vol. 13, Issue 1, pp. 113-132 https://dx.doi.org/10.32372/ChJS.13-01-06
Gomez-Deniz, E., Leiva, V., Calderin-Ojeda, E. , Chesneau, C.	<i>A novel claim size distribution based on a Birnbaum-Saunders and gamma mixture capturing extreme values in insurance: estimation, regression, and applications</i> <u>COMPUTATIONAL & APPLIED MATHEMATICS</u> , Vol. 41, Issue 4 https://dx.doi.org/10.1007/s40314-022-01875-6
Huang, X., Shang, HL., Pitt, D.	<i>A model sufficiency test using permutation entropy</i> <u>JOURNAL OF FORECASTING</u> , Vol. 41, Issue 5, pp. 1017-1036 https://dx.doi.org/10.1002/for.2849
Huang, X., Shang, HL., Pitt, D.	<i>Permutation entropy and its variants for measuring temporal dependence</i> <u>Australian & New Zealand Journal of Statistics</u> , Vol. 64, Issue 4, pp. 442-477 https://dx.doi.org/10.1111/anzs.12376

- Jin, Z.,** Tran, K., Yin, G. *Numerical solutions of stochastic control problems: Markov chain approximation methods*
JOURNAL OF OPTIMIZATION THEORY AND APPLICATIONS, Vol. 23, pp. 233-264
<https://dx.doi.org/10.1016/bs.hna.2021.12.007>
- Liu, G., Jin, Z., Li, S.,** Zhang, J. *Stochastic asset allocation and reinsurance game under contagious claims*
Finance Research Letters, Vol. 49
<https://dx.doi.org/10.1016/j.frl.2022.103123>
- Prieto, F., Maria,** Sarabia.,
Calderin-Ojeda, E. *The risk of death in newborn businesses during the first years in market*
Proc. of the Royal Society A-Math. Phys. And Engin. Sciences, Vol. 478, Issue 2263
<https://dx.doi.org/10.1098/rspa.2021.0952>
- Qiu,, M., Jin,, Z., Li,,** S.. *OPTIMAL DIVIDEND STRATEGIES WITH REINSURANCE UNDER CONTAGIOUS SYSTEMIC RISK*
SIAM JOURNAL ON CONTROL AND OPTIMIZATION, Vol. 60, Issue 3, pp. 1269-1293
<https://dx.doi.org/10.1137/21M1422318>
- Wang, W., Wang, Y.,** **Chen, P., Wu, X.** *Dividend and Capital Injection Optimization with Transaction Cost for Levy Risk Processes*
JOURNAL OF OPTIMIZATION THEORY AND APPLICATIONS, Vol. 194, Issue 3, pp. 924-965
<https://dx.doi.org/10.1007/s10957-022-02057-4>
- Winzar, H., Baumann,** C., Soboleva, A., Park, SH., **Pitt, D.** *Competitive Productivity (CP) as an emergent phenomenon: Methods for modelling micro, meso, and macro levels*
INTERNATIONAL JOURNAL OF HOSPITALITY MANAGEMENT, Vol. 105
<https://dx.doi.org/10.1016/j.ijhm.2022.103252>
- Yang, Y., Li, S.** *On a Family of Log-Gamma-Generated Archimedean Copulas*
North American Actuarial Journal, Vol. 26, Issue 1, pp. 123-142
<https://dx.doi.org/10.1080/10920277.2020.1856687>
- Zhang, P.,** **Calderin-Ojeda, E.,** **Li, S., Wu, X.** *Bayesian Multivariate Mixed Poisson Models with Copula-Based Mixture*
NORTH AMERICAN ACTUARIAL JOURNAL,
<https://dx.doi.org/10.1080/10920277.2022.2112233>
- Zhang, P., Pitt, D.,** **Wu, X.** *A NEW MULTIVARIATE ZERO-INFLATED HURDLE MODEL WITH APPLICATIONS IN AUTOMOBILE INSURANCE*
ASTIN BULLETIN, Vol. 52, Issue 2, pp. 393-416
<https://dx.doi.org/10.1017/asb.2021.39>

Zhou, R., Li, JS-H. *A multi-parameter-level model for simulating future mortality scenarios with COVID-alike effects*
ANNALS OF ACTUARIAL SCIENCE,
<https://dx.doi.org/10.1017/S1748499522000033>

Other publications

There were no non-journal publications in 2022.

Active competitive external research funding

Funding Period	Researchers	Information
2022—2025	Li, H., Chief Investigator	Quantitative Analysis of Systemic Risk in Insurance Australian Research Council (ARC) Discovery Project DP220100090. 390,258 (AUD) https://dataportal.arc.gov.au/NCGP/Web/Grant/Grant/DP220100090
2022—2024	Calderín, E., Co-Investigator	Economic Assessment and Meta-Analysis: Bayesian Solutions in health economics Ministerio de Ciencia en Innovación, Spain. 76,230 (EUR)
2021—2024	Chen, P., Co-Investigator	Research on Systemic Risk Measure and Asset Allocation based on Data-Driven Distributionally Robust Approach Natural Science Foundation of China. 480,000 (CNY)
2020—2024	Avanzi, B., Co-Partner Investigator, Zhou, R., Co-Partner Investigator	VALERIA: Valuation and Advanced Learning methods for Emerging, global Risks In Actuarial science Global PhD Partnership KU Leuven/Melbourne GPP/21/003. 30,000 (AUD) Other investigators include Professors Katrien Antonio and Jan Dhaene from KU Leuven, Belgium. Involves 2 full PhD scholarship with travel budget, and about AUD 50,000 cash support for Partner Investigators.
2022—2023	Li, H., Chief Investigator	Catastrophe Loss Prediction Contract Research. 15,000 (AUD)
2020—2023	Avanzi, B, Chief Investigator	Extreme Value Theory Approaches to Insurance in a Catastrophic Environment Australian Research Council (ARC) Discovery Project DP200101859. 310,000 (AUD) https://dataportal.arc.gov.au/NCGP/Web/Grant/Grant/DP200101859
2022—2022	Li, H., Chief Investigator	Analyzing Geographical Variation in Cause-of-death Mortality for China: Evidence from 2004 to 2017 Contract Research. 23,304 (AUD)

2019—2022	Chen, P., Co-Investigator	Research on Optimal Investment, Consumption and Life Insurance Strategies under the Pension Risk: From the Life Cycle's Perspective National Natural Science Foundation of China. 480,000 (CNY)
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Higher Degree Research

The following table lists current PhD students within the Centre.

Name	Supervisors	Thesis title
Atibhav Chaudhry	Zhou, R., Avanzi, B.	VALERIA: Valuation and Advanced Learning methods for Emerging, global Risks In Actuarial science
Xindi Fang	Wu, X., Pitt, D.	The study of modern technologies and big data analytical methods in insurance
Giovani Gracianti	Zhou, R., Li, J., Wu, X.	Weather Risk management in the renewable energy sector for developing countries
Suyuan He	Zhou, R., Li, S.	A practice of applying copula-based approach to multi-population mortality dependence modelling and longevity derivative pricing
Rong He	Li, S., Pitt, D., Jin, Z., Li, J.	Cyber risk modelling
Ming Qiu	Jin, Z., Li, S.	On analytical and numerical methods to ruin-related quantities and statistical approaches to actuarial problems
Xingyun (Claire) Tan	Calderin, E., Avanzi, B. Taylor, G., Wong, B.	Cyber risk modelling
Fan Zhang	Chen, P., Wu, X.	The application of age-structured model in actuarial studies

There was one new start (Xindi Fang) and one completion in 2022.
The completing student was:

Name	Supervisors	Thesis title
Guo Liu	Jin, Z., Li, S.	Optimal portfolio choice and dividend strategies under contagious financial markets

Editorial activities

Professor Benjamin Avanzi is an Editor for the *ASTIN Bulletin*, an Associate Editor for *Insurance: Mathematics and Economics* and is a member of the Editorial Board for the open access journal *Risks*.

Professor Shuanming Li was a member of the Reviewer Board of *Risks*, a member of the Reviewer Board of *Journal of Risk and Financial Management*, Member of the Editorial Board for the *Journal of Insurance Markets and Companies*, a Topic Editor of *Entropy*, and a reviewer of *American Mathematical Review*.

Doctor Enrique Calderin is an Associate Editor of the *Spanish Journal of Statistics*. He was also a Guest Editor of the *Special Issue: Symmetrical and Asymmetric distributions: Theoretical Developments and Applications III*.

Associate Professor Rui was a guest editor for the special issue titled *Managing climate-related Risks* in the *Annals of Actuarial Science*.

Associate Professor Xueyuan Wu was a guest editor for the Special Issue, *Machine Learning and Statistical Learning in Insurance and Actuarial Science*, in *Risks*.

Journal article reviews

Journal	Referees
Annals of Actuarial Science	Li, H., Pitt, D.
Applied Mathematics and Computation	Calderín, E.
ASTIN Bulletin	Li, H., Wu, X.
Australian and New Zealand Journal of Statistics	Pitt, D.
Brazilian Journal of Probability and Statistics	Calderín, E.
Chilean Journal of Statistics	Calderín, E.
Communications in Statistics - Theory and Methods	Calderín, E., Li, S.
Computational Statistics and Data Analysis	Wu, X.
Decisions in Economics and Finance	Li, S.
European Actuarial Journal	Avanzi, B.
Insurance: Mathematics and Economics	Avanzi, B., Chen, P., Li, H., Li, S., Wu, X., Zhou, R.
International Journal of Environmental Research and Public Health	Wu, X.
Journal of Applied Probability	Li, S.
Journal of Computational and Applied Mathematics	Li, S.
Journal of Industrial & Management Optimization	Chen, P.
Journal of Statistical Planning and Inference	Li, S.
Journal of the Royal Statistical Society Series C	Li, H.
Mathematical Methods in the Applied Sciences	Avanzi, B.
Mathematics	Wu, X.
MathSciNet	Li, S.
Methodology and Computing in Applied Probability	Li, S.
North American Actuarial Journal	Li, H., Wu, X., Zhou, R.
Plos One	Calderín, E.
Probability in the Engineering and Informational Sciences	Chen, P., Li, S.
Results in Applied Mathematics	Li, S.
Risk Management and Insurance Review	Calderín, E.
Risks	Avanzi, B., Pitt, D., Wu, X.
Scandinavian Actuarial Journal	Avanzi, B., Calderín, E., Chen, P., Li, H., Li, S.
Scientific Reports	Calderín, E.
Spanish Journal of Statistics	Calderín, E.

Conference and seminar presentations

Presenter	Topic	Conference
Avanzi, B.	Ensemble distributional forecasting for insurance loss reserving	Seminar presentation, One World Actuarial Research Seminar, Online. 1 June 2022
Avanzi, B.	On the mitigation of unwanted discrimination of multiple protected features via distance covariance regularisation	Workshop presentation, 2022 UNSW Workshop on Risk and Actuarial Frontiers, Sydney, Australia. 7 December 2022
Avanzi, B.	SPLICE: Synthetic data generation for loss experience	Conference presentation, 2022 All-Actuaries Summit: Getting closer, Thinking bigger, Melbourne, Australia. 4 May 2022
Avanzi, B.	An AI-driven Approach to Quantifying Model Error in Loss Reserving Generalised Linear Models	Conference presentation, 2022 All-Actuaries Summit: Getting closer, Thinking bigger, Melbourne, Australia. 4 May 2022
Avanzi, B.	Harnessing the power of “The Wisdom of Crowds”: How do we optimize the ensembling of different loss reserving models?	Conference presentation, 2022 All-Actuaries Summit: Getting closer, Thinking bigger, Melbourne, Australia. 4 May 2022
Avanzi, B.	Optimal reinsurance under terminal value constraints	Conference presentation, 2022 Virtual ASTIN/AFIR Colloquium, Online. 20–24 June 2022
Avanzi, B.	Stochastic Ensemble Loss Reserving	Conference presentation, 2022 Virtual ASTIN/AFIR Colloquium, Online. 20–24 June 2022
Avanzi, B.	Optimal reinsurance under terminal value constraints	Conference presentation, 25th International Congress on Insurance: Mathematics and Economics, Online. 15 July 2022

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| Avanzi, B. | Stochastic Ensemble Loss Reserving | Conference presentation,
25th International Congress on
Insurance: Mathematics and
Economics, Online. 15 July
2022 |
| Calderín, E. | Modeling time series of count with overdispersion
and bimodality based on INAR(1) model with
rBell innovations | Seminar presentation,
RISK2022, Universitat de
Barcelona. 20 October 2022 |
| Calderín, E. | Introducing a non-linear regression model in an
excess-of-loss reinsurance context | Seminar presentation,
RISK2022, Universitat de
Barcelona. 21 October 2022 |
| Chen, P. | A Supervised Mortality Learning | Conference presentation,
2022 Australasian Actuarial
Education and Research
Symposium, Australia. 24–25
November 2022 |
| Li, H. | Joint extremes in temperature and mortality: A
bivariate POT approach | Seminar presentation,
Ulm University, Germany. 6
July 2022 |
| Li, H. | Joint extremes in temperature and mortality: A
bivariate POT approach | Seminar presentation,
Technical University of
Munich, Germany. 22 June
2022 |
| Li, H. | Hierarchical Mortality Forecasting with EVT Tails:
An Application to Solvency Capital Requirement | Conference presentation,
The 42nd International
Symposium on Forecasting,
UK. 10–13 July 2022 |
| Li, H. | Impact of Climate Change upon Life Insurance | Conference presentation,
Convention A by EAA –
European Actuarial Academy,
Online. 22 September 2022 |
| Li, H. | Analyzing Geographical Variation in
Cause-of-Death Mortality for China | Invited speaker,
The 13th China Risk
Management and Actuarial
Forum (CRMAF), Online.
26–27 November 2022 |

Li, H.	COVID-19: Assessing Excess Mortality in Australia	Conference presentation, 2022 Australasian Actuarial Education and Research Symposium (AAERS), Canberra, Australia, Canberra, Australia. 24 November 2022
Li, H.	An EVT Approach to Quantifying Mortality Risk of Extreme Temperatures	Conference presentation, UNSW Workshop on Risk and Actuarial Frontiers, Sydney, Australia. 7 December 2022
Wu, X.	A comparative analysis of several multivariate zero-inflated and zero-modified models with applications in insurance	Seminar presentation, Shenzhen University, Online. 2 December 2022
Wu, X.	A comparative analysis of several multivariate zero-inflated and zero-modified models with applications in insurance	Invited speaker, Inaugural CUFÉ-MQ Online Workshop 2022, Online. 11 November 2022
Wu, X.	Multivariate zero-modified hurdle models in insurance	Seminar presentation, Institute and Faculty of Actuaries (IFoA, UK) Knowledge Sharing Session, Online. 28 January 2022
Zhou, R.	Model Risk in Pricing Wind Speed Derivatives.	Invited speaker, Fields-CFI Workshop on Impacts of Climate Change on Economics, Finance, and Insurance, Toronto. 21–23 September 2022

Engagement and professional activities

Professor Benjamin Avanzi is a member of the Advisory Board of the One World Actuarial Research Seminar (OWARS). He is also a member of the scientific committee of the Conference in Actuarial Science and Finance on Samos (Greece). In 2022 he became a fully qualified actuary in Switzerland (“Actuary SAA”), and a graduate of the Australian Institute of Company Directors (“GAICD”).

Professor David Pitt was an external examiner for a PhD thesis at Bond University. He also was an external referee for promotions at Macquarie University, as well as external referee for job applicants at The University of New South Wales. He continued as an external consultant to both government and industry. He was also an examiner for the Actuaries Institute Fellowship and Actuary programs.

Professor Shuanming Li was an external referee for academic promotion applications at Macquarie University, Australian National University, and Monash University.

Dr. Enrique Calderin was an external PhD examiner for a PhD thesis at the University of Cantabria, Spain. He is also a member of the Risk Analysis working group of Spanish Statistics and Research Society (SEIO).

Associate Professor Rui Zhou was an external examiner for Actuarial programs for the Chinese University of Hong Kong.

Associate Professor Xueyuan Wu was an external examiner for the Bachelor of Science (Hons) in Actuarial Studies at Sunway University in Malaysia. He was also a member of the Statistical Learning in Actuarial Applications Working Party of the Institute and Faculty of Actuaries (UK) in 2022. Xueyuan Wu reviewed a Postgraduate Research Scholarship Application from Xi’an Jiaotong-Liverpool University, China.

Associate Professor Han Li has been a member of the COVID-19 Mortality Working Group at the Actuaries Institute since July 2021.

Staff

Director of the Centre for Actuarial Studies

DAVID PITT:³ *BEC, BSc (Macquarie), PhD (ANU), FIAA*

³ D. Pitt Profile

Research interests: Income protection insurance, applied statistics, actuarial science, education

Professors of Actuarial Studies

BENJAMIN AVANZI:⁴ *Lic.Oec. (Lausanne), PhD (Lausanne), Actuary SAA, GAICD*

⁴ B. Avanzi Profile

Research interests: General insurance, Insurance capital modelling, Risk theory, Modelling and statistical analysis of big data, Social security and pensions, Risk modelling in operations management

SHUANMING LI:⁵ *BSc (Tianjin), MEd (Renmin), PhD (Concordia)*

⁵ S. Li Profile

Research interests: Risk and ruin theory, stochastic modelling in insurance and finance, actuarial science

DAVID PITT:⁶ *BEC, BSc (Macquarie), PhD (ANU), FIAA*

⁶ D. Pitt Profile

Research interests: Income protection insurance, applied statistics, actuarial science, education

Associate Professors of Actuarial Studies

HAN LI:⁷ *BCom (H) (UoM), PhD (Monash)*

⁷ H. Li Profile

Research interests: Longevity and mortality risks, ageing and retirement, climate change impact on insurance

PING CHEN:⁸ *BAM (Qufu), MSc (CAS), PhD (Hong Kong), AIAA*

⁸ P. Chen Profile

Research interests: Actuarial science, financial mathematics, statistics and information

XUEYUAN WU:⁹ *BS, MS (Nankai), PhD (Hong Kong), AIAA*

⁹ X. Wu Profile

Research interests: Risk and ruin theory, discrete-time risk models, phase-type distributions in risk theory

RUI ZHOU:¹⁰ *BSc (Remin), MMath (Waterloo), PhD (Waterloo), FSA, ACIA*

¹⁰ R. Zhou Profile

Research interest: Longevity/mortality risk measurement and management, mortality modeling and forecasting, longevity annuity, weather derivatives

Senior Lecturers in Actuarial Studies

ENRIQUE CALDERIN:¹¹ *BS, MS (UNED, Spain), PhD (ULPGC, Spain)*

¹¹ E. Calderin Profile

Research interests: Bayesian inference, statistical robustness, distribution theory, actuarial statistics

Honorary Senior Fellow

DAVID HEATH: *BEd (Hons) (Monash), FIAA, CPA, FFin*

External Lecturers

ANDREW BROWN: *BSc, DipEd (Melbourne), FIAA, FFin*

DONALD CAMPBELL: *BCom (Melbourne), FIAA*

ANDREW GALE: *BSc (Melbourne), FIAA*

GENEVIEVE HAYES, *BActS (Hons), BComm, MSCS, PhD, FIAA*

External Examiners for the Actuary Program

NIKI APPLETON (Actuarial Practice and Control I and II)

Appendix

Undergraduate subjects

Subject Code	Subject Title
ACTL10001	Introduction to Actuarial Studies
ACTL20001	Introductory Financial Mathematics
ACTL20003	Stochastic Techniques in Insurance
ACTL20004	Topics in Actuarial Studies
ACTL30001	Actuarial Modelling I
ACTL30002	Actuarial Modelling II
ACTL30003	Contingencies
ACTL30004	Actuarial Statistics
ACTL30006	Intermediate Financial Mathematics
ACTL30007	Actuarial Modelling III
ACTL30008	Actuarial Analytics and Data I
ACTL40001	Actuarial Studies Research Essay
ACTL40002	Risk Theory I
ACTL40004	Advanced Financial Mathematics
ACTL40006	Actuarial Practice and Control I
ACTL40007	Actuarial Practice and Control II
ACTL40010	Actuarial Studies Projects Part 1
ACTL40011	Actuarial Studies Projects Part 2
ACTL40012	Actuarial Analytics and Data II

Postgraduate subjects

Subject Code	Subject Title
ACTL90001	Mathematics of Finance I
ACTL90002	Mathematics of Finance II
ACTL90003	Mathematics of Finance III
ACTL90004	Insurance Risk Models
ACTL90005	Life Contingencies
ACTL90006	Life Insurance Models 1
ACTL90007	Life Insurance Models 2
ACTL90008	Statistical Techniques in Insurance
ACTL90010	Actuarial Practice and Control I
ACTL90011	Actuarial Practice and Control II
ACTL90013	Actuarial Studies Projects
ACTL90016	Actuarial Science Research Report Part 1
ACTL90017	Actuarial Science Research Report Part 2
ACTL90018	General Insurance Practice
ACTL90019	Data Analytics in Insurance 2
ACTL90020	General Insurance Modelling
ACTL90021	Topics in Insurance and Finance
ACTL90022	Economics for Actuaries
ACTL90023	Data Analytics in Insurance 1
ACTL90024	Actuarial Studies Projects - Part 2

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