



ACST862

General Insurance Pricing and Reserving

S2 Day 2019

Department of Actuarial Studies and Business Analytics

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General Information

Unit convenor and teaching staff

Unit Convener

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Contact via email

E4A616

Please refer to the i-Learn announcement.

Lecturer

Han Li

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Contact via email

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Please refer to the i-Learn announcement.

Credit points

4

Prerequisites

STAT806 or STAT810

Corequisites

Co-badged status

Unit description

This unit examines the use of statistical models in the general insurance context. Applications will include methods of estimating reserves for future insurance payments, generalised linear models and time series models.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

Describe and apply important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving, and manage to perform statistical analyses relevant to this unit using the statistical package R.

Explain basic theories and methodologies of time series model building and forecasting as well as their applications

Describe and apply some important theories and techniques of generalized linear models (GLMs)

Apply deterministic and stochastic methods for calculating outstanding claims provisions in general insurance

Use run-off triangles for claims reserving and prediction

General Assessment Information

- **Criteria and standards for grading**
 - Numerically correct answers based on correct reasoning
 - Assessment criteria for all assessment tasks will be provided on the unit iLearn site.
- **Submission methods**
 - Assignments are submitted via iLearn
 - The class test is in class in Week 7
- **Late assessments, extensions, penalties, resubmissions**
 - **Tasks 10% or less** – No extensions will be granted. Students who have not submitted the task prior to the deadline will be awarded a mark of 0 for the task, except for cases in which an application for special consideration is made and approved.
 - **Tasks above 10%** – No extensions will be granted. There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply for cases in which an application for special consideration is made and approved. No submission will be accepted after solutions have been posted.
- **Midterm and Final examination conditions.**
 - Non-programmable calculators with no text-retrieval capacity are allowed
 - No dictionaries permitted
 - You are permitted ONE A4 page of paper containing reference material printed on both sides. The material may be handwritten or typed. The page will not be returned to you at the end of the final examination.
- **Availability of marks**

- It is the responsibility of students to view their marks for each within session assessment on iLearn within 20 working days of posting. If there are any discrepancies, students must contact the unit convenor immediately. Failure to do so will mean that queries received after the release of final results regarding assessment marks (not including the final exam mark) will not be addressed.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Early Assessment Quiz</u>	5%	No	Week 3
<u>Class Test</u>	20%	No	Week 7
<u>Assignment</u>	15%	No	Week 10
<u>Final Examination</u>	60%	No	In the university exam period

Early Assessment Quiz

Due: **Week 3**

Weighting: **5%**

1. This will be an online quiz with five multiple choices questions.
2. It is envisaged that the online quiz will cover all materials in Weeks 1-2.
3. Please use the quiz as an indicator of whether you are progressing satisfactorily in the unit. If you are having difficulties, please see the Unit Convener and consider withdrawing before the census date in week 4.

On successful completion you will be able to:

- Describe and apply important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving, and manage to perform statistical analyses relevant to this unit using the statistical package R.
- Describe and apply some important theories and techniques of generalized linear models (GLMs)

Class Test

Due: **Week 7**

Weighting: **20%**

1. It is envisaged that the class test will cover all materials from Week 1 to Week 5.
2. The class test will be held in the lecture.

On successful completion you will be able to:

- Describe and apply important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving, and manage to perform statistical analyses relevant to this unit using the statistical package R.
- Describe and apply some important theories and techniques of generalized linear models (GLMs)
- Use run-off triangles for claims reserving and prediction

Assignment

Due: **Week 10**

Weighting: **15%**

1. This will be a written assignment that will require use of the software package R.
2. The assignment must be done individually and must be your own work.
3. Further details will be provided on iLearn.

On successful completion you will be able to:

- Describe and apply important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving, and manage to perform statistical analyses relevant to this unit using the statistical package R.
- Explain basic theories and methodologies of time series model building and forecasting as well as their applications
- Describe and apply some important theories and techniques of generalized linear models (GLMs)
- Apply deterministic and stochastic methods for calculating outstanding claims provisions in general insurance
- Use run-off triangles for claims reserving and prediction

Final Examination

Due: **In the university exam period**

Weighting: **60%**

It is envisaged that the final examination will cover all materials in the unit.

On successful completion you will be able to:

- Describe and apply important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving, and manage to perform statistical analyses relevant to this unit using the statistical package R.
- Explain basic theories and methodologies of time series model building and forecasting as well as their applications
- Describe and apply some important theories and techniques of generalized linear models (GLMs)
- Apply deterministic and stochastic methods for calculating outstanding claims provisions in general insurance
- Use run-off triangles for claims reserving and prediction

Delivery and Resources

Classes

The timetable for classes can be found on the University web site at:

<https://timetables.mq.edu.au/2019/>

Required and Recommended Texts and/or Materials

Required texts

A set of lecture notes and study pack including tutorial exercises and R examples are available for downloading from the ACST357/862 teaching website.

Optional ActEd material

The ActEd CT6 are not set as required or recommended reading for this unit, since the lecture notes are comprehensive and detailed.

Other useful references:

- Generalized linear models for Insurance Data. Cambridge University Press: Cambridge.
- Hossack, I.B., Pollard J.H, and Zehnwirth, B. (1999). Introductory statistics with applications in general insurance, second edition. Cambridge University Press: Cambridge.
- De Jong, P. and Heller, G.Z., (2008). Generalized linear models for Insurance Data. Cambridge University Press: Cambridge.
- Casualty Actuarial Society. (2001). Foundations of Casualty Actuarial Science, 4th edition. Casualty Actuarial Society.
- Kaas, R., Goovaerts, M., Dhaene, J. and Denuit, M. (2009). Modern actuarial risk theory using R, 2nd edition. Springer.

Some additional references will be listed in the lecture notes.

Technology Used and Required

- Latex, PDF, Word and Excel are used for preparing the lecture and tutorial materials.
- The R statistical software package will be used throughout the unit. Excel may also be used in the unit.
- Students will be required to use a non-programmable calculator in the final examination and during the in-class test.

Unit Web Page

To access the website, go to <http://ilearn.mq.edu.au> and login using your usual login and password.

Teaching and Learning Strategy

- The unit is taught using three hours of lectures and a weekly tutorial. Tutorials will commence in Week 2.
- Concepts and examples (including computing examples in R using real datasets in finance and insurance) will be discussed in the lectures.
- Problem sets will be discussed in tutorials.
- You are expected to read lecture materials in advance of the lectures and to participate actively in the tutorial classes.

What has changed since the previous offering of this unit?

Unit Guides, Lectures, Tutorials and Assessments Materials (Whenever Applicable)

Unit Schedule

Week Number	Week Beginning Monday	Topic and Notes	Tutorial
1	29 July	Introduction to GLMs	No tutorial
2	5 August	GLMs	Tutorial Set 1
3	12 August	GLMs	Tutorial Set 2
4	19 August	GLMs	Tutorial Set 3
5	26 August	1. GLMs 2. Introduction to Claim Reserving	Tutorial Set 4
6	2 September	Outstanding Claims	Tutorial Set 5
7	9 September	1. Class Test 2. Outstanding Claims	No tutorial
STUDY BREAK		No classes No classes	STUDY BREAK
8	30 September	Outstanding Claims	Tutorial Set 6
9	7 October	Intro to Time Series	Tutorial Set 7
10	14 October	Time Series	Tutorial Set 8
11	21 October	Time Series	Tutorial Set 9
12	28 October	Time Series	Tutorial Set 10
13	4 November	Revision	Tutorial Set 11

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)

- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Supplementary exams

Information regarding supplementary exams, including dates, is available at:
http://www.businessandconomics.mq.edu.au/current_students/undergraduate/how_do_i/disruption_to_studies

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Describe and apply important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving, and manage to perform statistical analyses relevant to this unit using the statistical package R.
- Explain basic theories and methodologies of time series model building and forecasting as well as their applications
- Describe and apply some important theories and techniques of generalized linear models (GLMs)
- Apply deterministic and stochastic methods for calculating outstanding claims provisions in general insurance
- Use run-off triangles for claims reserving and prediction

Assessment tasks

- Early Assessment Quiz
- Class Test
- Assignment

- Final Examination

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Describe and apply important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving, and manage to perform statistical analyses relevant to this unit using the statistical package R.
- Explain basic theories and methodologies of time series model building and forecasting as well as their applications
- Describe and apply some important theories and techniques of generalized linear models (GLMs)
- Apply deterministic and stochastic methods for calculating outstanding claims provisions in general insurance
- Use run-off triangles for claims reserving and prediction

Assessment tasks

- Early Assessment Quiz
- Class Test
- Assignment
- Final Examination

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Describe and apply important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving, and manage to perform statistical analyses relevant to this unit using the statistical package R.

- Explain basic theories and methodologies of time series model building and forecasting as well as their applications
- Describe and apply some important theories and techniques of generalized linear models (GLMs)
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Assessment tasks

- Early Assessment Quiz
- Class Test
- Assignment
- Final Examination

Research and Practice

Research and Practice

The student will learn some basic theories and methodologies in time series analysis, generalized linear models and run-off triangles which are expected to be useful for researching and practising general insurance pricing and reserving.