ACST862

General Insurance Pricing and Reserving

S2 Day 2016

Dept of Applied Finance and Actuarial Studies

Contents

Disclaimer

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General Information

Unit convenor and teaching staff
Unit Convenor
Ken Siu
Ken.Siu@mq.edu.au
Contact via email
E4A618
Please refer to the i-Learn announcement.

Credit points
4

Prerequisites
STAT806 or STAT810(P)

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:

> Solid understanding of some important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving

> Manage to perform statistical analyses relevant to this unit using the statistical package R

> Understand both theories and methodologies on time series model building and forecasting as well as their applications

> Deep understanding of some important theories and techniques of generalized linear models (GLMs)

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

Learn how to use run-off triangles for claims reserving and prediction

General Assessment Information

- **Criteria and standards for grading**

  - **N**umerically 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
  - Midterm is in class in Week 8

- **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 disruptions to studies 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 disruption of studies is made and approved. No submission will be accepted after solutions have been posted.

- **Midterm and Final examination conditions.**

  - 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 at the end of the midterm or final examination.
  - 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.

- **Supplementary Exams.** Further information regarding supplementary exams, including dates, is available here *http://www.businessandeconomics.mq.edu.au/current_students/ undergraduate/how_do_i/special_consideration*

Assessment Tasks

Name	Weighting	Due
Early Assessment Quiz	5%	Week 3
Class Test	35%	Week 8
Final Examination	60%	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. Class test under Midterm and Final examination conditions described in the general assessment information section

4. 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 Convenor and consider withdrawing before the census date on Friday of week 4.

On successful completion you will be able to:
- Solid understanding of some important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving
- Understand both theories and methodologies on time series model building and forecasting as well as their applications

Class Test

Due: **Week 8**
Weighting: **35%**

1. Non-programmable calculators with no text-retrieval capacity are allowed.

2. No dictionaries permitted.

3. One A4 sheet of notes double-sized (typed or handwritten) permitted.

4. It is envisaged that the class test will cover all materials from Week 1 to Week 7.

5. Class test under Midterm and Final examination conditions described in the general assessment information section.

6. Additional question(s) will be given in the class test for students taking ACST 862.

On successful completion you will be able to:

- Solid understanding of some important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving
- Manage to perform statistical analyses relevant to this unit using the statistical package R
- Understand both theories and methodologies on time series model building and forecasting as well as their applications
- Deep understanding of some important theories and techniques of generalized linear models (GLMs)

Final Examination

Due: **In the university exam period**
Weighting: **60%**

1. Non-programmable calculators with no text-retrieval capacity are allowed.

2. No dictionaries permitted.

3. One A4 sheet of notes double-sized (typed or handwritten) permitted.

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

5. Class test under Midterm and Final examination conditions described in the general assessment information section.

On successful completion you will be able to:

- Solid understanding of some important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving
- Manage to perform statistical analyses relevant to this unit using the statistical package R
- Understand both theories and methodologies on time series model building and forecasting as well as their applications
- Deep understanding of some important theories and techniques of generalized linear models (GLMs)
- Apply deterministic and stochastic methods for calculating outstanding claims provisions in general insurance
- Learn how to 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 www.timetables.mq.edu.au.

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.
- 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?

Lecture notes, tutorial exercises, assessment components

Unit Schedule

Week Number	Week Beginning Monday	Topic and Notes	Tutorial
1		Time Series: Introduction; Stationary Time Series; ACF and PACF	No tutorial
2		Time Series: Autoregressive (AR) Models; Moving Average (MA) Models; Autoregressive Integrated Moving Average (ARIMA) Models	Tutorial Set 1
3		1. Time Series Box Jenkin Algorithm I: Identification and Estimation 2. Online Quiz	Tutorial Set 2
4		Time Series: Box Jenkin Algorithm II: Diagnostic Checking and Prediction	Tutorial Set 3
5		GLMs: Review of Linear Regression; Introduction to GLMs	Tutorial Set 4
6		GLMs: Exponential Family Linear Predictor; Link Function	Tutorial Set 5
7		GLMs: Model Fitting, Selection and Analysis of Residuals	Tutorial Set 6
STUDY BREAK		No classes No classes	STUDY BREAK

8		1. Class Test	Revision
		2. Introduction to Claim Reserving	
9		Introduction to Claim Reserving	Tutorial Set 7
10		Outstanding Claims (deterministic)	Tutorial Set 8
11		Outstanding Claims (deterministic)	Tutorial Set 9
12		Outstanding Claims (stochastic)	Tutorial Set 10
13		1. Outstanding Claims (stochastic)	Tutorial Set 11
		2. Revision	

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of 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/support/student_conduct/

Results

Results shown in *iLearn*, 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.

Supplementary exams

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

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

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

- Solid understanding of some important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving
- Manage to perform statistical analyses relevant to this unit using the statistical package R
- Understand both theories and methodologies on time series model building and forecasting as well as their applications
- Deep understanding of some important theories and techniques of generalized linear models (GLMs)
- Apply deterministic and stochastic methods for calculating outstanding claims provisions in general insurance
- Learn how to use run-off triangles for claims reserving and prediction

Assessment tasks

- Early Assessment Quiz
- Class Test
- 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

- Solid understanding of some important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving
- Manage to perform statistical analyses relevant to this unit using the statistical package R
- Understand both theories and methodologies on time series model building and forecasting as well as their applications
- Deep understanding of some important theories and techniques of generalized linear models (GLMs)
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in general insurance

- Learn how to use run-off triangles for claims reserving and prediction

Assessment tasks

- Early Assessment Quiz
- Class Test
- 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

- Solid understanding of some important techniques used by actuaries to perform analysis and modelling in general insurance pricing and reserving
- Manage to perform statistical analyses relevant to this unit using the statistical package R
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- Deep understanding of some important theories and techniques of generalized linear models (GLMs)
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Assessment tasks

- Early Assessment Quiz
- Class Test
- 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.

Changes since First Published

Date	Description
21/07/2016	Assessment Tasks - Early Assessment Quiz