



ACST255

Contingent Payments 1

S2 Day 2015

Dept of Applied Finance and Actuarial Studies

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Disclaimer

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General Information

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Lecturer

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Credit points

3

Prerequisites

Admission to BActStud and ACST152 and ACST202 and STAT272 and GPA of 2.5 (out of 4.0)

Corequisites

Co-badged status

Unit description

This unit covers the analysis of cash flows dependent on uncertain events due to mortality and other factors. It introduces the concept of the expected present value of payments under various life insurance contracts, including whole life, term and endowment assurances; immediate and temporary annuities; and deferred assurances and annuities. The standard international actuarial notation in life insurance is used extensively. Probability models and life tables are used to calculate the expected present values accurately based on ultimate or select mortality. Furthermore, important concepts of pricing and reserving for future contingent liabilities are discussed. Equations of value are established to calculate net premiums. Prospective and retrospective net premium reserves required to meet future liabilities are determined and compared. The concepts and methods are then extended to gross premiums and reserves that make allowance for profits and expenses. Students gaining a grade of credit or higher in both ACST255 and ACST355 are eligible for exemption from subject CT5 of the professional exams of the Institute of Actuaries of Australia.

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:

Understand simple survival models and related properties

Be able to calculate expected present values and variances of benefits for simple life insurance contracts.

Understand the concepts of select and ultimate mortality rates and their applications

Be able to calculate premiums for various life insurance contracts, both with and without allowance for operating expenses.

Be able to calculate policy values for various life insurance contracts, both with and without allowance for operating expenses.

Be able to analyse the profit arising from life insurance contracts in simple scenarios.

General Assessment Information

Macquarie University uses the grades HD, D, Cr, P and F for grading the achievements of students in units of study. The meaning of each symbol is explained in the grading policy at

<http://www.mq.edu.au/policy/docs/grading/policy.html>

A Standardised Numerical Grade (SNG) gives you an indication of how you have performed within the band for your descriptive grade. The SNG is not a mark, and you may not be able to work it out based on your raw examination and other assessment marks. Nor are you able to determine you are "one mark away" from a different grade.

When you work as an actuary or in any other profession, if you have a dangerous misunderstanding of a concept you may provide incorrect advice to a client, possibly with severe financial consequences for your client and yourself. However, if you realise that you don't understand a concept you may refrain from giving advice on it until you have filled the gaps in your knowledge. That is, dangerous misunderstandings have more serious consequences than a recognised lack of knowledge.

The grading philosophy and marking scales adopted in this unit (and in many other university units) reflect this situation. Correct relevant statements earn marks. Statements revealing dangerous misunderstandings result in the deduction of marks. If your answers reveal that your misunderstandings are very severe or numerous, you might earn a negative mark for a question. If a part of a question is worth x marks, the smallest mark you can be allocated for that part is $-x$ marks.

As an example, a minor error when keying numbers into your calculator is not usually regarded as a dangerous error provided the resulting incorrect answer is plausible. However, if a calculator

error results in an obviously unreasonable answer, such as an expected present value of benefits which exceeds the maximum possible benefit, and you fail to state that you realise this answer is unreasonable, this would be regarded as a dangerous misunderstanding.

Assessment Tasks

Name	Weighting	Due
<u>Online Quiz 1</u>	5%	17/08/2015 11:59pm
<u>Online Quiz 2</u>	5%	31/08/2015 11:59pm
<u>Assignment</u>	20%	19/10/2015 12 noon
<u>Final Examination</u>	70%	Exam period

Online Quiz 1

Due: **17/08/2015 11:59pm**

Weighting: **5%**

Online quiz on Week 1 and 2 lectures.

You should complete the quizzes online. They are on this unit's iLearn web site.

In answering the online quizzes, you may consult your notes or any textbooks you like, but you may not seek assistance from any humans in any way whatsoever. This includes seeking assistance in interpreting what the questions mean. You should not discuss any of the quiz questions with any of your class mates until after the deadline for submitting the quiz has passed, even if you have already submitted the quiz and so can no longer change your answers, because you cannot be sure whether your class mates have submitted their quiz.

Once you start a quiz, you have a maximum of 2 hours to complete it. This quiz becomes available at 12:01 am on Friday 14 August and becomes unavailable at 11:59pm on Monday 17 August. That is, the quiz is available for 2 minutes less than 4 days. (We are avoiding using midnight as a cutoff time due to confusion as to whether "midnight Wednesday" means "midnight at the start of Wednesday" or "midnight at the end of Wednesday".) You may start the quiz anytime within that range, but if you start it within 2 hours of the end of that range then it still closes at the end of that range, meaning you get less than 2 hours to complete it. The days on which the quizzes open and close can also be viewed on the calendar tool within iLearn.

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.

On successful completion you will be able to:

- Understand simple survival models and related properties
- Be able to calculate expected present values and variances of benefits for simple life

insurance contracts.

Online Quiz 2

Due: **31/08/2015 11:59pm**

Weighting: **5%**

Online quiz on Week 3 and 4 lectures.

See the description of Online Quiz 1 for general information that applies to both quizzes.

This quiz becomes available at 12:01 am on Friday 28 August and becomes unavailable at 11:59pm on Monday 31 August. As for the first quiz, a 2 hour limit applies.

On successful completion you will be able to:

- Understand simple survival models and related properties
- Be able to calculate expected present values and variances of benefits for simple life insurance contracts.
- Understand the concepts of select and ultimate mortality rates and their applications

Assignment

Due: **19/10/2015 12 noon**

Weighting: **20%**

The assignment involves using a spreadsheet to investigate the differences between a range of approximations for life annuities with payments more frequently than annually.

Assignments should be submitted to the assignment box at BESS (E4B 106).

No extensions will be granted. Late tasks will be accepted up to 72 hours after the submission deadline. There will be a deduction of 20% 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 – 40% penalty). This penalty does not apply for cases in which an application for special consideration is made and approved.

On successful completion you will be able to:

- Be able to calculate expected present values and variances of benefits for simple life insurance contracts.
- Understand the concepts of select and ultimate mortality rates and their applications

Final Examination

Due: **Exam period**

Weighting: **70%**

To be eligible for a passing grade in this unit a pass is required in the final examination.

Students are permitted to use non-programmable calculators with no text-retrieval capacity.

The Macquarie University examination policy details the principles and conduct of examinations at the University. The policy is available at: <http://www.mq.edu.au/policy/docs/examination/policy.htm>

In the exam, you are required to write your answers on the ruled (right hand) pages of the answer booklet provided. Anything written on the unruled (left hand) pages will not be marked.

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 final examination.

On successful completion you will be able to:

- Understand simple survival models and related properties
- Be able to calculate expected present values and variances of benefits for simple life insurance contracts.
- Understand the concepts of select and ultimate mortality rates and their applications
- Be able to calculate premiums for various life insurance contracts, both with and without allowance for operating expenses.
- Be able to calculate policy values for various life insurance contracts, both with and without allowance for operating expenses.
- Be able to analyse the profit arising from life insurance contracts in simple scenarios.

Delivery and Resources

Classes

There are 4 hours of face-to-face teaching per week consisting of 3 hours of lectures and 1 hour of tutorial.

Class times can be found at: <http://www.timetables.mq.edu.au/>

Required and Recommended Texts and/or Materials

No textbooks are prescribed for this unit. Detailed notes, exercises and solutions are available on the unit's web site. If you want additional printed resources, you could purchase the ActEd CT5 notes.

Technology Used and Required

You will require a calculator. For the final exam, you may only use non-programmable calculators which are not able to store text. You may find it useful to be able to construct spreadsheets to verify your solutions to tutorial exercises. You will also be required to use a spreadsheet for the assignment. We do not prescribe any particular brand of spreadsheet.

You require access to a computer to access material on the unit's iLearn web site.

Unit Web Site

The web site for this unit can be accessed at <http://ilearn.mq.edu.au>

Unit Schedule

Since students often seem to print the schedule of topics, it is provided as a separate printer-friendly document in the administration section of this unit's iLearn web site.

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

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

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

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.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

Further information regarding supplementary exams, including dates, is available here

http://www.businessandeconomics.mq.edu.au/current_students/undergraduate/how_do_i/disrupt_ion_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

IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

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

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Assessment task

- Assignment

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where

relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Understand simple survival models and related properties
- Be able to calculate expected present values and variances of benefits for simple life insurance contracts.
- Understand the concepts of select and ultimate mortality rates and their applications
- Be able to calculate premiums for various life insurance contracts, both with and without allowance for operating expenses.
- Be able to calculate policy values for various life insurance contracts, both with and without allowance for operating expenses.
- Be able to analyse the profit arising from life insurance contracts in simple scenarios.

Assessment tasks

- Online Quiz 1
- Online Quiz 2
- Assignment
- Final Examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Understand simple survival models and related properties
- Be able to calculate expected present values and variances of benefits for simple life insurance contracts.
- Understand the concepts of select and ultimate mortality rates and their applications
- Be able to calculate premiums for various life insurance contracts, both with and without allowance for operating expenses.
- Be able to calculate policy values for various life insurance contracts, both with and

without allowance for operating expenses.

- Be able to analyse the profit arising from life insurance contracts in simple scenarios.

Assessment tasks

- Online Quiz 1
- Online Quiz 2
- Assignment
- Final Examination

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Understand simple survival models and related properties
- Be able to calculate expected present values and variances of benefits for simple life insurance contracts.
- Understand the concepts of select and ultimate mortality rates and their applications
- Be able to calculate premiums for various life insurance contracts, both with and without allowance for operating expenses.
- Be able to calculate policy values for various life insurance contracts, both with and without allowance for operating expenses.
- Be able to analyse the profit arising from life insurance contracts in simple scenarios.

Assessment tasks

- Online Quiz 1
- Online Quiz 2
- Assignment
- Final Examination

Research and Practice, Global and Sustainability

Survival analysis and the valuation of contingent payments has a long history. The techniques we are using can be found in textbooks on mathematics of finance, rather than needing to source recent research papers.

While some topics in this unit will use Australian jargon and mention Australian market features,

the mathematical concepts in this unit are independent of any legislative constraints and so do not recognise national or planetary boundaries.