ACST851

Mathematics of Finance

S2 Day 2014

Applied Finance and Actuarial Studies

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
Jim Farmer
jim.farmer@mq.edu.au
Contact via jim.farmer@mq.edu.au
E4A 616
Refer to the unit's web site

Credit points
4

Prerequisites
(ACST603 and ACST604) or admission to MActPrac prior to 2011

Corequisites

Co-badged status

Unit description
This unit provides a rigorous mathematical development of compound interest theory, using calculus where appropriate. Topics include the force of interest and its relationship to interest rates, inflation and capital gains tax, discrete and continuous term certain annuities, project appraisal, loans, bonds, yield curves, matching and immunisation, pricing by the 'no arbitrage' assumption, and forward rate agreements. Students are assumed to be able to use the basic functionality of a spreadsheet package of their choice.

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:

Be able to demonstrate a deep understanding of compound interest theory.

Be able to demonstrate a deep understanding of the use of annuities.

Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves & use of the “no arbitrage” pricing method, forward contracts and immunisation theory.

Be able to use spreadsheets to efficiently solve computationally challenging problems.

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

Assessment Tasks

Name	Weighting	Due
Quizzes	15%	Various over Weeks 2 to 6
Assignment	15%	Monday 27 October 10am.
Final Examination	70%	Standard exam period

Quizzes

Due: **Various over Weeks 2 to 6**
Weighting: **15%**

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

There are 6 quizzes covering topics 1 to 6. The quiz for a topic becomes available at 12:01am on the day after the tutorial on that topic, and closes at 11:59pm on the day before the next tutorial. That is, each quiz is available for 2 minutes less than 6 days.

Your total quiz mark is simply the sum of your marks from each quiz. Since the quizzes have different numbers of questions, this means the quizzes are not equally weighted in the assessment.

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:

- Be able to demonstrate a deep understanding of compound interest theory.
- Be able to demonstrate a deep understanding of the use of annuities.

Assignment

Due: **Monday 27 October 10am.**
Weighting: **15%**

The assignment must be submitted to the lecturer at any class by Monday 27 October 10am.

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:

- Be able to demonstrate a deep understanding of compound interest theory.
- Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves & use of the “no arbitrage” pricing method, forward contracts and immunisation theory.
- Be able to use spreadsheets to efficiently solve computationally challenging problems.

Final Examination

Due: **Standard 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

On successful completion you will be able to:

- Be able to demonstrate a deep understanding of compound interest theory.
- Be able to demonstrate a deep understanding of the use of annuities.
- Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves & use of the “no arbitrage” pricing method, forward contracts and immunisation theory.

Delivery and Resources

Classes

There are 5 hours of face-to-face teaching per week consisting of 3 hours of lectures and 2 hours 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. The web site also contains a list of all textbooks we are aware of covering significant amounts of the material in this unit.

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

Teaching and Learning Activities

This unit is taught via lectures and tutorials. However, a significant amount of the lecture time will be spent on attempting problems. The emphasis is on learning by doing.

Unit Schedule

The unit's iLearn web site contains a version of this schedule with clearer formatting.

Week	Week Begins	Topics Covered in Lectures
1	4 Aug	0. Preliminaries. (Reading only) 1. Interest Rates – Discrete time scenarios
2	11 Aug	2. Inflation and Capital Gains Tax 3. Forces of Interest – Continuous time scenarios
3	18 Aug	4. Level Annuities
4	25 Aug	5. Varying Annuities Sunday 31 August – Census Date
5	1 Sep	6. Loans
6	8 Sep	7. Project Appraisal
7	15 Sep	10. Bonds
2-week study break		
8	6 Oct	8. Measuring Investment Performance Public Holiday Monday 9. Investments and Industry Jargon (Reading only)
9	13 Oct	11. Yield Curves

10	20 Oct	12. Forward Contracts
11	27 Oct	13. Bond Statistics
12	3 Nov	14. Immunisation
13	10 Nov	

Topics 8 to 10 have been reordered to work around the lost lectures in Week 8.

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/

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

Student Support

Macquarie University provides a range of support services for students. For details, visit http://stu

dents.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

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

- Be able to demonstrate a deep understanding of compound interest theory.
- Be able to demonstrate a deep understanding of the use of annuities.
- Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves & use of the “no arbitrage” pricing method, forward contracts and immunisation theory.
- Be able to use spreadsheets to efficiently solve computationally challenging problems.

Assessment tasks

- Quizzes
- 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

- Be able to demonstrate a deep understanding of compound interest theory.
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- Be able to demonstrate application of the above concepts to a range of practical problems in finance, including loans, analysis of investment projects, valuation of fixed interest securities, including the use of yield curves & use of the “no arbitrage” pricing method, forward contracts and immunisation theory.
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Assessment tasks

- Quizzes
- Assignment
- Final Examination

Changes from Previous Offering

Nil.

Research and Practice

Mathematics of finance has a long history. Most of the mathematical theory used in this unit was developed over a century ago. Hence the research we are using can be found in textbooks on mathematics of finance, rather than needing to source recent research papers.

The development of computers in the 1960s, cheap electronic calculators in the 1970s and spreadsheets in the 1980s revolutionised the subject of mathematics of finance. Before computers many maths of finance problems were conceptually simple but the sheer length of the calculations required made exact calculations expensive to implement, and many clever approximate techniques were developed to work around this. Now, many approximate

techniques are not required, since computers can easily implement the lengthy calculations required to apply the theory exactly. While a textbook from 50 years ago might contain many concepts that are now irrelevant, it probably also contains most of the theory we still need for this unit.

Computers did also lead to the development of new ideas in mathematics of finance, notably in stochastic modelling. That new material mostly falls in the more advanced units ACST816 and ACST817 rather than in this introductory unit.