AFIN270

Stochastic Methods in Applied Finance

S1 Day 2019

Department of Applied Finance

Contents

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General Information

Unit convenor and teaching staff
Unit Convenor and Lecturer
Poon Leung
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Contact via Email
By appointment

Credit points
3

Prerequisites
15cp at 100 level or above including (AFIN100 or AFIN102 or ACST152) and (STAT150 or STAT170 or STAT171)

Corequisites

Co-badged status

Unit description
The applied finance discipline has become more reliant on quantitative analysis in recent years. Increasingly, models employed by practitioners and researchers are based on assumptions about the stochastic properties of financial variables and time series. This unit covers a variety of stochastic models for use in applied finance and includes extensive use of Excel spreadsheets. The topics include discrete and continuous probability distributions, extreme events, joint probability distributions, copulas, Bayesian analysis, regression models, time series models, and risk-neutral pricing.

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:

Use a range of probability distributions to model different financial variables

Assess the dependence between financial variables with suitable statistical tools

Apply regression models and time series models to various financial time series

Understand the basic concepts of no-arbitrage principle and risk-neutral pricing

Perform mathematical computations on Excel spreadsheets for practical problems

General Assessment Information

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 criteria for all assessment tasks will be provided on the unit iLearn site.

Assessment Tasks

Name	Weighting	Hurdle	Due
Online Quiz	5%	No	Week 3
Class Test	20%	No	Week 8
Assignment	15%	No	Week 10
Final Exam	60%	No	Exam Period

Online Quiz

Due: **Week 3**
Weighting: **5%**

Task Description:
The online quiz will be conducted through iLearn and consist of multiple choice questions, and calculation based questions, where a numerical value will need to be entered.

Type of Collaboration: Individual **Submission:** iLearn **Format:** Multiple Choice and Calculations **Length:** Refer to iLearn. **Late Submission:** No extensions will be granted. Students who miss the deadline for the Online Quiz will be awarded a mark of zero (0), except for cases in which an application for special consideration is made and approved.
On successful completion you will be able to:

• Use a range of probability distributions to model different financial variables

Class Test

Due: **Week 8**
Weighting: **20%**

Task Description:
The class test covers the Excel applications in Week 1 to Week 6. Use of the Internet during the

test is not permitted. Marks will be granted for accuracy and clarity of the work submitted.

You are permitted one (1) 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 class test.

Type of Collaboration: Individual **Submission:** The class test will be conducted in the tutorial **Format:** Refer to iLearn. **Length:** Students will have one (1) hour to complete the test and submit their spreadsheets. **Late Submission:** Students who do not attend the class test will be awarded a mark of zero (0) for the test, except for cases in which an application for special consideration is made and approved.

On successful completion you will be able to:

- Use a range of probability distributions to model different financial variables

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Assignment

Due: **Week 10**
Weighting: **15%**

Task Description:

The assignment will cover material from Week 1 to Week 9 inclusive. Students will be given a list of questions to answer.

Type of Collaboration: Individual **Submission:** iLearn **Format:** PDF file **Length:** Refer to iLearn. **Late Submission:**

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 - 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.

On successful completion you will be able to:

- Use a range of probability distributions to model different financial variables

- Assess the dependence between financial variables with suitable statistical tools

- Apply regression models and time series models to various financial time series

- Understand the basic concepts of no-arbitrage principle and risk-neutral pricing

Final Exam

Due: **Exam Period**
Weighting: **60%**

Task Description:
A two-hour (2) written exam will be held during the normal university exam period. Questions will cover the entire unit. Marks will be granted for accuracy and clarity of the work shown.

You are permitted one (1) 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 exam. Non-programmable calculators with no text-retrieval capacity are permitted.

Type of Collaboration: Individual **Submission:** In class during examination period **Format:** Refer to iLearn. **Length:** Two-hour (2) written exam **Inherent Task Requirements:** Refer to iLearn. **Late Submission:** Students who do not attend the final exam will be awarded a mark of zero (0) for the exam, except for cases in which an application for special consideration is made and approved.

On successful completion you will be able to:

- Use a range of probability distributions to model different financial variables
- Assess the dependence between financial variables with suitable statistical tools
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- Perform mathematical computations on Excel spreadsheets for practical problems

Delivery and Resources

Recommended Text:	Rachev S.T., Hoechstoetter M., Fabozzi F.J., and Focardi S.M., 2010, Probability and Statistics for Finance, John Wiley & Sons.
Unit Web Page:	Lecture handouts are available for download from iLearn before lectures. Students are expected to read the handout and the corresponding textbook chapter(s) before each lecture.
Technology Used and Required:	Students will be required to use iLearn, Excel, PDF, Word, and a non-programmable calculator.
Delivery Format and Other Details:	The timetables for classes can be found on the University website at: https://timetables.mq.edu.au/2019/ Tutorials (Excel workshops) will commence in Week 1.
Recommended Readings:	
Other Course Materials:	

Unit Schedule

Week 1   Measures of Location and Spread

Week 2   Discrete Probability Distributions

Week 3   Basic Option Pricing Techniques

Week 4   Continuous Probability Distributions

Week 5   Modelling Extreme Events

Week 6   Joint Probability Distributions

Week 7   Copulas and Dependence Measures

Week 8   Bayesian Analysis

Week 9   Regression Models

Week 10   Time Series Models

Week 11   Risk-Neutral Pricing

Week 12   Professional Ethics

Week 13   Revision

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). 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). 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 (https://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.businessandeconomics.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

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

- Use a range of probability distributions to model different financial variables
- Assess the dependence between financial variables with suitable statistical tools
- Apply regression models and time series models to various financial time series
- Understand the basic concepts of no-arbitrage principle and risk-neutral pricing
- Perform mathematical computations on Excel spreadsheets for practical problems

Assessment tasks

- Online Quiz
- Class Test
- Final Exam

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

- Use a range of probability distributions to model different financial variables
- Assess the dependence between financial variables with suitable statistical tools
- Apply regression models and time series models to various financial time series
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Assessment tasks

- Class Test
- Assignment
- Final Exam

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

- Use a range of probability distributions to model different financial variables
- Assess the dependence between financial variables with suitable statistical tools
- Apply regression models and time series models to various financial time series
- Understand the basic concepts of no-arbitrage principle and risk-neutral pricing
- Perform mathematical computations on Excel spreadsheets for practical problems

Assessment task

- Assignment

Changes from Previous Offering

Assessed coursework has been replaced with an Online Quiz and an assignment.