ECFS882

Structured and Exotic Products

AFC Term 3 MB 2016

Dept of Applied Finance and Actuarial Studies

Contents

General Information

Unit convenor and teaching staff
Unit Convenor / Lecturer
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Credit points
2

Prerequisites
(Admission to MAppFin or PGCertAppFin or GradDipAppFin) and ECFS867

Corequisites

Co-badged status

Unit description
Structured products are investment vehicles often designed for investors to achieve a higher return, or exposure to a particular market, or for companies to raise funds more cheaply. To achieve this, the end user will typically take on a higher level of risk and be expressing a particular market view. Such products are engineered by packaging standard instruments with derivatives, possibly with exotic features, to reflect the risk tolerance and market outlook of the user. This unit introduces the most important types of exotic derivatives, including digital, average rate and barrier options; path-dependent options such as cliquet options; and multi-asset options such as basket options . In each case, we see how these derivatives can be used as building blocks to construct structured products which enable market participants to achieve risk-return profiles beyond those provided by standard financial instruments. As well as construction, we discuss risks and difficulties experienced in the trading, pricing and management of such products.

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:

Demonstrate how to calculate the payoff of exotic options and structured products containing exotic features.
Critically evaluate exotic options, their appropriate applications, limitations, risks involved in trading the product, efficient pricing methods and hedging techniques.
Recognise exotic features and deconstruct complex products into components in 'real world' situations.
Recognise key features of structured product construction.
Acquire knowledge of key analytical and numerical techniques for valuing exotic options including their appropriate applications and limitations.
Apply appropriate techniques to value and analyse exotic options and structured products using Black-Scholes model assumptions.
Develop skills in researching complex structured products used in the financial markets.
Develop skills in communicating complex technical concepts.

General Assessment Information

To pass this unit (requires a Standardised Numerical Grade of 50 or better) the student must pass the final examination.

Assessment Tasks

Name	Weighting	Due
Pre-Unit Assignment	10%	First class
Participation	10%	1 week after final lecture
Assignment	30%	Refer to iLearn
Final Exam	50%	Refer to Timetable

Pre-Unit Assignment

Due: **First class**
Weighting: **10%**

Summary of Assessment Task

Individual / Group: Individual

Due Date: In first class

Grading Method: Refer to 'Standards Required to Complete the Unit Satisfactorily' section

Submission Method: In class

Duration: Refer to Assignment coversheet

Extension Requests:

- No extensions are permitted.
- Late submission will result in zero marks, unless special consideration is approved by the Director of Studies under the University's Disruption to Studies Policy.

Other Information: Assignment contained in Unit notes.

On successful completion you will be able to:

- Apply appropriate techniques to value and analyse exotic options and structured products using Black-Scholes model assumptions.

Participation

Due: **1 week after final lecture**
Weighting: **10%**

Summary of Assessment Task

Individual / Group: Individual

Due Date: Presentation in final class; related forum post 1 week after final lecture.

Grading Method: Refer to 'Standards Required to Complete the Unit Satisfactorily' section

Submission Method: In class and iLearn.

Duration: Refer to iLearn.

Extension Requests:

- If you have extenuating circumstances that prevent you from submitting your assignment by the due date, please make arrangements with your Lecturer prior to the due date.
- Unless prior arrangements have been made, any late submission of assignments will automatically be penalised. In the absence of special circumstances, the penalty will be 10% of the available marks for the assessment for each business day (or part thereof) they are late.

Other Information: Refer to Participation Activities section in iLearn.

On successful completion you will be able to:

- Recognise exotic features and deconstruct complex products into components in 'real world' situations.
- Recognise key features of structured product construction.
- Develop skills in researching complex structured products used in the financial markets.
- Develop skills in communicating complex technical concepts.

Assignment

Due: **Refer to iLearn**
Weighting: **30%**

Summary of Assessment Task

Individual / Group: Individual

Due Date: Refer to the Unit's iLearn site

Grading Method: Refer to 'Standards Required to Complete the Unit Satisfactorily' section

Submission Method: Online via Turnitin on the Unit's iLearn site

Duration: Refer to Assignment coversheet

Extension Requests:

- If you have extenuating circumstances that prevent you from submitting your assignment by the due date, please make arrangements with your Lecturer prior to the due date.
- Unless prior arrangements have been made, any late submission of assignments will automatically be penalised. In the absence of special circumstances, the penalty will be 10% of the available marks for the assessment for each business day (or part thereof) they are late.

Other Information: Assignment distributed during lectures and via iLearn.

On successful completion you will be able to:

- Demonstrate how to calculate the payoff of exotic options and structured products containing exotic features.
- Acquire knowledge of key analytical and numerical techniques for valuing exotic options including their appropriate applications and limitations.
- Apply appropriate techniques to value and analyse exotic options and structured products using Black-Scholes model assumptions.

Final Exam

Due: **Refer to Timetable**
Weighting: **50%**

Summary of Assessment Task

Individual / Group: Individual

Due Date: Refer to Timetable. Assessments: Different Class Groups have different deadlines. Students should find the timetable and dates relevant to their group at www.mafc.mq.edu.au

Grading Method: Refer to 'Standards Required to Complete the Unit Satisfactorily' section

Submission Method: As per MAFC Program Rules & Procedures at www.mafc.mq.edu.au

Duration: 2 hours plus 10 minutes reading time

Examination Conditions:

- All examinations are closed book. However, the following is permitted:
    - A study sheet, prepared by the Student (one double-sided A4 page), to be advised by the Lecturer prior to the Exam.
- Calculators are not required nor permitted in the Final Exam.
- Exam times and locations are noted in the unit timetable at www.mafc.mq.edu.au.
- Refer to MAFC Program Rules & Procedures at www.mafc.mq.edu.au.

Extension Requests:

- You are expected to present yourself for examination at the time and place designated in the relevant MAFC Timetable at www.mafc.mq.edu.au.
- Deferral of an examination is not permitted, unless special consideration has been approved by the Director of Studies under the University's Disruption to Studies Policy.
- Refer to MAFC Program Rules & Procedures at www.mafc.mq.edu.au for information on the University's Disruption to Studies Policy or non-attendance at an examination.

On successful completion you will be able to:

- Demonstrate how to calculate the payoff of exotic options and structured products containing exotic features.
- Critically evaluate exotic options, their appropriate applications, limitations, risks involved in trading the product, efficient pricing methods and hedging techniques.
- Recognise exotic features and deconstruct complex products into components in 'real world' situations.
- Recognise key features of structured product construction.
- Acquire knowledge of key analytical and numerical techniques for valuing exotic options including their appropriate applications and limitations.
- Apply appropriate techniques to value and analyse exotic options and structured products using Black-Scholes model assumptions.
- Develop skills in communicating complex technical concepts.

Delivery and Resources

CLASSES

Face-to-Face Teaching: Generally 20 hours

Timetable: Detailed timetable for classes are on the Centre's web site www.mafc.mq.edu.au

Consultation Times:

Students who wish to contact any of the teaching staff may do so through:

- The Unit's iLearn site, in relation to general queries (so that all students may benefit); or
- Individual consultation with the lecturer by email in the first instance, if necessary.

REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

Text: Readings include sections from Robert L. McDonald, *Derivatives Markets* (3rd edition). Pearson Education/Prentice Hall, 2013. A lower cost version is available, Pearson New International Edition: ISBN 9781292021256. Students should already have this textbook from the Financial Instruments core unit.

Additional Readings:

- Readings containing relevant articles and book sections are included in the unit notes.
- Readings that are specifically discussed in class are examinable.

Lecture Notes: Available in printed form and electronically via iLearn.

Pre-Unit Materials: In this unit you will build on your knowledge of standard options and pricing models for them, from earlier units, in particular the Financial Instruments core unit. Revision readings from McDonald, *Derivatives Markets* (3rd edition) are listed in iLearn.

Useful References:

- Clarke Pitts (Editor), *Structured Products, Evolution and Analysis*, Risk Books, 2013.
- Andreas Blumke, *How to invest in Structured Products*, Wiley, 2009; author's website: http://www.my-structured-products.com/
- Espen Gaarder Haug, *The Complete Guide to Option Pricing Formulas*, 2nd Edition, McGraw-Hill 2006. This contains Excel/VBA option pricing software, some of which is used in the exercises in class.
- Kerry Back, *A Course in Derivative Securities, Introduction to Theory and Computation*, Springer Finance 2005. Accompanying Excel spreadsheets can be downloaded from the author's website: http://www.kerryback.net
- These are *references* only; it is *not* necessary to obtain these books for the unit.

Calculators: In examinations, hand held calculators are not required nor permitted. Mobile

phones and computers are not permitted.

Assumed Knowledge:

- You need to be comfortable with algebraic expressions and the basic concepts of calculus and probability.
- Workshops using Excel spreadsheets are done in class, to price exotic options using different methods and to study their behaviour as market conditions change. VBA macros are supplied and modified in class but you do not need previous experience with VBA. The assignment involves similar calculations and graphics in Excel.

Assumed Access:

- Access to a computer with word processing and MS Excel spreadsheet capability (with VBA) is assumed, as is general student computer literacy.
- Almost any version of MS Office on Windows or Mac will do. If you have a Mac, you will need to use Office 2004 or earlier, or Office 2011 (with Service Pack 1) or later. The workshops and assignment cannot be done using Office 2008 for Mac since it does not have VBA.
- Workshops are done in class on laptop computers. If you have a laptop or access to one, it would be beneficial if you could bring it. It will need to have MS Excel installed. Students can work in pairs or small groups so that those without their own laptop still experience the exercises and take away a copy of the work done in class. In this case you need to arrange to work with another student and take a copy of the work that you have done together in class.

TECHNOLOGY USED AND REQUIRED

Unit iLearn Site:

- Found by logging on to iLearn ilearn.mq.edu.au, then clicking on ***Structured and Exotic Products***.
- This is where you will find forums, downloadable resources and links to important pages.
- The forum allows you to communicate with other students and lecturer(s) and may provide supplementary material.
- You are requested to post your questions on the forums at least 24 hours prior to the assignment submission date or the examination date. Questions posted after that time may not be answered. **Do not leave your questions to the last few days.**

Important Notice:

- It is important that you familiarize yourself with the Unit's iLearn site.
- Students should check the Unit's iLearn site regularly (minimum twice a week and prior to all lectures) and look for updates and distribution of materials (including case studies) related to the unit or assessments and, if relevant, participate in forum discussions.

Unit Schedule

1. INTRODUCTION TO STRUCTURED PRODUCTS AND EXOTIC OPTIONS

- Definition, development and classification of exotic options.
- Definition, development and classification of structured products.
- How structured notes are constructed.
- Equity Linked CD Example.

2. REVIEW OF PRICING MODELS

- Review of standard option pricing; Black Scholes model.
- Volatility smiles; reasons for them and some models that can explain them.

3. SINGLE-ASSET PATH-INDEPENDENT EXOTICS

- Digital options; pricing and hedging.
- Examples of structured products containing digitals:
    - Strip of digitals note.
    - Range accruals
- Second order options: compound options.

4. OVERVIEW OF NUMERICAL METHODS

- Numerical integration; binomial tree models; finite difference methods;
- Monte-Carlo simulation; variance reduction and efficiency.

5. MULTI-ASSET PATH-INDEPENDENT EXOTICS

- Two asset options: out-performance options; spread options.
- Quantos: pricing using risk-neutral trend; applications in FX markets.
- Basket options; definition and uses.
- Pricing issues; analytical approximation versus simulation.
- Sensitivity to correlation, volatility and dispersion.
- Examples of multi-asset structured products:
    - Multi-asset quanto note
    - Multi-asset range accrual

- Path-Independent mountain options

6. SINGLE-ASSET PATH-DEPENDENT EXOTICS

- Forward start and cliquet options.
- Average options; varieties and uses.
- Decision options: American and Bermudan options.
- Barrier and related options: varieties of barriers; dynamics and hedging.
- Lookback and hindsight options.
- Pricing issues for path-dependent options.
- Examples of structured products:
  - Wedding cake; Faders.
  - Path-dependent mountain options

7. STRUCTURED PRODUCTS

- SSPA Derivatives Map: Capital Protection; Yield Enhancement; Participation.
- Further examples of structured products.
- Classification of examples.

Learning and Teaching Activities

Strategy

The Master of Applied Finance degree adopts a deep teaching and learning strategy, in which Students acquire and retain knowledge and also are able to make sense of the issues and concepts and apply them in the “real world”. The degree relies heavily on student engagement and participation by: (a) Continuous learning throughout the semester. This is encouraged through a combination of students undertaking prescribed reading throughout the units and / or completion of practice problems, case studies, assignments, class presentations etc and interaction via forums in the unit’s iLearn site; and (b) Assessments, which enable the student to demonstrate his / her understanding of the learning objectives achieved through the continuous learning.

Student Participation

Students participate in this unit by: (a) Attending lectures and participating in class discussion; (b) Before each class, completing the recommended readings of notes and text, and working systematically through suggested problem sets; (c) Interacting on the unit’s iLearn site; and (d) Completing all assessment tasks and exams. On average the unit will require students to complete, for every hour of class time, approximately 3 hours private study.

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.

Students should also consult the MAFC Program Rules & Procedures found at http://www.mafc.mq.edu.au

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 enquiry service (MAFC-specific)

For all student enquires, please contact studentsupport@mafc.mq.edu.au

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.

Learning Skills

Learning Skills (http://www.students.mq.edu.au/support/learning_skills/) 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 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 - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcomes

- Demonstrate how to calculate the payoff of exotic options and structured products containing exotic features.
- Critically evaluate exotic options, their appropriate applications, limitations, risks involved in trading the product, efficient pricing methods and hedging techniques.

- Recognise exotic features and deconstruct complex products into components in ‘real world’ situations.
- Recognise key features of structured product construction.
- Acquire knowledge of key analytical and numerical techniques for valuing exotic options including their appropriate applications and limitations.
- Apply appropriate techniques to value and analyse exotic options and structured products using Black-Scholes model assumptions.
- Develop skills in researching complex structured products used in the financial markets.
- Develop skills in communicating complex technical concepts.

Assessment tasks

- Pre-Unit Assignment
- Participation
- Assignment
- Final Exam

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

- Demonstrate how to calculate the payoff of exotic options and structured products containing exotic features.
- Critically evaluate exotic options, their appropriate applications, limitations, risks involved in trading the product, efficient pricing methods and hedging techniques.
- Recognise exotic features and deconstruct complex products into components in ‘real world’ situations.
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- Apply appropriate techniques to value and analyse exotic options and structured products using Black-Scholes model assumptions.
- Develop skills in researching complex structured products used in the financial markets.
- Develop skills in communicating complex technical concepts.

Assessment tasks

- Pre-Unit Assignment
- Participation
- Assignment
- Final Exam

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

- Demonstrate how to calculate the payoff of exotic options and structured products containing exotic features.
- Critically evaluate exotic options, their appropriate applications, limitations, risks involved in trading the product, efficient pricing methods and hedging techniques.
- Recognise exotic features and deconstruct complex products into components in ‘real world’ situations.
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- Develop skills in researching complex structured products used in the financial markets.
- Develop skills in communicating complex technical concepts.

Assessment tasks

- Pre-Unit Assignment
- Participation
- Assignment
- Final Exam

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual

formats.

This graduate capability is supported by:

Learning outcome

- Develop skills in communicating complex technical concepts.

Assessment tasks

- Participation
- Final Exam

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcomes

- Demonstrate how to calculate the payoff of exotic options and structured products containing exotic features.
- Critically evaluate exotic options, their appropriate applications, limitations, risks involved in trading the product, efficient pricing methods and hedging techniques.
- Recognise exotic features and deconstruct complex products into components in ‘real world’ situations.
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- Develop skills in researching complex structured products used in the financial markets.
- Develop skills in communicating complex technical concepts.

Assessment tasks

- Pre-Unit Assignment
- Participation
- Assignment
- Final Exam

Changes from Previous Offering

Term 3 2016 is the first offering of Structured and Exotic Products. It replaces ECFS882 Exotic Options, with increased content on the classification and features of structured products.

Important Notice

This Unit Guide may be subject to change. The latest version is on the Centre's web site www.mafc.mq.edu.au.

Students should read the Unit Guide carefully at the start of semester. It contains important information about the Unit. If anything is unclear, please consult one of the unit lecturers.

Standards Required to Complete the Unit Satisfactorily

University Policy on Grading:

- Macquarie University's Academic Senate has established a Grading Policy available at http://www.mq.edu.au/policy/docs/grading/policy.html. Your final result will include:
    - A grade ranging from Fail to High Distinction; and
    - A Standardised Numerical Grade (SNG). A SNG is not a summation of the individual assessment components, but is allocated on the basis of the performance in all assessment items, providing the examination component is passed.
- It is important to note:
    - The Policy does not require that a minimum or maximum number of students are to be failed in any unit;
    - Grades will not be allocated to fit a predetermined distribution; and
    - The process of allocating SNGs does not change the rank order of marks among students who pass the unit.

Specific Unit Grading:

- To pass this unit (requires a Standardised Numerical Grade of 50 or better) the student must pass the final examination.
- All final grades in the Applied Finance Centre are determined by a grading committee and are not the sole responsibility of the unit convenor.
- The core criteria used to assess student work in this unit are:
    - Knowledge and understanding: Understanding key ideas, knowledge and use of concepts.
    - Application: Ability to apply theoretical ideas and frameworks in practice and in a

critically reflective way.
    - Reasoning and analysis: Ability to analyse, use critical reasoning and principles to formulate a position, balancing theory and personal reflection.
    - Professional literacy and research: Understanding of professional factors (language and landscape) and ability to undertake appropriate research.
    - Communication and presentation: Ability to communicate and present effectively (written and oral, as relevant).
    - Use of mathematical and statistical ideas: Ability to use mathematical and statistical ideas, methods and formulae appropriately.
- Performance in relation to each of these criteria are assessed against the University's grading descriptors:

Grade	Expectation
High Distinction	Provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality and insight in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; critical evaluation of problems, their solutions and their implications; creativity in application as appropriate to the discipline.
Distinction	Provides evidence of integration and evaluation of critical ideas, principles and theories, distinctive insight and ability in applying relevant skills and concepts in relation to learning outcomes. There is demonstration of frequent originality in defining and analysing issues or problems and providing solutions; and the use of means of communication appropriate to the discipline and the audience.
Credit	Provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is demonstration of substantial understanding of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; convincing argumentation with appropriate coherent justification; communication of ideas fluently and clearly in terms of the conventions of the discipline.
Pass	Provides sufficient evidence of the achievement of learning outcomes. There is demonstration of understanding and application of fundamental concepts of the field of study; routine argumentation with acceptable justification; communication of information and ideas adequately in terms of the conventions of the discipline. The learning attainment is considered satisfactory or adequate or competent or capable in relation to the specified outcomes.
Fail	Does not provide evidence of attainment of learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; missing, undeveloped, inappropriate or confusing argumentation; incomplete, confusing or lacking communication of ideas in ways that give little attention to the conventions of the discipline.

Review of Grade and final examination Script viewing:

- A student who has been awarded a final grade for a unit and who does not believe it is an accurate reflection of their performance, and has grounds for such a claim and can demonstrate those grounds, may apply to have their grade reviewed.
- For information on requesting a review of grade and/or viewing your final exam script, please refer to the University's Grade Appeal Policy at http://www.mq.edu.au/policy/docs/gradeappeal/policy.html and MAFC Program Rules & Procedures at http://www.mafc.mq.edu.au.