

McDonough School of Business
Finc-574-20 Option Positioning and Trading

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Office Hours: M W 10:30am-noon and by appointment

Prerequisites: A full semester of Financial Management, Finc 551 and 557. Besides this basic material, the student must have a good understanding of forwards, basic options, and probability concepts associated with expected values and measures of dispersion (standard deviation/volatility), as well as math-calculus. Finc 556-10, Derivatives and Financial Markets Concepts (DFM) is highly recommended. Students will also benefit by having taken one or more of the corporate finance, investments, real option, and/or fixed income courses.

Description: This course develops derivative-related financial understanding (forwards, swaps, futures, multiple types of options, hybrid securities), and their use in financial positioning, hedging, and trading. A modeling perspective is emphasized.

Objectives: To develop an integrated understanding of derivatives positioning, trading, hedging, and valuation.

To develop derivative-based solutions to investment and corporate financial management problems.

To address problems from the financial engineering perspective.

Required Notes: The first module will be distributed in class. Subsequent modules are available on the MSB intranet as a hyperlink in the title of each section of in the course outline.

https://intranet.msb.edu/faculty/bodurthj/restricted/teaching/574-20_syllabus.htm

Required Text: You should buy any of the listed editions of the following book:

Hull, J., Options, Futures and Other Derivative Securities, 7th edition, Upper Saddle River, N.J., Prentice Hall, 2008, ISBN 978013601586-4,

(or Hull, J., Options, Futures and Other Derivative Securities, 6th edition, Upper Saddle River, N.J., Prentice Hall, 2006, ISBN 013149908-4,

or Hull, J., Options, Futures and Other Derivative Securities, 5th edition, Englewood Cliffs, N.J., Prentice Hall, 2003, ISBN 013009056-5,

or Hull, J., Options, Futures and Other Derivative Securities, 4th edition, Englewood Cliffs, N.J., Prentice Hall, 2000, ISBN 013022444-8.)

(If you prefer to purchase the book alone, the accompanying CD is not necessary. Required class spreadsheet software is on the class web for download).

As the class-notes are in overhead form, you will need the text. The class note modules all have cross-references to the appropriate sections of the Hull book(s). It is also recommended that you keep up with the financial press. The [FT-US](#) and [WSJ](#) are good daily sources. The Wall Street Journal provides discount student subscriptions on a [quarterly](#) or a [semester](#) basis (click to access) -- as does the [FT for students](#). Weekly sources include [The Economist](#), [Barron's](#), [Business Week](#), [Fortune](#), and [Forbes](#).

Calculation: The course will require a significant amount of calculation and/or computer spreadsheet work. Please always bring your financial calculator to class.

Grading: A series of 100 point quizzes and projects will be given every one or two weeks throughout the

module and during the assigned final exam period. The course final project is also due at or before our final exam session. The grade weight of the final project is equal to two in-module quizzes and projects (2 x 100 points). In the final exam period, a quiz on your final project content will be given and will be equal to 1/2 of a regular quiz or project (1/4 of the final project.)

As this course concerns derivatives, you earn two grading options by completing all quizzes and projects. You will have the option to exclude one quiz or project from your final grade calculation. Should you have an excused absence for a quiz or project, then you must complete the quiz or project as additional homework to apply the drop option to the associated quiz. Additionally, you will have the option to redo one quiz question on each quiz to earn back half of the points lost on the question. The options are inclusive, i.e. you have both options.

The grade equation is the following:

$$=IF\{F>0,[(SUM(Q)-MIN(Q))+F/2]/[N-1/2],[SUM(Q)-MIN(Q)/2]/[N-1/2]\}$$

In Excel, the formula is the following:

$$=IF(Z16>0,((SUM(P16:Y16)-MIN(P16:Y16))+Z16/2)/(COUNT(P16:Y16)-1/2),(SUM(P16:Y16)-MIN(P16:Y16)/2)/(COUNT(P16:Y16)-1/2))$$

Q = Quiz Grades (Excel Range P16:Y16 for student in worksheet row 16, etc.)

F = Final Session Grade = 1/2 regular quiz (Excel Cell Z16 for student in row 16, etc.)

N = Number of Quizzes

Grade Weights

| | | |
|---|-----|--|
| Quizzes, Projects and Required Homework | 90% | There will be a series of required homework and smaller projects with each module. Homework and project materials will be available on the class web site |
| Class Attendance | 10% | If you do miss a class or have negative participation, then I will evaluate your excuse, and potentially adjust the related project or quiz grade by 10%. Obviously, there will be a sign-up sheet handed out for each class, and I ask you to sit in the same seat throughout the semester. |

Grading Curve

Class Grades will be curved in line with the suggested finance elective median of 3.5.

Quiz and project dates -

Our first quiz is during the second class period. All other quizzes, projects, and the final exam session will be scheduled subsequently.

There will be **no quiz make-ups**. If, for some reason - like snow, a quiz must be **canceled for the entire class**, then the next quiz will count as a double quiz.

Outline

[1. The Binomial Option Model](#)

Objectives

Identify and define option time values
 Link expected values, arbitrage and risk-neutral valuation
 Show that option hedging is option pricing
 Link discrete-time binomial and continuous-time Black-Scholes models
 Highlight European and American option distinction

Structure

Calculate discounted risk-neutral expected values
 Develop binomial hedging option model - [Binomlwk.xls](#)
 Link risk-neutral and risk-adjusted discounted expected values
 Illustrate binomial model convergence to Black-Scholes - [Binomial convergence.xls](#)

Analyze American options

Options 7th: 11, 19.1-19.5; optional 12, 17.6-17.8

Options 6th: Chapter 11, 17.1-17.5; optional 12, 17.6-17.9

Options 5th: Chapter 10, 18.1-18.5; optional 11, 18.6-18.9

Options 4th: Chapter 9, 16.1-16.5; optional 10, 16.6-16.9

Optional: [Cox-Rubinstein, Option Markets, 1985, Chapter 5](#)

[Bodurtha-Courtadon, The Pricing of Currency Options, 1987.](#)

2. [Option Positions, Strategies, and Hybrids](#)

Objectives

To apply option positions and strategies in corporate finance and investment

To relate different securities with option-based structures

Structure

Worksheet [OPTPOS.XLS](#)

Case Study - LYONS

Options 6th and 7th: Chapters 9, 10

Options 5th: Chapters 8, 9

Options 4th: Chapters 7, 8

Optional: [Structured Bond Products](#) (+B-C, etc.)

Options 7th: 294-296 566-567, 599-602, 647-648

Options 6th: 298-300, 520-523, 540-541, 614

Options 5th: 249-250, 445-456, 511

Options 4th: 253-254, 469-470, 533-534, 646-648

[Cox-Rubinstein, Option Markets, 1985, Chapter 7.3](#)

[Bodurtha-Valnet, "Innovation in the International Money and Bond Markets: A Source of Lower Borrowing Costs?", 1988.](#)

3. [Delta-Hedged Option Positions, Trading, and "The Greeks"](#)

Objectives

To understand the concept of Delta and the dynamics of Delta Hedging

To become familiar with the importance of other measures of option sensitivity and associated issues of managing option books

Structure

Delta Lecture

Delta Hedging Illustrative Exercise - [D-](#)

[HEDGE.XLS](#)

Discussion

Options 7th: Chapter 17

Options 6th: Chapter 15

Options 5th: Chapter 14

Options 4th: Chapter 13

4. [Modifying Standard Black-Scholes and Binomial Models](#)

Objectives

Adjust Black-Scholes and the binomial model for rate term structure effects, and volatility term structure effects

Structure

Discrete forward rate term structure

Risk-neutral (drift) valuation -

[RSKNTRL.XLS](#)

Two volatility specifications

Merton's option pricing model

Options 7th: 13.1, Chapter 18; optional Chapter 21

Options 6th: 13.1, Chapter 16; optional Chapter 19

Options 5th: 12.10-12.11, Chapter 15; optional Chapter 17

Options 4th: 11.10-11.11, Chapter 17; optional Chapter 15

5. [Interest Rate Options and Risk Management](#) (optional)

Objectives

Develop continuous- and discrete-time interest rate derivative models by the HJM method

Identify key links between forward prices and rates, and futures prices and rates

Structure

Rate evolution

Black-Scholes model for discount bonds

Bond forwards and futures prices

Forward rate agreements

Eurodollar forward and futures prices

Forward rate options (caps and floors)

Eurodollar options (calls and puts)

Numerical applications (discount bonds, fra,

bond-rate options, exotics and

index amortizing swaps -

[HJMSPML.XLS](#))

Options 7th: Chapters 28 and 31, optional Chapters 22, 23, 29 and 30

Options 6th: Chapters 26 and 29, optional Chapters 20, 21, 27 and 28

Options 5th: Chapters 22 and 24, optional Chapter 23, 26 and 27

Options 4th: Chapters 20 and 22, optional Chapter 21 and 23

6. [Exotic Options and Simulation](#)

Objectives

Understand pricing and uses of Exotics

Address standard model short-comings and alternative types of options

Structure

Barrier (Knock-...) Options

Average -Rate (Asian) Options

Compound Options (Options on Options)

Simulation methods and improving accuracy

Other distributions and methods -

[SIMLGNFP.XLS](#)

Options 7th: 19.6-7, Chapter 24

Options 6th: 17.6-7, Chapter 22

Options 5th: Chapter 19

Options 4th: Chapter 18

7. [Multiple Risks and Correlation](#)

Objectives

Understand multi-dimensional environments

Apply multivariate valuation techniques

Structure

The correlation concept

Portfolio basket covariance

Quanto application

Multivariate simulation

Options 7th: 21.6, 24.11-24.12, 26.6

Options 6th: 19.6, 22.11-22.12, 24.6

Options 5th: 18.6, 19.11-19.12, 20.8

Options 4th: 16.6, 18.5

8. Final Project Materials

Project topics are open at this point. Three suggestions are the following:

- 1) Actively manage an underlying exposure and derivative hedges over the module period
- 2) Analyze the structure of a project, security or other financial position that has derivative components
- 3) Program an alternative variant of a derivative pricing and hedging model

[WSJ and Web-based Information on futures and options markets](#)

PostScript

Additional Suggested References -

Chance, D., An Introduction to Derivatives, New York, Dryden, 1998.

Cox, J. and M. Rubinstein, Options Markets, Englewood Cliffs, N.J., Prentice-Hall, 1985, ISBN 0136382053.

Figlewski, S., W. Silber and M. Subrahmanyam, Financial Options, : From Theory to Practice, Homewood, Illinois, Business One Irwin, 1990, ISBN 1556232349.

Jarrow, R.A. and A. Rudd, Option Pricing, Homewood, Illinois, Dow Jones-Irwin, 1983, ISBN 0870943782.

Jarrow, R.A. and S. Turnbull, Derivative Securities, Cincinnati, Ohio, South-Western, 1996.

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Rubinstein, Mark, In-the-Money, <http://www.in-the-money.com/body.htm>, hard copy is Rubinstein on Derivatives, London, Risk Books, ISBN 1899332537.

Stoll, H. and R. Whaley, Futures and Options: Theory and Applications, Cincinnati, Ohio, South-Western, 1993, ISBN 0538801158.

Derivatives Used in Practice -

Bookstaber, R.M., Option Pricing and Investment Strategies, Chicago, Probus, 1991, ISBN 1557381453.

Burghardt, Galen, The Eurodollar Futures and Options Handbook, New York, McGraw-Hill, 2003, ISBN 0071418555.

Gastineau, G.L., The Stock Options Manual, 3rd edition, New York, McGraw-Hill, 1988, ISBN 0070229813.

Gatheral, Jim, The Volatility Surface: A Practitioner's Guide, Hoboken, Ny Finance, 2006, 9780471792512.

Kolb, R.W., Financial Derivatives, Miami, Kolb Publishing, 1993, ISBN 1878975188.

Kolb, R.W., Understanding Futures Markets, 3rd edition, Miami, Kolb Publishing, 1991, ISBN 187897503X.

McMillan, L.G., Options as a Strategic Investment, 3rd edition, New York, New York Institute of Finance, 1993, ISBN 0136360025.

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Smith, Jr., C.W. and C.W. Smithson, The Handbook of Financial Engineering, New York, Harper & Row, 1990, ISBN 0887304486.

Risk, From Black-Scholes to Black Holes, London, Risk, 1993, ISBN 0 9516453 31.

Taleb, Nassim, Dynamic Hedging: Managing Vanilla and Exotic Options, New York, Wiley, 1997, ISBN-10 0471152803, ISBN-13 [978-0471152804](#).

Tompkins, R.G., Options Analysis, Chicago, Probus, 1994, ISBN 1557388342.

More technical -

Ingersoll, J., Theory of Financial Decision Making, Totowa, N.J., Rowman & Littlefield, 1987, ISBN 0847673596.

Shimko, D., Finance in Continuous Time: A Primer, Miami, Kolb Publishing, 1992, ISBN 1878975072.

Wilmott, Paul, J. Dewynne and S. Howison, Option Pricing: Mathematical Models and Computation, Oxford, Oxford Financial

Press, 1993, ISBN 0952208202.