

McDonough School of Business
Finc-556 Derivatives and Financial Markets

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Office Hours: M W 11:40am-12:45pm and by appointment

Prerequisites: Both Financial Management modules, Finc 551 and 557. Therefore, the student must have a good understanding of discounted cash flows, present value, and future value. Students must be able to solve linear equations. Additionally, the student should be comfortable with statistics, differentiation, natural logs, and the natural number (e). Often, students have also taken at least one additional corporate finance, investments, real options, or fixed income course.

Description: This course develops understanding of the basic derivative-related financial instruments (forwards, swaps, futures, at-the-money European options, collars, and participation contracts), and their use in transforming and managing risky investments and projects.

Objectives: To provide a basic understanding of derivatives practice and use in financial markets.

To provide practical and simple investment and corporate financial management strategies using derivatives.

To allow students to apply these concepts and skills to meet investment and corporate finance objectives, using a series of examples that build to a final project.

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/unrestricted/teaching/556_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 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 quizzes (2 x 100 points). Historically, project grades have averaged 90-91 on a 100 point scale. The final exam period quiz is equal to 1/2 of a regular quiz. (Beyond your project work, you will not have to study for this quiz.)

As this course concerns derivatives, you earn two grading options by completing all quizzes. You will have the option to exclude one quiz from your final grade calculation. Should you have an excused absence for a quiz, then you must complete the quiz 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 and Required Homework | 90% | There will be a series of required homework, from 1-3 per assignments per module. Homework will be distributed in class. Homework is also available on the class web site, as are suggested homework answers. Any homework that is unsatisfactory or missed will result in up to a 10 point penalty on the associated quiz. I require that all homework be turned in with the associated quiz. |
| Class Attendance | 10% | On all quizzes subsequent to the first one, a student earns 90 out of 100 quiz points for their work on the quiz. An additional 10 points are earned by attending and participating in class during the classes leading up to a quiz. If you do miss a class or have negative participation, then I will evaluate your excuse out of 2-4 points per class. 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

In accordance with business school guidelines, class grades will be curved. Past experience provides some indicative letter grade cutoffs (with no rounding up) : A 100-97.0, A- 96.99-94.0, B+ 93.99-91.0, B 90.99-88.0, B- 87.99-81.0, C 80.99-60.0, and below 60.0 is an F.

Quiz dates -

Our first quiz is during the second class, 11/9. Current quiz dates are 11/16, 11/30, and 12/14.

Our final session should be on Wednesday, 12/21.

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

[Review: Time Value of Money and Interest Rates](#) (click on title link for pdf file)

Objectives

Link compounding growth and discounting
Review interest rate logic and math
Observe and understand the term structure of interest rates
Understand discount rates and yields

Structure

Present value and future value from growth and discounting
Compounding bases
Bond prices, yields and rate sensitivities (Duration and Convexity)
Appendix: e, integration and ln (natural logarithms)

Options 7th: 4.2-4.3 especially, 4.1-4.10, 6.1-6.2 (optional 6.3-6.4)

Options 6th: [4.2-4.3 especially, 4.1-4.10, 6.1-6.2 \(optional 6.5-6.6\)](#)

Options 5th: [pg. 42-44, 5.1-5.9, 5.13-5.15](#)

Options 4th: [pg. 50-53, 4.1-4.9, 4.13-4.15](#) (optional Chapter 23-Credit Risk, esp. pp. 623-629)

[Review with required answers: Time Value of Money and Interest Rates](#)

(Please focus on the first 20 pages of the handout. Exercise 1) on page 17 is required, and 2) will provide extra practice. The [Raterevw.xls](#) spreadsheet has an example of solutions.

The appendix should help you better understand all of the concepts, but officially it is "optional, but highly recommended." Prior to the quiz date, I'll be checking voice- and e-mail, and will be in my office off and on. To see background work, you may click to download an associated spreadsheet: [Intgrte.xls](#).)

Finally, an optional spreadsheet illustrates how to work off the benchmark Treasury yield curve (or term structure) to evaluate a risky project's cash flows by risk- and time- adjusted DCF - [Term DCF RP.xls](#).

[Notation: Abbreviations and Symbols](#) (click on title link for pdf file)

1. [Forwards and Swaps](#)

Objectives

To develop the forward-breakeven price benchmark concept
To link forward-based hedges across fixed-income, currency and other exposures
To use forward benchmark values in making risk management decisions

Structure

Currency receivables, payables and forward prices
Forward-futures carry and yield
Futures (forward)-Inferred Expected Spot

Options 6th and 7th: 1.3, 5.3-5.7

Options 5th: [1.3, 3.4 - 3.8](#) (pdf copy)

Options 4th: 1.1, 3.1 (pp. 53-59) - 3.5

2. [Judgmental, Historical, and Regulatory Volatility](#) (click on title link for pdf file)

([Bloomberg HVG-color, pg 13](#))

Objectives

To understand how volatility and critical outcome likelihoods are measured and used

Structure

Volatility Intuition and Estimates
Judgemental (Likely Range),
Historical (% Price Change Standard Deviation), and
Regulatory (250 daily equally-weighted observations)

Options 7th: 13.1-13.2, 13.4, 20.1, 21.1-21.2; optional 13.3, 20.2-20.3, 21.3-21.6

Options 6th: 13.1-13.2, 13.4, 18.1, 19.1-19.2; optional 13.3, 18.2-18.3, 19.3-19.6

Options 5th: 12.1-12.2, 12.4, 16.1, 17.1-17.2; optional 12.3, 12.12, 16.2-16.3, 17.3-17.6

Options 4th: 11.1-11.3, 14.1-14.2, 15.1-15.2; optional 15.3-15.7

3. [Market Benchmarked Expectations, Volatility, and Price Value @ Risk](#) (click on title link for pdf file)

Objectives

To relate forward-futures price, risk premia, and expected spot prices
To understand price value @ risk concepts, and implement in practice

Structure

Forward-futures and expected market (inferred) spot
Price risk management application
Details: JP Morgan Riskmetrics and Price Value @ Risk

Options 7th: 5.15, 20.1, 20.6-20.8 and 20.summary; optional Chapter 3, 20.4-20.5 and 20.9

Options 6th: 5.15, 18.1, 18.6-18.8 and 18.summary; optional Chapter 3, 18.4-18.5 and 18.9

Options 5th: 3.15, 16.1, 16.6-16.8 and 16.summary; optional Chapter 4, 16.4-16.5 and 16.9

Options 4th: 3.12, 14.2, 14.7-14.9, 14.summary

4. [Implied Volatility and Its Term Structure](#) (click on title link for pdf file)

([Bloomberg HIVG-color, pp 7-8](#))

Objectives

To understand how implied volatility is measured, its importance, and the patterns of option value implied volatility across time and future spot prices

Structure

Implied Volatility Exercises
 Currency Option Pricing and Implied Vols
[\[OPTPRICE.XLS\]](#)
 Direction and Volatility Option Strategies
 S&P 500 Volatility History
 (Optional) S&P 500 option volatility
 "Smiles/Smirks"
[\[OPTIMPVL.XLS\]](#), a variant of
[OPTSIMPL.XLS](#),
[Running Solver & macros across Excel 2003 and 2007](#)

Options 7th and 6th: Chapters 13 (1-4, 8-9, 11)

Options 5th: Chapters 12 (1-5, 8-9, 11), optional 16.4

Resources: [Bloomberg Calculation Methods](#)
[CBOE Volatility Index Futures \(Vix\)](#)
[CBOE web option calculator \(with implied vol applet\)](#)
[S&P 500 futures vol "skew" - Optionsanalysis.com](#)

5. [Option fundamentals: calls, puts, and underlying](#) (click on title link for pdf file)

Objectives

To introduce the basic lexicon of options

Structure

Option Basics
 Basic Worksheets and Grids
 Basic Option Positions
[\[OPTPOS.XLS\]](#)
 Summary Market View and Position
 Purpose Grids

Options 6th and 7th: 1.5-1.7, Chapter 8

Options 5th: 1.5-1.7, Chapter 7

Options 4th: 1.3, 1.4, Chapter 6

6: [Option Positions and Strategies](#) (click on title link for pdf file)

Objectives

To understand basic option position and strategy applications
 To relate different underlying and option positions

Structure

Combination Worksheets
 Options Positions 2, 3 and 4
[\[OPTPOS.XLS\]](#)
 Derivative algebra (+F, +C, -P, +C=+F+P, ...)
 Discussion

Options 7th: Chapter 10, pp. 219-221, 230-231

Options 6th: Chapter 10, pp. 223-225, 234-235

Options 5th: Chapter 9, pp. 185-187, 194-195

Options 4th: Chapter 8, pp. 185-187, 194-195

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.](#)**7. [Black-Scholes-Merton Model Sensitivities](#) (click on title link for pdf file)****Objectives**

To understand what causes changes in option values derived with the Black-Scholes-

Merton

model

To develop an intuition of option value sensitivities

Structure

Analysis of value sensitivity tables and graphs

Option Sensitivity Analysis

[OPTPRICE.XLS]

Discuss the logic of the value sensitivities

[Chance, D., An Introduction to Derivatives, 4th ed., pp. 139-150](#)[Cox-Rubinstein, Option Markets, 1985, 5.8, pp. 215-235](#)[Hull, 7th edition, Chapter 12-Wiener Processes and Ito's Lemma](#)**8. Project Materials [Overview](#) (pdf) ([Group Listing](#), [Alphabetical Listing](#))**[WSJ and Web-based Information on futures and options markets](#)[Project Assignment #1](#) (pdf), some forecast information @ [forecasts.org](#)[Project Assignment-Web #2](#), (pdf intro) [Risksmpl.xls](#) spreadsheet[Project Assignment #3](#) (pdf)**[Project Examples](#)**

Examples and Support Data/Analytics -

"Open format" [Optposwk.xls](#) project spreadsheet

(Be sure to save to your PC, and then run.

Please do not run "open this file off its current location.")

9. [Risk Management](#) This written module is a summary and extension. We don't specifically cover this material in class.**Additional Suggested References -**

Bodurtha, J. and Courtadon G., The Pricing of Foreign Currency Options, New York, Salomon Brothers Center, New York University, 1987-4/5.

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 -

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

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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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Siegel, D.R. and D.F. Siegel, The Futures Markets, Chicago, Probus, 1990, ISBN 1557385726.
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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.

PostScript

[Derivative Events](#)

[Enron](#)

[Highlights of Enron Documents](#)