



Finance 465, Derivatives Markets I

Winter, 2008, Evanston
Prof. Robert McDonald

Office Andersen 4-208
Office hours Wednesday, 3:00-4:00 or by appointment
Phone 847-491-8344
Fax 847-491-5719
E-mail r-mcdonald@northwestern.edu

This course provides an analytical overview of futures, options, swaps and other derivatives, most of which are now commonplace. We will discuss examples of how derivatives are used to solve particular problems, as well as the underlying pricing methodologies. We will make extensive use of Excel.

The mathematics will be basic (e.g. continuous compounding, solving two equations in two unknowns, elementary probability calculations), but the subject is inherently analytical. Expect numerous numerical examples. You should review basic probability.

1 Readings

- **McDonald, R. L., 2006a, *Derivatives Markets*, Addison Wesley, Boston, MA, 2nd edition.** The material in Sections 1.4 (short sales), Section 7.1 (basic bond concepts) and Appendix B on continuous compounding is material you should already understand.
- **Marthinsen, J., 2005, *Risk Takers: Uses and Abuses of Financial Derivatives*, Pearson Addison Wesley, Boston** This book contains extended examples that I will use as the basis for class discussion throughout the quarter.
- **Case Packet** This contains the items marked with a "*" in the course outline below.
- **First Assignment** McDonald (2006a, Chapter 1)

2 Grading

Grades will be based on exams (three in-class quizzes and a final exam), homework, and class participation.

2.1 Exams

- **Quizzes.** There will be three brief (less than 30-minute) quizzes, in class. I will drop the low grade. *There will be no make-ups for missed in-class quizzes.*
 - Quiz 1: Jan 24
 - Quiz 2: Feb 14

– Quiz 3: Mar 6

- Final Exam: Thursday, March 20, 3pm. Room TBA.

2.2 Class Participation

You are to display your name card at all times. This grade is determined by the quality of your participation. Here are things which will count as class participation:

- Making comments and asking questions in class which are instructive and helpful for the class as a whole.
- Active, helpful participation in the newsgroup.
- Direct feedback to me which helps me do a better job of teaching. (This includes constructive feedback on problem sets, lectures, and the textbook.)
- Copies of articles or materials which are helpful for the class.

It is possible to earn negative participation points.

2.3 Problem Sets

These may be handed in as group assignments; the maximum size of a group for submitting written work is 4. Identical material submitted on behalf of more than 4 people will receive no credit. I drop the low problem set grade, so you may miss one problem set without penalty. *Homework must be printed out. I do not accept electronic submissions.*

Homework submissions should be self-explanatory. Spreadsheet printouts which require interpretation to grade will receive no credit.

Every homework must be signed by every group member.

2.4 Grade Formula

The grade will be determined by the following formula:

$$0.05 \times X_P + 0.10 \times X_{PS} + 0.85 \times \max(0.4X_Q + 0.6X_F, X_F)$$

where X_P is the participation grade, X_{PS} the problem set grade, X_Q the average quiz grade (I drop the low quiz grade), and X_F the final. Notice that if you do better on the final than on the quizzes, only your final exam grade will count.

2.5 Regrading

I adhere to the Kellogg policy on regrading, which is posted at the student affairs website: http://www.kellogg.northwestern.edu/stu_aff/policies/registration.htm. Note in particular that you have 10 days to request a regrade and the entire work is subject to a regrade, not just the contested portion. *The request must be in writing.* This is a firm policy.

3 Class Logistics

3.1 Getting in Touch

- **Office Hours:** I have office hours (posted above), and I will make appointments at other times if necessary.

- **Electronic Questions:** I am happy to answer questions about lectures and homework *if those questions are posted on the class newsgroup*. If you ask such a question directly via e-mail, I will not respond. You must post to the newsgroup.
- **Personal Questions:** You can use e-mail for questions of a personal nature (e.g., you want to make an appointment). Such e-mails should have a subject containing the preface “Fin-465:”. I will filter e-mails using this preface.

3.2 Etiquette

The purpose of etiquette rules is to ensure that no one interferes with the learning of another. I do understand that recruiting sometimes interferes with class. Thus,

- I plan to start promptly and I expect you to be on time.
- If, because of some unusual circumstance you come in late, please enter as surreptitiously as possible.
- If it is necessary for you to leave early, please sit next to a door. Please ask someone to switch seats before class starts if this is necessary.
- You may leave the room briefly if it is an emergency (if you have any doubts, it’s not an emergency).

3.3 Computers in Class

As a general rule, you may not use notebook computers or other handheld computing or communication devices in class, unless you sit in the last row. From time to time I may permit everyone to use computers for specific limited purposes. *At no time are you permitted to perform any e-mail related activities or electronic messaging in class, even if you are sitting in the back row.*

3.4 The Honor Code

In addition to the usual expectations created by the honor code, there are three aspects I want to interpret and emphasize for this class:

- *You must have a full understanding of any written material you submit with your name on it.* I encourage you to work in groups, as I believe this is the best way to learn. You may hand in group problem sets. However, if you are not completely familiar with the contents of a document bearing your name, I will regard this as an honor code violation.
- *You may not sign anyone else’s name to a homework.* [how to word this...]
- *With the exception of material which appears on my current web site, you may not use any material from previous offerings of this course in preparing material to be graded.* For example, you may not look at problem set answers from previous quarters. I do have prior exams posted, and you are free to use them as a resource.
- *There is to be no collaboration of any sort on exams.* (The GMA told me that I need to state this explicitly. So here it is, explicitly, in writing.)

4 Course Outline

I will cover topics in the order listed, but we may move faster or slower than indicated in the outline. If you miss class, be sure to ask a classmate for notes and updates, and also check the web page for announcements and handouts.

4.1 Introduction (Jan 7)

- Review of: continuous compounding, short sales, and miscellany:
 - McDonald (2006a, Section 1.4, Appendix B, Section 7.1)
- Purpose and Overview
 - McDonald (2006a, Chapter 1)

4.2 Basic Concepts, Pricing Relationships, and Strategies (Jan 7, Jan 10, Jan 14)

- Calls, Puts, and Forwards: definitions and diagrams
 - McDonald (2006a, Sections 2.1–2.4)
- Calls and Puts as Insurance
 - McDonald (2006a, Sections 2.5–2.6)

4.3 Pricing Relationships and Strategies (Jan 17, Jan 23)

- Put-Call Parity
 - McDonald (2006a, Section 3.2)
- Spreads, straddles, collars, and other strategies
 - McDonald (2006a, Chapter 3), Simon (2000)*, Marthinsen (2005, Chapter 3), Northrup Grumman Press Release*, Markets (2001)(include link to web)

4.4 Risk Management (Jan 23)

- Producer and Buyer Perspectives
 - McDonald (2006a, Sections 4.1, 4.2, 4.4), Trottman (2001)*, Prystay et al. (2004)*
- Reasons (or not) to Manage Risk
 - McDonald (2006a, Section 4.3)

4.5 Quiz # 1, Jan 24

4.6 Financial Forwards and Futures (Jan 24, Jan 28)

- Pricing financial pre-paid forwards and forwards
 - McDonald (2006a, Sections 5.1–5.3)
- Futures contracts
 - McDonald (2006a, Section 5.4)
- Examples
 - McDonald (2006a, Sections 5.5–5.7), Marthinsen (2005, Chapter 7)

4.7 Commodity Forward and Futures Contracts (Jan 31)

- What's different about commodities?
 - McDonald (2006a, Sections 6.1–6.6)
- Examples of commodity contracts
 - McDonald (2006a, Section 6.7–6.11), Smith (2005), Banham (1999)*, Kilman (1996)*

4.8 Swaps (Feb 4, Feb 7)

- Interest rate and commodity swaps
 - McDonald (2006a, Chapter 8), Marthinsen (2005, Chapter 5) Dunbar (2003)*, NICOR Solutions (2003)*, Securities and Exchange Commission (2003b)*, Securities and Exchange Commission (2003a)*

4.9 Parity and other option properties (Feb 11)

- Parity; currency options
 - McDonald (2006a, Sections 9.1–9.2)
- Properties of Option Prices
 - McDonald (2006a, Section 9.3, pp. 292–298)

4.10 Quiz # 2, Feb 14

4.11 Binomial Option Pricing (Feb 14, Feb 18)

- One-period binomial pricing
 - McDonald (2006a, Section 10.1)
- Multi-period binomial pricing and American options
 - McDonald (2006a, Sections 10.2–10.4, 11.1–11.2)
- Options on other assets
 - McDonald (2006a, Sections 10.5)

4.12 The Black-Scholes formula (Feb 21, Feb 25)

- The Black-Scholes Formula
 - McDonald (2006a, Sections 12.1–12.2, 12.6)
- Option Greeks
 - McDonald (2006a, Section 12.3)
- Payoff and Profit Diagrams
 - McDonald (2006a, Section 12.4)
- Historical Volatility and Implied Volatility
 - McDonald (2006a, Section 11.4, 12.5), Gladwell (2002)*, Marthinsen (2005, Chapter 4)

4.13 Delta-Hedging and Market-Making (Feb 28)

- Risk-management for market-makers
 - McDonald (2006a, Sections 13.1 – 13.3)

4.14 Exotic options (Feb 28)

- Asian and Barrier Options
 - McDonald (2006a, Sections 14.1–14.3)
- Exchange Options
 - McDonald (2006a, Section 14.6)

4.15 Corporate applications (Mar 3, Mar 6)

- Designing Structured Products
 - McDonald (2006a, Chapter 15), Marthinsen (2005, Chapter 2)
- Valuing Corporate Securities
 - McDonald (2006a, Section 16.1)
- Compensation
 - McDonald (2006a, Section 16.2), Marthinsen (2005, Chapter 1),
- Mergers
 - McDonald (2006a, Section 16.3)
- Problem Solving with Financial Engineering
 - McDonald (2006a, Sections 15.6, 16.3), Marshall & Ilsley SPACES Prospectus (web), Bible (2004)

4.16 Quiz # 3, Mar 6

4.17 Real options (Mar 10, Mar 13)

- What are real options?
 - McDonald (2006a, Sections 17.1 – 17.4), McDonald (2006b, link)
- Examples
 - McDonald (2006a, Sections 17.5 – 17.6), Triantis and Borison (2001)*

References

- Banham, R., 1999, “They’re Singin’ in the Rain,” *CFO*, pp. 87–88.
- Bible, P. R., 2004, “Letter to FASB,” <http://www.fasb.org/eitf/0408CL3.pdf>.
- Dunbar, N., 2003, “Revealed: Goldman Sachs’ Mega-deal for Greece,” *Risk*, 16(7), 20–21.
- Gladwell, M., 2002, “Blowing Up,” *The New Yorker*, pp. 162–173.
- Kilman, S., 1996, “As Corn Prices Soar, A Futures Tactic Brings Rancor to Rural Towns,” *Wall Street Journal*.
- Markets, P. C., 2001, *Protecting Your Wealth: Hedging, Monetizing And Diversification Strategies*, Technical report, PNC Bank.
- Marthinsen, J., 2005, *Risk Takers: Uses and Abuses of Financial Derivatives*, Pearson Addison Wesley, Boston.
- McDonald, R. L., 2006a, *Derivatives Markets*, Addison Wesley, Boston, MA, 2nd edition.
- McDonald, R. L., 2006b, “The Role of Real Options in Capital Budgeting: Theory and Practice,” *Journal of Applied Corporate Finance*, 18(2), 28–39.
- NICOR Solutions, 2003, “Natural Gas Marketing Material,” Insert.
- Prystay, C., McDermott, D., Santini, L., and Davis, A., 2004, “How a Singapore Fuel Company Lost \$550 Million in Oil Trading,” *Wall Street Journal*, p. A1.
- Securities and Exchange Commission, 2003a, “SEC Settles Enforcement Proceedings against J.P. Morgan Chase and Citigroup,” Press Release.
- Securities and Exchange Commission, 2003b, “United States Securities and Exchange Commission, Plaintiff, v. J.P. Morgan Chase & Co.” Complaint, United States District Court, Southern District of Texas, Houston Division.
- Simon, R., 2000, “With Stock Hedges, Outcomes Can Vary With the Strategies,” *Wall Street Journal*, p. C1.
- Smith, R., 2005, “Soaring Prices – and the Consequences,” *Wall Street Journal*, p. R4.
- Triantis, A. and Borison, A., 2001, “Real Options: State of the Practice,” *Journal of Applied Corporate Finance*, 14(2), 8–24.
- Trottman, M., 2001, “Southwest Airline’s Big Fuel-Hedging Call is Paying Off,” *Wall Street Journal*, p. B4.