

Stephen M. Ross School of Business  
UNIVERSITY OF MICHIGAN

Derivative Securities

FIN 316, Winter 2009

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Meeting time/place: TuTh 8:30–10:00am, R 1230

Office hours: Wed 2–4pm.

## Course Objective

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 methods. We will make extensive use of Excel.

The math will be basic, including continuous compounding, solving two equations in two unknowns, elementary probability, but the subject is inherently analytical. Expect numerous numerical examples. Please also review basic probability.

## Course Materials

There are two required textbooks for this course:

- **Fundamentals of Derivatives Markets**, 1<sup>st</sup> edition, Pearson-Addison Wesley, by Professor Robert L. McDonald at Northwestern University's Kellogg School of Management. We will closely follow his book. You should also get the Student Solutions Manual for the book that contains correct answers to one half of the all end-of-chapter questions.
- **Risk Takers: Uses and Abuses of Financial Derivatives**, 2008, 2nd edition, by John Marthinsen, who provides nice real life cases on how derivatives are used (and abused) in practice.

I will provide supplementary readings in the CTools Web site. In addition, I recommend the following non-technical books on derivatives and finance in general. I encourage you to read some of these books on your own, preferably before our course formally starts.

- “When Genius Failed: The Rise and Fall of Long-Term Capital Management,” by Roger Lowenstein
- “Big Bets Gone Bad,” by Philippe Jorion, who delineates the financial and human side of the Orange Country bankruptcy

## Prerequisites

The study of derivatives is quantitative. Many equations show up in every lecture. You must be comfortable with basic probability theory, statistics, and some calculus. You also must feel comfortable with a computer package that does statistical analysis and numerical simulations. Excel will do.

## Cases

We adopt the **Action-Based Learning** philosophy in this course and apply analytical concepts of derivatives in real-life settings. There will be about six case presentations throughout the semester. You can work on the cases in teams up to **four** members.

Each team must work on all cases throughout the semester. For each case one team will present their work in class and handle questions. We will spend about 50 minutes on each case: 30 minutes on case presentation and 20 minutes on questions and answers. **I will assign on average higher case and participation grades to members of presenting teams** because they take a higher work load and because I want to encourage active leadership from students. **Please email me if your team wants to present a specific case.** Each team can present at most one case.

Unlike lectures, everyone must prepare ahead of time for a case session to be productive. **Your case/participation grade will depend a lot on your discussions in the case sessions.** Each group must turn in a written report before the presentation. And I will grade your performance in a given case based on your write-up and case discussion in class. Please bring your name card to class at all time. The case presentations (and discussions) are meant to be oral exams. This means that I will not give you any suggestions on the cases unless you are in a presenting team. (I will of course answer clarification questions.) Presenting teams do not need to submit a case write-up, **but must send me their presentation slides at least 24 hours before a case presentation.** I will do some quality control and provide suggestions as I see fit to improve the case presentation.

Case write-ups (5–10 pages) must be submitted using the “Assignment” tool in the course Web site. Each group should submit a single copy of their work, clearly specifying the names of all contributing members. All team members will receive the same grade for each case. The case report should be a self-contained write-up of the results and conclusions. Additional tables and figures can be included. The case assignment will be posted in the course Web site at least one week before each due date. Except for extreme circumstances such as medical emergency, I will not accept late assignments. **Each team will present one case and submit write-ups for all other cases.** I will grade all case write-ups and a presentation for a given team. But for a

given team I will count only **the write-ups with the three highest scores along with the presentation** toward the “25% case presentations and write-ups” in your overall grade.

Requests for a regrade of a case assignment must be submitted in writing no later than one week following the day the grade on the item was returned. Please give your names and section along with a brief summary of why you think the grading was in error. Note that the entire case assignment will be regraded and that a regrade request can often result in a lower grade.

## Teaching Assistant

Our TA is Chen Xue, who is a doctoral student in finance. Chen’s email is xuechen@bus.umich.edu. And he’ll help us grade the assignments and the final exam.

## Exams

There will be a midterm exam and a final exam (dates to be determined). The exams will be closed-book and closed-notes. But you can bring one 8.5 by 11 sheet of notes (double sided) to the midterm and two to the final exam.

The exam questions are similar to end-of-chapter problems in McDonald’s textbook, 1e. I suggest that you use these problems to prepare for the midterm and final.

## Grading

Your grade for the course will be determined according to the following formula:

$$15\% \text{ class participation} + 25\% \text{ case presentations and write-ups} + 25\% \text{ midterm} + 35\% \text{ final exam}$$

I will assign the final grade according to the policy of the Ross School. I will adhere strictly to this policy by ranking students based on their scores and applying the relevant percentile cutoff points.

Regrading period for all exams extends up to one week after the graded exams are made available. If regrading is requested, each and every question will be regraded. There is no selective regrading and regrading can lead to a lower grade. When requesting regrading, you must submit a written (no hand written please) explanation of your questions about the exams to me.

In regard to class participation, you are to display your name card at all times. This grade is determined by the quality of your participation. I will count the following things as class participation:

- Making comments and asking questions in class which are instructive and helpful for the class as a whole.
- 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 that are helpful for the class.

It is entirely possible to earn negative participation points.

## Professional Etiquette

The purpose of etiquette rules is to ensure that no one interferes with the learning of others. I do understand that recruiting sometimes interfere 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 with you before class starts if this is necessary.
- You may leave the room briefly if it is an emergency: if you doubt whether it is an emergency, it's not.

As a general rule, you may not use other handheld communication devices in class. I allow the use of laptops for specific limited purposes such as note-taking. At no time are you permitted to perform any email related activities or e-texting in class. Doing so can lead to negative participation points.

## Academic Integrity

Personal integrity and professionalism are fundamental values of the Ross School community. To help ensure that these values are upheld and to maintain equitability in the evaluation of your work, this course will be conducted in strict conformity with the Academic Honor Code. The code and related procedures can be found at the following Web site:

<http://www.bus.umich.edu/Academics/Resources/communityvalues.htm>

The site also contains comprehensive information on how to ensure that you have not plagiarized the work of others. Claimed ignorance of the code and related information appearing on the site will be viewed as irrelevant should a violation take place.

Any content in an assignment you submit that is based on the work of others must be properly cited. This includes any information found on the Web. The Community Values Committee Web site contains detailed information regarding proper citations:

<http://www.bus.umich.edu/Academics/Resources/communityvalues.htm>

Failure to comply with these procedures is treated as an honor code violation.

To be more specific in this course, the midterm and final exams are to be the work of the individual using only the material permitted during the exam. "Individual" means that you're

only allowed to seek clarification from the instructor or the TA. Collaboration (such as sharing information) among students during the final exam is strictly prohibited. Concerning all other aspects of the course, including the team assignments, you can discuss freely with your classmates, both within or outside your own team. But the work you ultimately turn in for your assignments must be that of your own team. For example, turning in an assignment write-up with at least 25% of the materials identical (verbatim) to those of other teams (or other published sources including the internet) constitutes an honor code violation. The penalty enforced by the CVC (outside the control of any specific professor) is often to fail the course. Please note that my policy on cross-team collaboration probably is more liberal than those from your other courses. Please consult the syllabi from your other courses for guidance.

## **Tentative Course Outline**

The following is a **tentative**, ambitious list of the topics that will be covered in the course. The required readings are listed under each topic. Additional required and supplementary readings will be provided later on the course Web site as the course unfolds. Use handouts of lecture notes as a guide for your study.

### **Overview, Continuous Compounding, Short Sales**

McDonald-Chapter 1, Appendix B

### **Forwards and Options**

McDonald-Chapter 2

### **Insurance, Collars, and Other Strategies**

McDonald-Chapter 3

Case on “Barings Bank PLC: Leeson’s Lessons” (Marthinsen, Chapter 7)

### **Risk Management**

McDonald-Chapter 4

Case on “Metallgesellschaft AG: Illusion of Profits and Losses, Reality of Cash Flows” ((Marthinsen, Chapter 4))

### **Financial Forwards and Futures**

McDonald-Chapter 5

## **The Wide World of Futures Contracts**

McDonald-Chapters 6, excluding Section 6.2

Case on “Amaranth Advisors LLC: Using Natural Gas Derivatives to Bet on the Weather”  
(Marthinsen, Chapter 9)

## **Interest Rate Forwards and Futures**

McDonald-Chapter 7, Section 6.2

Case on “Orange Country: The Largest Municipal Failure in U.S. History” (Marthinsen, Chapter 6)

## **Swaps**

McDonald-Chapter 8

Case on “Swaps That Shook an Industry: Procter & Gamble versus Bankers Trust” (Marthinsen, Chapter 5)

## **Parity and Other Option Relationships**

McDonald-Chapter 9

## **Binomial Option Pricing**

McDonald-Chapter 10

## **The Black-Scholes Formula**

McDonald-Chapter 11

Additional background material on the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel 1997

Black, 1989, How we come up with the option formula, *Journal of Portfolio Management* 4–8.

## **Implied Volatility, Historical Volatility, Volatility Smiles, and Extensions to the Black-Scholes Model**

McDonald-Chapter 11

Whaley, 2000, The investor fear gauge, *Journal of Portfolio Management* 12–17.

Derman and Kani, 1994, The volatility smile and its implied tree

Optional: Rubinstein, 1994, Implied binomial trees, *Journal of Finance* LXIX, 771–818.

## **Hedge Funds**

Bodie, Kane, and Marcus, Investments, 8e, Chapter 26

Case on “Long-Term Capital Mismanagement: ‘JM and the Arb Boys’ ” (Marthinsen, Chapter 8)

[Supplement: HBS Case on “Long-Term Capital Management, L. P.” (A), (B), (C), and (D)]

Hasanhodzic and Lo, 2007, Can hedge-fund returns be replicated? The linear case, *Journal of Investment Management*, 5, 5–45.

## **Credit Risk and the Current Credit Crisis**

McDonald-Chapter 13: Section 13.1, 13.2

Moody’s KMV: Modeling Default Risk

Brunnermeier, 2009, Deciphering the liquidity and credit crunch 2007–2008, *Journal of Economic Perspectives* 23, 77–100.