

Derivatives and Risk Management

Professor: Manuel Moreno

Overview and objectives

The goal of this course is to study the fundamentals of financial risk management using in most of the cases derivatives assets. The course has three main objectives:

- a. To understand the role of financial risk management as well as the techniques available for its measurement in financial and non-financial corporations.
- b. To review the set of financial instruments available in modern financial markets as well as the strategies that a firm can use to optimize the management of the risks this company is faced to, and
- c. To build a framework that will help integrate financial risk management into the overall corporate strategy of the firm.

In summary, the main objective of this course is to present an overview of the different potential applications for risk management of derivative assets. Other potential applications of derivatives that can also be covered are, for instance, a) speculation in markets (how to get money departing from a certain guess on future movements in markets) and b) design of (arbitrage) strategies to make riskless profits from observed arbitrage opportunities.

Course outline

The course is focused on the area of financial risk management with special emphasis on financial derivatives. This type of assets represents one of the key components of modern financial markets. The mere size of derivatives markets (futures, options, swaps, etc) dwarfs that of any other type of markets in existence and is measured in thousands of trillions of U.S. dollars. The key reason for that is that financial assets allow astute investors to easily change risk exposure of their investment portfolios and, thus, tailor them to their particular needs and desires.

In this course we depart from the design, pricing and valuation of financial derivatives and we aim to understand how such contracts are used in the management practice around the world. While pricing of derivatives can be rather technical and complex, the fundamental economic reasoning behind derivatives pricing methods is quite simple. In our approach we aim to always give first the “big picture” and motivation and only then dwell into technical details but only to the extent that it is necessary from the practical applications point of view. At the end of the course you should be able to understand the structure of the main types of derivative contracts, how to price these derivatives and, even more important, thoroughly understand how these assets can be used to manage the exposure to a certain risk.

We will review some of the most commonly used pricing methods and techniques for measuring and managing risk and, then, we will move to the understanding of the use of financial instruments to manage risk.

This part will involve the understanding of international financial markets for interest rates, equity and derivatives. The emphasis here will be in the applications of derivative instruments for pricing and risk management by corporations. We will also review examples throughout the course in which financial engineering of corporate risks was crucial for the success (and failure) of a company's strategy.

Methodology

Every lecture will typically contain some of the following 3 elements:

- a. Presentation and discussion of a reading set.
- b. Case presentation and discussion, and
- c. Lecturing (theory concepts).

The recommended dynamics for the student is to work on the readings set or case before the corresponding session, attend the session and participate actively in the readings or case discussion. Then read the corresponding chapters / readings (if additional details are needed) and work on the corresponding issue after the session.

The Course Schedule below includes a detailed list of all the readings that will be covered through the course. In what follows you will find a description of each of these elements, the class dynamics, and the grading criterion.

Prerequisites

The course will cover some financial instruments and strategies which could be quite complex. The course assumes that students have no prior knowledge about how derivative instruments work and one of the main objectives of the course is to guarantee that students finish with a good handle on the mechanics of these instruments. As most of these instruments are quantitative in essence, familiarity with quantitative and analytical techniques is strongly recommended.

Cases

Several of the lectures include a “Case Discussion.” The cases are meant to summarize and exercise the concepts studied in the lecture/s. As a way to introduce the case and structure its analysis a set of questions will precede the case. All the students are expected to read the cases with the questions in mind in order to contribute to the class discussion. This will be graded through case discussion.

Every case will be assigned to a particular student or group who will be in charge of

1. Handing in a written answer to the questions (synthesis will be rewarded)
2. Introducing the topic during approximately the first part of the class
3. Leading the discussion (extra material, complementary questions...)

These tasks will be graded. The average will constitute the case discussion grade for the particular student/s (in case of group work, all the students will obtain the same grade except the group unanimously decides otherwise).

Lecturing

As a general rule, most of the lectures will introduce new concepts and theory. The objective is to make it as participative and dynamic as possible. Therefore, students are encouraged to intervene with clarifying and constructive questions or remarks anytime during the lecture.

The material covered in every lecture is contained in the recommended readings. The specific material is mentioned opportunely in the course schedule. Due to the obvious time constraint, class slides will only cover the main aspects of every topic. A successful preparation for the exam requires reading the corresponding material and working on the suggested problems (if any) after every session.

Suggested problems

Some lectures may include a suggested set of problems from the recommended readings. These problems are designed to help you understand and digest the course material and serve as a self-guide of your progress and as preparation for the final exam. Students are encouraged to work

regularly on the suggested problems and check personally with the instructor any question/doubt. Some sessions can focus on discussing / solving some of these problems, especially those that elicit questions/doubts from a sufficiently large number of students.

Required Activities

To be determined by professor.

Evaluation

The grade is based on class participation, preparation of readings or cases, problems resolution, and a final exam.

Students will be evaluated on the basis of the following criteria:

1. Class participation (10 points). I expect you to become an active participant in the class. This participation is not limited to preparation and class discussion of the different materials. You should ask questions, raise issues, contribute your knowledge, and challenge the opinion of others (including mine, of course). Quality versus quantity will be rewarded.
2. Case discussion and problems resolution (30 points). Students will be required to discuss and/or present the cases involved in the course. The students will be assigned a certain case. Their discussions / presentations should help to form an opinion about a certain firm's strategies. In general terms, the grade will depend on how you arrived at your conclusions regardless your opinion agrees with mine. Problems resolution is also included in this item.
3. Final exam (60 points). You are allowed to bring in one page (written on both sides) including the material (mathematical expressions, graphs,..) you feel convenient.

Recommended Readings

The course will use class materials including handouts, cases, and some other readings. There exist many very good books that review the basic financial instruments and tools commonly used in derivatives pricing and financial risk management.

- In short, the course will use material extracted from the following books: Chance, D. (2003). "Analysis of Derivatives for the CFA Program". AIMR.
- This book is the classical reference for applications of derivatives (trading, pricing, valuation, and risk management) for preparation for the CFA exam (levels I, II, and III).
- Hull, J. (2011) "Options, Futures and other Derivatives" Prentice Hall, 8th edition.
- This book is a classical reference in this area. It was chosen in 2003 as the "most influential book" on the financial area as a result of a worldwide survey among practitioners and academics.
- This book is the extended version of the following one: Hull, J. (2010) "Fundamentals of Futures and Options Markets" Prentice Hall, 7th edition.
- Jointly with this, some of the following books may be mentioned during the course: Hull, J. (2012). "Risk Management and Financial Institutions" Wiley-Finance, 3rd edition.
- This book provides an excellent survey of the main current risk management techniques for financial institutions and for particular investors.
- Jorion, P. (2000). "Value at Risk", McGraw Hill, 2nd edition. (This book will be referred to from now on as Jorion).
- This book provides an excellent up-to-date review of the main topics around current risk management techniques for financial institutions:
- Stulz, R. (2002). "Derivatives and Risk Management" Southwestern Publishing Company. A very well written reference showing the links between derivatives assets and risk management.

The following papers will be discussed:

- Meulbroek, L. (2002). “A Senior Manager’s Guide to Integrated Risk Management”. *Journal of Applied Corporate Finance*, 56, winter, 56-70.
- Stulz, R. (1996). “Rethinking Risk Management”. *Journal of Applied Corporate Finance*, Fall, 8-24

In addition, some of the following papers can be discussed:

- Edwards, F.R. and Canter,-Michael S. (1995). “The Collapse of Metallgesellschaft: Unhedgeable Risks, Poor Hedging Strategy, or Just Bad Luck?” *Journal of Futures Markets*; 15, 3, 211-64.
- Handley, J.C. (2000). “Variable Purchase Options”. *Review of Derivatives Research*, 4, 219-230.
- Moreno, M. and J.F. Navas (2008). “Australian Options”. *Australian Journal of Management*, 33, 1, 69-93.

Course Schedule

- Identifying, Measuring, and Hedging the Exposure to Financial Price Risk
- Introduction: Course overview, description, and work plan.
- Reasons and incentives for Financial Risk Management (FRM)
- Applications of FRM
- The Building Blocks of Risk Management Systems
- Derivatives assets: trading, pricing, and valuation
- Cross-hedging basis risk and application of basis risk
- Using options and option-like instruments to limit your risk
- Trading strategies with options to achieve optimal risk / payoff strategies (I): Portfolio Insurance and dynamic replication risk
- Trading strategies with options to achieve optimal risk / payoff strategies (II): Is it possible to guarantee an IPO?
- Pricing and risk management strategies with standard and exotic options
- Hedging an Specific Type of Risk: Dealing with Interest Rate Risk
- Interest rate derivatives
- Identifying, measuring, and managing interest rate risk

Course Materials

BOOKS

Main references:

- Chance, D. (2003) “Analysis of Derivatives for the CFA Program”. AIMR.
- Hull, J. (2011) “Options, Futures and other Derivatives” Prentice Hall, 8th edition.
- Hull, J. (2010) “Fundamentals of Futures and Options Markets” Prentice Hall, 7th edition.

Complementary references:

- Hull, J. (2012). “Risk Management and Financial Institutions” Wiley-Finance, 3rd edition.
- Jorion, P. (2000) “Value at Risk”, McGraw Hill, 2nd edition.
- Stulz, R. (2002). “Derivatives and Risk Management” Southwestern Publishing Company.

READINGS

- Handouts on derivatives assets
- Handouts on forward and futures agreements
- Handouts on swaps
- Handouts on options
- Handouts on fixed income assets and interest rate risk management

PAPERS

- Meulbroek, L. (2002). "A Senior Manager's Guide to Integrated Risk Management". *Journal of Applied Corporate Finance*, 56, winter, 56-70.
- Stulz, R. (1996). "Rethinking Risk Management". *Journal of Applied Corporate Finance*, Fall, 8-24
- Edwards, F.R. and Canter,-Michael S. (1995). "The Collapse of Metallgesellschaft: Unhedgable Risks, Poor Hedging Strategy, or Just Bad Luck?" *Journal of Futures Markets*; 15, 3, 211-64.
- Handley, J.C. (2000). "Variable Purchase Options". *Review of Derivatives Research*, 4, 219-230.
- Moreno, M. and J.F. Navas (2008). "Australian Options". *Australian Journal of Management*, 33, 1, 69-93.

CASES

- American Barrick Resource Corporation: Managing Gold Price Risk (HBS 9-293-128)
- Metallgesellschaft AG (HBS 9-194-097)
- Metallgesellschaft AG (IMD 3-0613)
- Pine Street Capital (HBS 9-201-071)
- Speculation in the Financial Futures Market: A Local Tries to Break the Bund (London Metropolitan University 299-099-1)
- The Collapse of Barings (London Business School 401-020-1 and 401-021-1)