

Hong Kong University of Science and Technology

Corporate Risk Management

FINA 513 & 690Y

Fall 2002, Sat. 9 – 12:20, LTG & 4219

COURSE OBJECTIVE

This course discusses risk management and financial engineering issues from the perspective of non-financial corporations. FINA 513 focuses mostly on the theory of corporate risk management. It covers how to measure risk, why firms should or should not hedge, how to hedge with futures and/or options, and the management of foreign exchange rate risk. FINA 690Y focuses on the applications of risk management. It covers the management of interest rate risk, credit risk and equity price risk, and advanced financial engineering issues. We will also discuss special risk management problems in Asia and hear about risk management policies at Cathay Pacific Airlines and MTRC.

INSTRUCTOR

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COURSE PREREQUISITS

To enroll in FINA 513 you must have successfully completed FINA 551: Options and Futures Markets, or possess equivalent knowledge of derivative securities. Familiarity with basic corporate finance issues, which are covered in FINA 512 for example, is strongly recommended.

To enroll in FINA 690Y you must also enroll in FINA 513.

Note: The add/drop period for FINA 690Y ends on November 1, 2002. There is no extended drop period for FINA 690Y.

READINGS

There is no assigned textbook for this course. The required readings (identified by ●) and some optional articles (identified by ○) are contained in two course packs, one for FINA 513 and a second one for FINA 690Y, which will be distributed at the beginning of each course. Lecture notes and further optional materials are available from the course web site.

The following is a list of useful reference books.

J.C. Hull (2000), *Options, Futures and other Derivative Securities*, Prentice Hall, 4th edition

S. Titman and M. Grinblatt (2002), *Financial Markets and Corporate Strategy*, McGraw-Hill, 2nd edition

Brealey and Myers (2000), *Principles of Corporate Finance*, McGraw-Hill, 6th edition

C.W. Smithson, C.W. Smith and D.S. Wilford (1995), *Managing Financial Risk*, Irwin

R. Stulz, *Risk Management and Derivatives*, South-Western College Publishing [not yet published] <http://www.cob.ohio-state.edu/fin/faculty/stulz/index.htm>

ASSESSMENT

The course grades for FINA 513 and FINA 690Y will be based on class participation, homeworks, and two case reports for each course.

	FINA 513	FINA 690Y
Class participation	30%	30%
Homeworks	10%	10%
2 case reports	60%	60%

Class participation: Class participation consists of your comments and questions during lectures and case discussions, as well as case presentations. Remember that the quality of your participation counts more than the quantity.

Your participation will be evaluated after each class. To make sure you receive credit for your class participation, you should display your name card at all times during the class.

Late arrivals are very disruptive to the quality of the learning environment in the classroom. I discourage these strongly. Consistent late arrivals will affect your participation grade negatively. Please also disable your mobile phone/pager during class time.

Homeworks: Homeworks will be distributed occasionally during both courses. You should work on these *individually* and submit a hardcopy of your answers before class

on the due dates. A penalty of 10% will be applied to late homeworks for each day past the due date, except if the answers to the homework are discussed in class. In this case no late homework assignments can be accepted. To accommodate the sometimes erratic work schedules of part-time students I will drop the worst homework grade when calculating your overall homework grade.

Case reports: For each course you need to submit two detailed case reports. You may work in teams of up to five people and submit one report per team. You should share the workload equally among all team members. If you experience any free-rider problems in your team you should inform me as soon as possible. I will handle any complaints confidentially. At the end of the semester there will be a peer evaluation, which may affect your overall case grade.

Those students who submit a case report should prepare themselves to lead the discussion of the case during our meetings. Each team should present a case at least once during the semester.

To ensure that you tackle a case from the right angle and don't overlook critical points you should send me a draft of your report one week before the due date. This will give you the opportunity to incorporate my feedback in your case analysis prior to the case discussion in class.

Both a hardcopy of your report and a computer file containing the report are due at the beginning of the class the case is scheduled for discussion. The computer file that contains the report should be sent as an e-mail attachment. Since we discuss the case solutions in class, late reports cannot be accepted.

CLASS ANNOUNCEMENTS

Announcements and some class materials will be distributed via the course web site and via e-mail. If you do not use your UST account regularly, you should automatically forward incoming e-mail messages to whatever account you are using, so that you will receive all e-mail announcements and class materials without delay.

CASE SCHEDULE

Sept. 14	Aspen Technology
Oct. 5	American Barrick Resource Corp.
Oct. 19	Enron Gas Services
Oct. 26	Walt Disney Company
Nov. 9	Union Carbide Corp.
Nov. 16	Enron Corp.
Nov. 23	IBM
Nov. 30	Avon Products
Nov. 30	Times Mirror Company

COURSE OUTLINE AND READING ASSIGNMENTS

Sept. 7: The building block approach to financial engineering

The nature and sources of risk

Review of derivatives: Payoff diagrams, pricing relationships, historical development

The building block approach to financial engineering

- East Tex Oil: Valuation of an oil-indexed dual-currency bond
- TVX Gold Inc.: Analysis of a gold-linked convertible note

- *Learning with Cases*, Ivey School of Business, University of Western Ontario
- C.W. Smithson (Winter 1987), *A LEGO Approach to Financial Engineering: An Introduction to Forwards, Futures, Swaps, and Options*, Midland Corporate Finance Journal 4, pp. 16 - 28.

Sept. 7: Measuring risk exposures

Transaction, translation, and economic (competitive) exposures

Risk measures: Volatility, RiskGrade™, VaR, CaR

- Smithson, Smith and Wilford (1995), *Chapter 5: Measuring a Firm's Exposure to Financial Price Risk*, in *Managing Financial Risk*, Irwin, pp. 134 - 144
- [Kim and Mina \(2000\), *RiskGrades™ Technical Document*, RiskMetrics Group, pp. 1 - 7](#)

Sept. 14: Measuring risk exposures

Measuring the sensitivity of risk exposures

Case: Aspen Technology, HBS 6-296-027

Sept. 28: Theoretical foundations for financial risk management

Review: The Modigliani-Miller theorem

How managing risk can enhance shareholder value

The limits of risk management

Empirical evidence on corporate risk management

- Fite and Pflleiderer, *Should Firms Use Derivatives to Manage Risk?*, in *Risk Management: Problems and Solutions*, McGraw-Hill, pp. 139 - 169
- Why Manage Risk? HBS Note 294107
- Brealey and Myers (2000), *Chapter 17: Does Debt Policy Matter?*, in *Principles of Corporate Finance*, McGraw-Hill
- [Bodnar and Marston \(1998\), *1998 Survey of Financial Risk Management by U.S. Non-Financial Firms*, George Weiss Center for International Financial Research, Wharton School](#)

Oct. 5: Why a firm should or should not hedge

Case: American Barrick Resources Corp: Managing Gold Price Risk, HBS 9-293-128

- Proxy statement of American Barrick for fiscal year ending Dec. 1992

Oct. 5: Static hedging strategies

Hedging strategies using futures and forwards

- Hull (2000), Chapters 2.8 - 2.10, in *Options, Futures and other Derivative Securities*, Prentice Hall, 4th edition, pp. 35 - 41
- Sercu and Uppal (1995), *Options as Hedging or Speculating Devices*, in *International Financial Markets and the Firm*, pp. 178 - 186

Oct. 12: Dynamic hedging strategies

Hedging strategies using options

Strip versus stack hedges: The case of Metallgesellschaft

- Stulz (2001), *Metallgesellschaft*, in *Financial Engineering and Risk Management*, Chapter 7.6, pp. 40 - 47
- Culp and Miller (1995), *Metallgesellschaft and the Economics of Synthetic Storage*, *Journal of Applied Corporate Finance*

Oct. 19: Risk management at Enron

Case: Enron Gas Services, HBS 9-294-076

Oct. 19: Managing foreign exchange risks

Characteristics of foreign exchange markets

Exchange rate determination

Swaps

- A Note on Currency Swaps, HBS 9-292-043
- Campbell and Kracaw (1993), *Chapter 11: Managing Foreign Exchange Risk*, in *Financial Risk Management*, pp. 302 - 319
- *Economist* (April 2001), *Big Mac Currencies*

Oct. 26: Managing foreign exchange risks

Case: Walt Disney Company's Yen Financing, HBS 9-287-058

Note: Add/drop period for FINA 690Y ends on November 1, 2002.

Nov. 2: Managing interest rate risk

Duration

Asset – liability management

- Hull (2000), Chapters 4.13 – 4.15, in *Options, Futures and other Derivative Securities*, Prentice Hall, 4th edition, pp. 108 - 114
- John Y. Campbell (1995), *Some Lessons From the Yield Curve*, *Journal of Economic Perspectives* 9, 129 - 152
- Jorion and Khoury (1996), *Interest Rate Management: Hedging Assets and Liabilities*, in *Financial Risk Management*, Blackwell Publishers, pp. 73 - 104

Nov. 2: Managing credit risk

The market for credit derivatives

Pricing credit derivatives: The Jarrow-Lando-Turnbull Model (1997)

- Neal and Rolph (1999), *Chapter 1: An Introduction to Credit Derivatives*, in *The Handbook of Credit Derivatives*, Francis, Frost, and Whittaker eds., pp. 3 – 20
- Neal and Rolph (1999), *Chapter 5: Pricing Credit Derivatives*, in *The Handbook of Credit Derivatives*, Francis, Frost, and Whittaker eds., pp. 101 – 138

Nov. 9: Managing interest rate risk

Case: Union Carbide Corp. – Interest Rate Risk Management, HBS 9-294-057

- E. Sheridan (December 1992), *Smarter Than the Average Player*, *Risk Magazine*
- Statement by Thomas Jones, Vice President and Treasurer of UCC in *Bank of America Roundtable on Derivatives and Corporate Risk Management*, *Journal of Applied Corporate Finance* 8 (Fall 1995), pp. 64 – 67

Nov. 16: Managing credit risk

Case: Enron Corporation - Credit Sensitive Notes, HBS 9-297-099

- S.R. Das and P. Tufano (19??), *Pricing Credit-Sensitive Debt When Interest Rates, Credit Ratings and Credit Spreads Are Stochastic*, *Journal of Financial Engineering* 5, 161 - 198

Nov. 16: Financial engineering – the use of warrants & convertibles

Warrants and convertible debt

- P. Tufano (1996), *How Financial Engineering Can Advance Corporate Strategy*, *Harvard Business Review*, January-February, pp. 136 – 141
- Brealey and Myers (2000), *Chapter 22: Warrants and Convertibles*, in *Principles of Corporate Finance*, McGraw-Hill

Nov. 23: Financial engineering – why firms issue put options

Case: IBM: Issuer of Put Options, Darden UVA-F-1009

- *Stock answers*, Risk Magazine (July 1998), pp. 16 – 17

Nov. 23: Financial engineering - why firms issue hybrid securities

Freeport-McMoRan's Gold-Denominated Depositary Shares

- Smithson and Chew (1991), *The Uses of Hybrid Debt in Managing Corporate Risk*, Journal of Applied Corporate Finance, pp. 79 - 89
- Chidambaran, Fernando and Spindt (2001), *Credit enhancement through financial engineering: Freeport-McMoRan's Gold-Denominated Depositary Shares*, Journal of Financial Economics 60, 487 - 528

Nov. 30: Managing equity price risk

Case: Avon Products, HBS 289049

Nov. 30: Managing equity price risk

Case: Times Mirror Co. PEPS Proposal Review, HBS 296089

- Financial Engineering and Tax Risk: The Case of Times Mirror PEPS, HBS Note 297056

Dec. 7: Risk Management at Cathay Pacific Airlines

Presentation by Mr. Keith Fung, General Manager Corporate Finance

Dec. 7: Debt portfolio and risk management at MTRC

Presentation by Mr. Jeff Kwan, Treasury Manager of MTRC

Dec. 14: Risk management in theory and practice

Risk management at Cathay Pacific and MTRC: A critical review

Dec. 21: Managing risk in developing countries

Risk management issues in Asia

- Asia Risk (June 2001), *Cutting through the hype*
- Allayannis, Brown and Kappler (2001), *Exchange-Rate Risk Management: Evidence from East Asia*, University of Virginia Working Paper
- Asia Risk (December 1998), Property knocks

A blue font indicates that the document is available in electronic format from the course web page.

Case Study Questions

You should view your case report as a report to senior management or the board of directors. It is to provide the decision makers with all *relevant* information of a particular case and your policy recommendation. I recommend the following general structure of the report: (1) problem statement, (2) policy recommendation, (3) reasoning / relevant background information. Alternatively, you can follow the outline of the study questions.

There is no formal size limit for a case report, but you should keep in mind that conciseness and clarity make reports more convincing and will be rewarded accordingly. In particular, a summary of the facts from the case **should not include the facts that are not relevant to your analysis**. An important part of this exercise is to distinguish the relevant from the irrelevant, and it is for the team to decide what issues are relevant. Furthermore, you should not explain at length any relevant financial concepts covered in class. Instead, show how these concepts apply to a particular case, assuming that the reader is familiar the finance theory.

Make sure you provide supporting evidence for any claims that you make. Otherwise, they will look like random guesses.

Any spreadsheet printouts provided should be *self-contained*, i.e., one should be able to understand the information given in a table without relying on the main text of the analysis. Tables should include all your assumptions as well as the formulas that are not immediately transparent.

You should start working on a case report at least two weeks prior to the due date. This would allow you to get some feedback from me about your case analysis before you submit your final version.

Aspen Technology, Inc. (quantitative)

1. What are Aspen Technology's main exchange rate exposures?
2. Calculate Aspen's exposures by currency for the past year. What currencies is it long and short?
3. What goal would you recommend for the firm's currency risk management program? Why? Based on your goal, what type of exposure should Aspen be measuring?
4. Should the firm maintain its policy of completely eliminating all exposure on booked sales? If not, what policy would you advocate and why?
5. How, if at all, should Aspen's recent transition from a private to a publicly-traded firm affect its approach to risk management?

American Barrick (qualitative)

1. Background questions
 - a. Describe the value chain in the mining industry, i.e. what general activities do mining firms perform? At which points in this value chain can a mining company create value for its shareholders?
 - b. Briefly describe the market for gold. What is the gold lease rate?
 - c. Briefly characterize American Barrick and its position in the gold mining industry.
2. What is the stated objective of Barrick's hedging program? Is this objective consistent with any of the five theories of hedging? Should a gold mining company like Barrick hedge its gold price exposure? Why, or why not?
3. Describe the instruments that Barrick has used to manage its exposure to gold prices. How would you replicate the cash flows from (i) a gold loan (e.g. the bullion loan with Toronto Dominion Bank to fund the acquisition of the Mercur Mine), (ii) the \$50 million 2% gold-indexed Eurobond (p.8), and (iii) the Cullaton Gold Trust with simple financial securities?

Assume the following return schedule for the Cullaton Gold Trust

<i>Gold price</i>	<i>Return</i>	<i>Gold price</i>	<i>Return</i>
< \$399	3% of production	\$700 - \$799	7% of production
\$400 - \$499	4% of production	\$800 - \$899	8% of production
\$500 - \$599	5% of production	\$900 - \$999	9% of production
\$600 - \$699	6% of production	> \$1000	10% of production

4. What is a spot-deferred contract (SDC)? Is it an option, a forward contract, both, or neither? How does deferring delivery on a SDC differ from rolling over a forward position?
5. *Optional*: Estimate the sensitivity of Barrick's stock returns to changes in the gold price. How does a 1% change in the gold price affect Barrick's market valuation? Compare Barrick's sensitivity to the gold price sensitivities of Homestake Mining and Agnico-Eagle, two companies which do not hedge their gold price exposure.

Additional readings: "A Golden Opportunity" by Shimko and McDonald, and "Golden Rules" by Humphrey

Enron Gas Services (qualitative)

1. Describe the market for natural gas as of 1993 (prices, participants, regulations).
2. Describe Enron Gas Services' business and its position in the gas industry.
3. Describe Enron's supply and delivery contracts. What is the structure of the "Cactus Fund?"
4. Describe Enron's risk management program (ERMS). What are the major risks that Enron faces as a result of its supply and delivery contracts? How does Enron manage these risks?
5. Where in the complex system of contracts does EGS create value for its shareholders?
6. What challenges does Enron face?

Walt Disney (quantitative)

1. Should Disney hedge its yen royalty cash flow? Why or why not? Do not simply recite the theories of hedging but show whether and how they apply in the case of Disney.
2. Assuming a hedge is desirable, what hedging techniques are available to the treasurer (discuss all) and what are the advantages and disadvantages of each?
3. Evaluate Goldman's proposal for an ECU bond issue accompanied by an ECU/Yen swap.
 - a. What is the 'all-in' cost of the yen term loan available to Disney? What is the 'all-in' cost of the proposed ECU bond before executing the currency swap? What are currently (as of 1985) the French utility's borrowing costs in ECU

and Yen? (*Note*: 'all-in' cost generally refers to that discount rate which equates the present discounted value of future debt service payments with the financing proceeds less front-end fees [i.e. the internal rate of return], expressed as an annual rate).

- b. Why would the French utility ever consider swapping obligations with Disney?
- c. What is the 'all-in' cost of the ECU Eurobond swapped into yen for Disney? For the French utility? How well does IBJ make out? Express the gains for all parties in terms of basis points.
- d. What is the origin of these gains?

Union Carbide Corp. (qualitative)

1. You are a member of the Finance and Pension Committee of Union Carbide Corporation's Board of Directors. The firm's finance staff has come before you with their proposal for managing interest rate risk. What questions will you ask the team? What is your response to the team's proposal?
2. In analyzing this proposal, you may want to consider the following questions:
 - a. Do the objectives of the plan make sense? If not, what objectives would you suggest? *Hints*: The four objectives of the plan are discussed on pages 5-6. What theories of corporate risk management might motivate the fourth objective: protecting the equity value from interest rate movements? Is the plan consistent with the implications of the theory?
 - b. Is it sensible to characterize the firm's normalized portfolio in terms of its duration? If not, what alternative would you suggest?
 - c. UCC tries to analyze the duration of its assets in Exhibit 6. Is the analysis correct? If not, how could it be improved?
 - d. Critique the proposed implementation program. Does it follow from the analysis that precedes it? *Hints*: Do you agree with the limited active approach for long-dated instruments (p.9), and the active approach for short-dated instruments (p.10)? Do you think the performance measurement plan (p.10-11) is sensible?
 - e. Will you approve the program? If not, what modifications to it would you recommend?

Enron Corporation (qualitative & quantitative)

1. Based on Exhibits 2-7, describe the determinants of credit spreads and credit spread volatility. Provide intuition for your results.
2. Analyze Enron's credit sensitive note. Consider the following questions.
 - a. How does Enron's note differ from standard bonds?

- b. Is the embedded credit derivative sensitive to default and/or recovery risk?
 - c. How does the yield on Enron's credit sensitive note compare to the market conditions for corporate bonds at the time of issue?
 - d. What are possible motives for Enron to issue the credit sensitive note? What are the benefits to Enron, and where could these benefits come from?
3. As a buyer of Enron's credit sensitive note, how would you analyze its value? What are the benefits of this issue to a buyer?

IBM (update)

1. How should IBM fulfill its share acquisition requirements for 1992?
2. Should the company pursue the put-option strategy?
3. Does the put-option strategy hedge IBM's ESPP position? What policies, if any, should be instituted along with an issuer put-option program to minimize the risk to IBM?
4. Should the treasury department be allowed to make money like other IBM profit centers? Why, or why not?
5. How would you expect the stock market to react to IBM's move to begin writing put options on its own shares? How do you think current shareholders and employees would perceive such a strategy?

Avon Products, Inc. (quantitative)

1. Briefly evaluate Avon's financial condition as of the end of 1987. Why was Avon reducing its dividend?
2. Value Avon's PERCS. As an institutional investor holding Avon stock, would you accept the exchange offer or keep the common stock?
3. What was the purpose of the exchange offer?

Times Mirror PEPS Proposal Review (quantitative)

1. Describe the PEPS in terms of simple financial contracts (building blocks, e.g. stocks, options, bonds, etc.). What are the salient institutional features of the PEPS proposal?

2. Does the pricing proposed by Morgan Stanley appear to be “fair” from the perspective of potential investors? What are the key sensitivities of your pricing analysis? What important assumptions have you made? What aspects of the contract have you ignored, and how might they affect your valuation?
3. Why would Times Mirror issue the PEPS? How large is Times Mirror’s net benefit from issuing the PEPS as compared to its other alternatives? Calculate the sources of value (and costs) to Times Mirror of issuing the PEPS transaction instead of selling its Netscape shares privately. What are the largest sources of value and costs? What risks must Times Mirror bear to carry out this strategy?
4. Does everyone “win” in this case? If so, how can that be?