

Fin 829: Risk Management

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This course is designed to train the participants in evaluating and managing risks using an enterprise-wide approach. Most of the course deals with financial risks. The course starts with an analysis of how risk management contributes to firm value. A general framework for how to use risk management to create value is presented next. The course then examines the measurement and management of market risks, cash flow risks for non-financial firms, interest rate risks, credit risks, and operational risks. The course turns next to the implementation issues of enterprise-wide risk management, showing how to aggregate risks across the firm and how to use a firm-wide risk measure to make various corporate decisions and to evaluate performance within the firm. The course finishes with a discussion of recent issues in risk management. The emphasis of the course is on creating value with risk management rather than on the technical details of statistical measurement and pricing of derivatives. The material is necessarily analytical and quantitative, but the course does not require knowledge of mathematics and statistics beyond what is required for the prerequisites. Students have to be comfortable with Excel, Black-Scholes, and the CAPM to attend successfully; if you are not comfortable with these tools, you should not take the course. Risk management problems for financial intermediaries as well as for firms outside the financial sector are also examined. Students will learn how to manage financial risks through lectures, exercises, cases, and guest lectures from practitioners. A major component of the course is a four-part case that covers all aspects of integrated risk management. At the completion of that case, students will have measured firm-wide risk for a financial institution.

Course materials: Risk Management and Financial Institutions, by John C. Hull, Prentice Hall, is the required textbook. My textbook Derivatives and risk management, by René M. Stulz, Southwestern, 2003, is useful but not required. Some chapters from that textbook are assigned as required readings. The four-part case, “Integrated Risk Management”, will be made available on the course website on Carmen. The PowerPoint slides for the lectures will be available on the course website prior to each class. All the required readings are available in a course package available at Uniprint.

Course requirements: Students will be responsible for six assignments and a final examination. The assignments can be prepared in groups of no more than five students. You should form groups on your own. If you have a difficulty doing so, you should contact me. You should inform the TA of the group composition by Friday April 3rd. No late assignments will ever be accepted. Four assignments are parts of a single case that covers all aspects of integrated risk management for a major financial institution. It is important for students to understand that the case requires cumulative knowledge. It is therefore critical for students to work on all parts of the case and keep up with the classes.

If you are unwilling to make a commitment to preparation at a high level and consistently follow through on it throughout the quarter, then DO NOT TAKE THIS CLASS.

Course grades:

Assignments (you will have six assignments in total): 125 points

- Assignment related to the market risk measurement part of the four-section case: 50 points
- The other five assignments: 15 points each

Final examination: 125 points

Class participation: 50 points

Total: 300 points (= 125 + 125 + 50)

Office hours: I will be available immediately after each class. I will also be available on Wednesdays from 1:30 pm to 3 pm. Finally, I will also be available by appointment. I can be contacted anytime by e-mail.

Review session: There will be a review session the Saturday morning before the last week of classes, on May 30, at 11 am.

Teaching assistant: The teaching assistant is Jérôme Taillard. His e-mail address is taillard_1@fisher.osu.edu. His office is 810 Fisher Hall; his office phone number is 292-2830. You should let him know ahead of time if you need to be excused for a class. He will keep class attendance.

Academic integrity: Each student in this course is expected to be familiar with and abide by the principles and standards set forth in The Ohio State University's code of student conduct and code of academic conduct. You can view these documents or download pdf versions at: [OSU Standards of Conduct](#) and [OSU Academic Standards](#).

It is also expected that each student will behave in a manner that is consistent with the Fisher Honor Statement, which reads as follows:

As a member of the Fisher College of Business Community, I am personally committed to the highest standards of behavior. Honesty and integrity are the foundations from which I will measure my actions. I will hold myself accountable to adhere to those standards. As a future leader in the community and business environment, I pledge to live by these principles and celebrate those who share these ideals.

While most students have high standards and behave honorably, like every academic institution we sometimes encounter cases of academic misconduct. It is the obligation of students and faculty to report suspected cases of academic and student misconduct. Students can report suspected violations of academic integrity or student misconduct to faculty or to a program's leadership. All reported cases of academic misconduct are actively pursued and confidentiality is maintained.

All group work has to be done by the group without outside help and without consulting case notes of students who attended the course in earlier years in the MBA program or in executive sessions. Failure to adhere to this requirement would result in a failing grade for the whole group.

Web site: Detailed assignments, PowerPoint slides, and supplemental materials will be posted online at the Carmen website for the course.

Grading: As required by school policy, grading will be based on relative rather than absolute standards. The average grade in this course will be a 3.6 or lower. It is possible to earn any of the official OSU grades, from A to E, in this course. Grades below B have been given in this course. Grades will only be reconsidered if you file an appeal within one week of the return of an assignment or test. Your appeal must be written and must specify clearly your grounds for appeal. If an appeal is filed, the whole assignment or test will be regarded.

Course Topics and Estimated Timetable

1. March 30. Course introduction and overview.

Hull, Chapter 1.

Stulz, Chapter 1 (in packet).

Deloitte, 2007, Global Risk Management Survey: Fifth edition.

Stulz, Should we be afraid of derivatives, Journal of Economic Perspectives.

2. April 1, April 6, and April 8. Integrated risk management and value creation.

The Bear Stearns case (1st assignment) will be due on April 8 and discussed in class that day.

2.1. What does value creation mean?

- Measuring value creation: EVA™ and other approaches.

2.2. How can integrated risk management create value?

- Reducing bankruptcy and distress costs.
- Funding disruptions.
- Taxes.
- Stakeholder costs.
- Managerial compensation and incentives.
- Large shareholders.
- Planning and renegotiation costs.

2.3. Mapping the risks corporations face.

- Market risks.
- Credit risks.
- Operational risks.

- Political and regulatory risks.
- 2.4. Is there an optimal risk level?
 - Marginal cost of bearing risk.
 - Determinant of this cost across firms.
 - Marginal cost of reducing risk with:
 - Derivatives.
 - Operations.
 - Investment policy.
 - Diversification.
 - Insurance.
 - Convergence products (contingent capital).
 - The optimal amount of risk for a corporation.
- 2.5. Implementing integrated risk management.
 - Risk monitoring versus managing risk.
 - Strategic decisions.
 - Tactical decisions.
 - The role of risk measures.
- 2.6. How do we know that integrated risk management creates value?
 - Empirical evidence.

Stulz, René, 1996, "Rethinking Risk Management," Journal of Applied Corporate Finance, Vol. 9, No. 3 (Fall), pp. 8–24.

Hull, Chapter 2.

Stulz, Chapter 3 (in packet).

3. Measuring risk. April 13, 15, and 20.

Market Risk Problems (2nd assignment), due on April 20.

Market Risk Measurement section of four-part case (3rd assignment), due April 29.

3.0. Exposure measurement (Hull, Chapter 3)

3.1. Value-at-risk

- Definition (Hull, 8.1-8.3)
- Volatility and correlations (Hull, sections 5.1.-5.7., 5.10, 6.1.-6.2)
- Riskmetrics™ approach (Hull, 8.4, 10.1-10.4)
- Derivatives and VaR.
 - Delta VaR (Hull 10.5)
 - VaR and the collapse of Barings.
- Introduction to Monte Carlo
- Full valuation Monte Carlo approach (Hull, 10.7)
- Full valuation historical approach (Hull, 9.1-9.3)
- VaR and fat tails (Hull, 10.8)
- Empirical evidence on VaR.
- VaR versus other risk measures for institutional investors.

- Risk management at Goldman Sachs.
- VaR and regulatory capital.
- VaR in practice.

3.2. Beyond VaR.

- Measuring expected tail loss.
- Forecasting VaR in the presence of liquidity risks (Hull, 15.7)
- Stress tests.
 - The BIS survey.
 - Stress tests at JP Morgan Chase.
- Uncovering black holes.

Stulz, Chapter 4, Section 4.1. (in packet).

Litterman, Robert, 1996, Hot Spot (tm) and Hedges, *Journal of Portfolio Management*, Special Issues, pp. 52–75.

Berkowitz, Jeremy and James O'Brien, "How Accurate are Value-at-Risk Models at Commercial Banks?", *Journal of Finance*, Vol 57, No 3, pp. 1093–1112.

4. Credit and interest rate risks. April 22, 27, and 29; May 4. Part of the class of April 29 will be used to discuss the Market Risk Case.

Credit Risk Measurement section of four-part case (4th assignment), due on May 4.

- 4.1. Measuring interest rate risks (Hull, Chapter 4)
 - Duration and convexity
 - Duration VaR
 - Using interest rate models
- 4.2. Hedging interest rate risks
 - Using swaps
 - Using caps and floors
- 4.3. Measuring credit risks
 - Estimating default probabilities (Hull, 11.1-11.4)
 - Merton's model (Hull 11.6)
 - The approaches of Duffie and Singleton and Jarrow and Turnbull
 - KMV, CreditMetrics™ and CreditRisk+ (Hull Chapter 12)
 - Measuring default correlations
- 4.4. Credit derivatives and hedging with credit derivatives (Hull, Chapter 13)
 - CDS
 - Credit indices
 - CDOs

Stulz, *Risk Management and Derivatives*, Chapter 18 (in packet).

5. Operational risk. May 6 and 11.

Operational Risk Measurement section of four-part case (5th assignment), due on May 13.

- 5.1. Definitions.
- 5.2. The top-down approach.
- 5.3. The bottom-up approach.
- 5.4. Basel II and operational risk.

Hull, Chapter 14.

5. The practice of integrated risk management. May 13, 18 and 20.

Firm-wide risk measurement section of four-part case (6th assignment), due on May 27.

May 27: Brian Nocco, CFO of XL Insurance

- 6.1. Using a risk measure to set the optimal amount of capital and economic capital (Hull, 16.1)
- 6.2. Measuring risk at the firm level
- 6.3. Methods to aggregate risk
- 6.4. Estimating a firm-wide loss distribution (Hull, 16.2, 16.3)
- 6.5. Correlations across risks
- 6.6. Decomposing VaR (Hull 8.5)
- 6.7. Measuring the impact of a trade
- 6.8. Managing a trading desk with VaR
- 6.9. Risk measures and investment policy
- 6.10. Risk measures and performance evaluation
- 6.11. Risk measures and compensation
- 6.12. Risk measures and intra-firm capital allocation (Hull, 16.6)
- 6.13. First and second generation RAROC models (Hull, 16.8)
- 6.14. Evaluating strategic risks

Stulz, Chapter 4, Sections 4.2. and 4.3. (in packet).

Nocco, Brian, and René M. Stulz, 2006, Enterprise Risk Management: Theory and Practice, Journal of Applied Corporate Finance, Vol. 18, No. 4 (Fall) pp. 8-20.

7. Lessons from recent events for risk management, May 27 and June 1.

- 7.1. The subprime crisis.
- 7.2. The quant meltdown.
- 7.3. Marking-to-market CDOs.
- 7.4. AIG and the role of CDS.

- 7.5. The role of hedge funds.
- 7.6. The role of risk management failures.
- 7.7. The future of risk management.

Brunnermeier, Markus, 2009, Deciphering the liquidity crisis, *Journal of Economic Perspectives*.

KPMG, 2008, Never again? Risk management in banking beyond the credit crisis.

Andrew G Haldane, 2009, Why banks failed the stress test, Bank of England.

Stulz René, 2008, Risk management failures: What are they and when do they happen?, *Journal of Applied Corporate Finance*.