

Advanced Finance/ERM Exam

Fall 2009

Important Exam Information:

<u>Exam Date and Time</u>	A read-through time will be given prior to the start of the exam—15 minutes in the morning session and 15 minutes in the afternoon session.
<u>Exam Registration</u>	Candidates may register online or with an application.
<u>Study Note Order Form</u>	Study notes are part of the required syllabus and are not available electronically.
<u>Introductory Study Note</u>	The Introductory Study Note has a complete listing of all study notes as well as errata and other important information.
<u>Case Study</u>	This case study will also be provided with the examination. Candidates will not be allowed to bring their copy of the case study into the examination room.
<u>Past Exams</u>	Past Exams from 2000-present are available on SOA web site.
<u>Updates</u>	Candidates should be sure to check the Updates page on the exam home page periodically for additional corrections or notices.

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Syllabus for Advanced Finance/ERM:

The candidate should be very familiar with the Learning Objectives as described in the Basic Education Catalog. These Learning Objectives are the first ingredient in developing the syllabus and also guide the examination committee when writing questions. The Learning Objectives set out the cognitive level needed to pass this exam. You will notice that the candidates are expected to “analyze,” “explain,” “calculate,” “describe,” “apply,” etc. While studying the syllabus material, candidates may want to refer back to the Learning Objectives to remain focused on the goals of the exam.

1) Risk Definitions, Categories, and Identification

- a) Identify and describe financial market risks faced by an entity, including but not limited to currency risk, credit risk, spread risk, liquidity risk, interest rate risk, and equity risk.
- b) Identify and describe insurance risks faced by an entity, including but not limited to: mortality risk, morbidity risk, catastrophe risk, product risk, embedded options
- c) Identify and describe operational risks faced by an entity, including but not limited to:
 - Market Conduct (e.g., sales practices)
 - HR risk, e.g., productivity, talent management, employee conduct
 - Process risk, e.g., supply chain, R&D
 - Technology risk, e.g., reliability, external attack, internal attack
 - Judicial risk, e.g., litigation
 - Compliance risk, e.g., financial reporting
 - Internal and External fraud
 - Execution risk
 - Governance risk
 - Supplier/partner risk
 - Disaster risk, e.g., natural disaster, man-made disaster
- d) Identify and describe strategic risks faced by an entity including, but not limited to
 - Product sustainability risk
 - Distribution sustainability risk
 - Consumer preferences and demographics
 - Geopolitical risk
 - Competitor risk
 - External relations risk
 - Legislative/Regulatory risk
 - Reputation Risk
 - Sovereign risk

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SYLLABUS RESOURCES

- Hardy, *Investment Guarantees*, 2003
 - Ch. 1, Investment Guarantees,
 - Ch. 6, Modeling the Guarantee Liability
- Tilman, *Asset/Liability Management of Financial Institutions*, 2003
 - Ch. 1, The Task of Asset/Liability Management, by L. Tilman
 - Ch. 16, Understanding Options Embedded in Insurers' Balance Sheets, by L. Rubin.

- FE-C102-07: General American Life Can't Pay Investors, Looks at Suitors
- FE-C104-07: Insurance OP Risk: The Big Unknown
- FE-C106-07: Mapping of Life Insurance Risks, AAA Report to NAIC
- FE-C137-07: Moody's Looks at Risk Management and the New Life Insurance Risks
- FE-C151-08: Atkinson and Dallas, Ch. 13 (Sections 13.1 – 13.4), Annuity and Investment Products
- FE-C153-09 : Variable Annuity – “No Loss” Propositions
- FE-C154-09 : Life Insurance Pricing and the Measurement of the Duration of Liabilities
- FE-C159-09: Countering the Biggest Risk of All by Slywotzky and Drzik
- FE-C160-09: Moody's Looks at Terrorism Risk in the U. S. Life Insurance Industry February 2006.
- FE-C169-09: Atkinson and Dallas, Ch. 3, Pricing Assumption

- “Death Benefit Focused UL”, Product Development section newsletter, April 2003 <http://www.soa.org/library/newsletters/product-development-news/2003/april/pdn0304.pdf>
- Enterprise Risk Management Specialty Guide, SOA 2006 <http://www.soa.org/library/professional-actuarial-specialty-guides/enterprise-risk-management/2005/august/spg0605erm.pdf>
- “Fixed Annuities in Low Interest Rate Environment”, Product Development newsletter, April 2003 <http://www.soa.org/library/newsletters/product-development-news/2003/april/pdn0304.pdf>
- “Influenza Pandemics: Are We Ready for the Next One”, by Max Rudolph, Risk Management section newsletter, July 2004 <http://www.soa.org/library/newsletters/risk-management-newsletter/2004/july/rmn0407.pdf>
- “Managing Variable Policyholder Behavior Risk”, Product Development newsletter, March 2005 <http://www.soa.org/library/newsletters/product-development-news/2005/march/pdn0503.pdf>
- “Whither the Variable Annuity”, Product Development section newsletter, November 2003 <http://www.soa.org/library/newsletters/product-development-news/2003/november/pdn0311.pdf>
- “Operational and Reputational Risks: Essential Components of ERM”, by M. Rochette, Risk Management, December 2006. <http://www.soa.org/library/newsletters/risk-management-newsletter/2006/december/RMN0612.pdf>

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2. Value, Accounting Measures, and Risk Quantification

- a. Describe basic accounting concepts used in producing financial statements:
 - in insurance companies
 - in other financial institutions
 - in non-financial institutions
- b. Analyze a specific company financial situation by demonstrating advanced knowledge of balance sheet and income statement structures.
- c. Describe economic measures of value (e.g. EVA; embedded value) and their uses in corporate decision-making process.
- d. For companies with capital requirements, define and describe how to calculate required capital on an economic capital basis.
 - Define the basic elements and explain the uses of economic capital.
 - Explain the challenges and limits of economic capital calculations and explain how it may differ from external requirements of rating agencies and regulators.
- e. Define risk metrics to quantify major types of risk exposure in the context of an integrated risk management process.
 - Describe risk aggregation techniques incorporating the use of correlation
 - Describe how and why risks are correlated, and give examples of risks that are positively correlated and risks that are negatively correlated.
 - Assess the overall corporate risk exposure arising from financial and non-financial risks.
- f. Explain the limitations of risk metrics
- g. Define and explain model risk

SYLLABUS RESOURCES

Crouhy, Galai, & Mark, *Risk Management*, 2001

Ch. 5, "Measuring Market Risk: The VaR Approach

Ch. 6, "Measuring Market Risk: Extensions of the VaR Approach and Testing the Models

Ch. 15, Model Risk

Fridson, Alvarez *Financial Statement Analysis: A Practitioners Guide*

Ch. 1, The Adversarial Nature of Financial Reporting

Ch. 13, Credit Analysis

Background only:

Ch. 2, The Balance Sheet

Ch. 3, The Income Statement

Ch. 4, The Statement of Cash Flows

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Hardy, *Investment Guarantees*, 2003,
Ch. 9, “Risk Measures”
Ch. 10, “Emerging Cost Analysis”
Ch. 11, “Forecast Uncertainty”

Tilman, *Asset/Liability Management of Financial Institutions*, 2003
Ch. 24, Accounting Standards and Requirements, by E. Habayeh & S. Sethi

- FE-C142-07: “Theory and Practice of Model Risk Management” Ricardo Rebonato
- FE-C143-07: Dynamic Financial Models of Property-Casualty Insurers
- FE-C149-07: Use of Stochastic Techniques to Value Liabilities under Canadian GAAP
- FE-C162-09: EVA and Strategy
- FE-C163-09: Modern Valuation Techniques, Staple Inn Actuarial Society, February 2001.
- FE-C164-09: CSFB Credit Portfolio Modeling Handbook – Ch. 4 “Demystifying copulas”
- FE-C165-09: CSFB Credit Portfolio Modeling Handbook – Ch. 9 “Risk measures: how long is a risky piece of string?”
- FE-C166-09: Black Monday and Black Swans

- Actuarial, Stochasticity and Risk Management: The Real Lessons of Long-term Capital Management,” by B. Crompton, *The Actuary*, September 2007.
<http://www.soa.org/library/newsletters/the-actuary-magazine/2007/august/act2007aug.aspx>

- “An Overview of Embedded Value,” H. Mueller, *Financial Reporter*, Sept. 2003.
<http://www.soa.org/library/newsletters/financial-reporter/2003/november/frn-2003-iss55-mueller.pdf>

- Economic Capital for Life Insurance Companies, SOA Monograph, 2008
<http://www.soa.org/files/pdf/research-ec-report.pdf>

- “Fair Value – Financial Economics Perspective,” by Babbel, Gold and Merrill NAAJ,
http://www.soa.org/library/journals/north-american-actuarial-journal/2002/january/naaj0201_2.pdf

- “Fair Valuation of Insurance Liabilities: Principles and Methods,” AAA Monograph, September 2002 http://www.actuary.org/pdf/finreport/fairval_sept02.pdf

- FASB Summary of FAS 157 -- <http://www.fasb.org/st/summary/stsum157.shtml>

- Risk Aggregation for Capital Requirements Using the Copula Technique”, Song Zhang, *Risk Management Newsletter*, March 2005, Issue #4 <http://www.soa.org/library/newsletters/risk-management-newsletter/2005/march/rmn0503.pdf>

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3. Risk Management

General

- a. Explain the rationale for managing risk and for the selection of the appropriate risk retention level.
- b. Identify and describe means for transferring risk to a third party, and identify the costs and benefits of doing so.
- c. Identify and describe means for reducing risk without transferring it (internal hedges)
- d. Describe how the performance of risk transference activities may be evaluated.
- e. Describe risk management techniques that can be used to deal with financial and non-financial risks.

Asset Liability Management

- f. Describe how derivatives, synthetic securities, and financial contracting may be used to manage interest rate risk, including key rate risks.
 - Contrast modified duration and effective duration measures.
 - Calculate effective duration and effective key-rate durations of a portfolio.
 - Explain the concepts of immunization including modern refinements and practical limitations.
- g. Describe how derivatives, synthetic securities, and financial contracting may be used to manage equity risk, in particular, equity market guarantees found in variable annuities.

Credit Risk Management

- h. Define and evaluate credit risk as related to fixed income securities.
- i. Define and evaluate spread risk as related to fixed income securities
- j. Describe best practices in credit risk measurement, modeling, and management.
- k. Define credit risk as related to derivatives, define credit risk as related to reinsurance ceded, define counter-party risk and describe the use of comprehensive due diligence and aggregate counter-party exposure limits.
- l. Describe risk mitigation techniques and practices: credit derivatives, diversification, concentration limits, and credit support agreements.

Liquidity Risk Management

- m. Define liquidity risk.
- n. Describe methods for managing this risk, both pre-event and post-event
- o. Understand examples of company disasters that were the result of these types of risks – what the exposure was, what occurred, the sequence of events, what actions management took, didn't take and could have / should have taken, what the financial impacts and general consequences were.

Strategic Risk Management

- p. Define strategic risk
- q. Describe methods for managing this risk, both pre-event and post-event

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- r. Understand examples of company disasters that were the result of these types of risks – what the exposure was, what occurred, the sequence of events, what actions management took, didn't take and could have / should have taken, what the financial impacts and general consequences were

Operational Risk Management

- s. Define operational risk
- t. Describe methods for managing this risk, both pre-event and post-event
- u. Understand examples of company disasters that were the result of these types of risks – what the exposure was, what occurred, the sequence of events, what actions management took, didn't take and could have / should have taken, what the financial impacts and general consequences were.

SYLLABUS RESOURCES:

Crouhy, Galai, & Mark, *Risk Management*, 2001

- Ch. 7, Credit Rating Systems
- Ch. 8, Credit Migration Approach to Measuring Credit Risk
- Ch. 9, The Contingent Claim Approach to Measuring Credit Risk
- Ch. 10, Other Approaches: The Actuarial and Reduced-Form Approaches to Measuring Credit Risk
- Ch. 12, Hedging Credit Risk
- Ch. 13, Managing Operational Risk

Damoradan, *Strategic Risk-Taking*, 2007

- Ch. 9, Risk Management: The Big Picture
- Ch. 10, Risk Management: Profiling and Hedging
- Ch. 11, Strategic Risk Management
- Ch. 12, Risk Management: First Principles

Hardy, *Investment Guarantees*, 2003,

- Ch. 8, "Dynamic Hedging for Separate Account Guarantees"
- Ch. 12, "Guaranteed Annuity Options"

Tiller, *Life, Health and Annuity Reinsurance*, 3rd Edition., 2005,

- Ch. 5, "Advanced Methods of Reinsurance"
- Ch. 16, "Assumption"
- Ch. 17, "Special Purpose Reinsurance Companies"

Tilman, *Asset/Liability Management of Financial Institutions*, 2003

- Ch. 9, "Measuring and Marking Counterparty Risk," by E. Canabarro & D. Duffie
- Ch. 25, Implications of Regulatory and Accounting Requirements for Asset/Liability Management Decisions, by Hida, Habayeb, Yetis, & Sethi.

- FE-C117-07: *Integrated Risk Management*, Doherty, Chapters 1, 7, and 8

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- FE-C102-07: General American Life Can't Pay Investors, Looks at Suitors
- FE-C118-07: Securitization of Life Insurance Assets and Liabilities
- FE-C127-07: Asset Liability Management for Insurers
- FE-C128-07: Asset/ Liability Management, IASA Handbook
- FE-C129-07: Principles for the Management of Interest Rate Risk
- FE-C130-07: Hedging with Derivatives in Traditional Insurance Products
- FE-C135-07: Financial Oversight of Enron: The SEC and Private-Sector Watchdogs (pp. 97-127 only)
- FE-C141-07. Letter to SEC Regarding Fitch Ratings' View on the Role and Function of Rating Agencies in the Operation of Securities
- FE-C145-07: Dynamic Financial Condition Analysis Handbook, Ch. 1 (background only), 8 and Appendix A
- FE-C147-07: Derivatives: Practice and Principles, pp. 13-24 and 43-52
- FE-C155-09: Chapter 1 of, *Investment Management for Insurers*, Babbel & Fabozzi
- FE-C156-09: Key Rate Durations: Measures of Interest Rate Risks
- FE-C157-09: Long-Term Economic and Market Trends and Their Implications for Asset-Liability Management of Insurance Companies
- FE-C158-09: Variable Product Hedging Practical Considerations
- FE-C167-09: Hedging the Bet: Variable Annuity "Bells and Whistles"
- FE-C168-09: Chapter 1 of *Credit Portfolio Management*, C. Smithson,
- FE-C170-09: Why COSO Is Flawed, by A. Samed-Khan

- "Liquidity Risk Measurement," CIA Educational Note
<http://www.actuaries.ca/members/publications/1996/9626e.pdf>

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4. Enterprise Risk Management Framework

- a. Define Enterprise Risk Management.
- b. Describe the fundamental concepts of financial and non-financial risk management and evaluate a particular given risk-management framework.
- c. Describe how an organization can create a risk management culture including: risk consciousness, accountabilities, discipline, collaboration, and communication.
- d. Describe elements of risk governance, and how these issues are resolved through organizational structure.
- e. Describe various regulatory/industry frameworks: Basle II, Sarbanes-Oxley Act, OSFI Supervisory Framework, OSFI Standard of Sound Financial and Business Practices, UK FSA guidelines, and COSO.
- f. Understand the perspectives of regulators, rating agencies, stock analysts, and company stakeholders and describe how they evaluate the risks and the risk management of an organization.

SYLLABUS RESOURCES

Crouhy, Galai, & Mark, *Risk Management*, 2001,

- Ch. 2, The New Regulatory and Corporate Environment”
- Ch. 3, Structuring and Managing the Risk Management Function in a Bank
- Ch. 17, Risk Management in the Future

- FE-C117-07: Chapter 1, 7 and 8 of *Integrated Risk Management*, Doherty
- FE-C129-07: Principles for the Management of Interest Rate Risk
- FE-C133-07: Internal Control – Guidance for Directors on the Combined Code
- FE-C134-07: Supervisory Framework – 1999 and Beyond (OSFI – Canadian)
- FE-C139-07: No Assurance of Good Governance: Observations on Corporate Governance in the U.S. Insurance Sector
- FE-C171-09: Insurance Criteria: Refining the Focus of Insurer Enterprise Risk Management Criteria, Standard & Poor’s, June 2006.
- FE-C172-09: Enterprise Risk Management – Integrated Framework: Executive Summary, COSO, September 2004.
- FE-C173-09: Risk Management and the Rating Process for Insurance Companies, Best Rating Methodology, January 2008.

- “Actuarial Aspects of SOX 404”, The Financial Reporter, Dec. 2004,
<http://www.soa.org/library/newsletters/financial-reporter/2004/december/frn0412.pdf>

- Enterprise Risk Management Specialty Guide, SOA 2006
<http://www.soa.org/library/professional-actuarial-specialty-guides/enterprise-risk-management/2005/august/spg0605erm.pdf>

- “Responsibilities of the Actuary for Communicating Sarbanes-Oxley Controls” The Financial Reporter, Dec. 2004,
<http://www.soa.org/library/newsletters/financial-reporter/2004/december/frn0412.pdf>

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5. Enterprise Risk Management Process

- a. Explain the ERM process steps to be followed once the ERM framework is in place:
 - Risk identification
 - i. Defining and categorizing risk
 - ii. Qualitative risk assessments
 - Risk quantification
 - i. Scenario development / types of scenarios
 - ii. Individual risk quantification, including inherent vs. residual exposures
 - iii. Quantifying enterprise risk exposure, including correlations of risks
 - Risk management
 - i. Defining risk appetite
 - ii. Managing enterprise risk exposure towards risk appetite
 - Internal reporting
 - i. Performance measurement
 - ii. Performance management and incentive compensation
 - External disclosures
 - i. Shareholders
 - ii. Rating agencies
 - iii. Regulators
- b. Describe how risk and opportunity influence the selection of a firm's vision and strategy.
- c. Articulate risk objectives and a risk philosophy.
- d. Describe a desired risk profile and appropriate risk filters.
- e. Describe how ERM is able to contribute to shareholder value creation.
 - Describe how the performance of a given firm or venture may be evaluated against its objectives including total returns
- f. Explain how risk metrics can be incorporated into the risk monitoring function as part of an ERM framework.
- g. Describe means for managing risks and measures for evaluating their effectiveness.
- h. Describe and assess the elements of a successful risk management function and recommend a structure for an organization's risk management function.

SYLLABUS RESOURCES

Crouhy, Galai, & Mark, *Risk Management*, 2001,

- Ch. 3, Structuring and Managing the Risk Management Function in a Bank

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- Ch.13, Managing Operational Risk
- Ch. 14, Capital Allocation and Performance Measurement

Hardy, *Investment Guarantees*, 2003

- Ch. 6, Modeling the Guarantee Liability
 - Ch. 9, “Risk Measures”
 - Ch. 12, “Guaranteed Annuity Options”
-
- FE-C117-07: Chapters 7 and 8 of *Integrated Risk Management*, Doherty
 - FE-C124-07: Performance Measurement Using Transfer Pricing, by M. Wallace
 - FE-C125-07: Total Return Approach to Performance Measurement
 - FE-C133-07: Internal Control – Guidance for Directors on the Combined Code
 - FE-C138-07: Managing the Invisible: Measuring Risk, Managing Capital, Maximizing Value, Panning
 - FE-C140-07: Risk Measurement, Risk Management and Capital Adequacy in Financial Conglomerates (excl Appendices)
 - FE-C143-07: Dynamic Financial Models of Property-Casualty Insurers
 - FE-C145-07: Dynamic Financial Condition Analysis Handbook, Ch. 1 (background only), 8 and Appendix A
 - FE-C171-09: Insurance Criteria: Refining the Focus of Insurer Enterprise Risk Management Criteria, Standard & Poor’s, June 2006.
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- “Application of Coherent Risk Measures to Capital Requirements in Insurance”, Artzner, -NAAJ, Vol 3, No 2 http://www.soa.org/library/journals/north-american-actuarial-journal/1999/april/naaj9904_1.pdf
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- Enterprise Risk Management Specialty Guide, SOA 2006
<http://www.soa.org/library/professional-actuarial-specialty-guides/enterprise-risk-management/2005/august/spg0605erm.pdf>
-
- “Risk Management: The Total Return Approach and Beyond”, Ho, Risk Management Newsletter, November 2004, Issue #3
<http://www.soa.org/library/newsletters/risk-management-newsletter/2004/november/rmn0411.pdf>