

**Advanced Finance/ERM Exam
Spring 2010**

Important Exam Information:

Exam Date and Time	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.
Exam Registration	Candidates may register online or with an application.
Study Note Order Form	Study notes are part of the required syllabus and are not available electronically.
Introductory Study Note	The Introductory Study Note has a complete listing of all study notes as well as errata and other important information.
Case Study	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.
Past Exams	Past Exams from 2000-present are available on SOA web site.
Updates	Candidates should be sure to check the Updates page on the exam home page periodically for additional corrections or notices.

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Topic: Risk Categories and Identification

Learning Objective:

- 1. The candidate will understand the types of risks faced by an entity and be able to identify and analyze those risks.**

Learning Outcomes:

The candidate will be able to:

- a) Identify and analyze 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 analyze insurance risks faced by an entity, including but not limited to: mortality risk, morbidity risk, catastrophe risk, product risk, and embedded options.
- c) Identify and analyze 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 analyze 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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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-C154-09: Life Insurance Pricing and the Measurement of the Duration of Liabilities

FE-C151-08: Ch. 13 (Sections 13.1 – 13.4), Annuity and Investment Products of Atkinson & Dallas, *Life Insurance Products and Finance*

FE-C153-09: Variable Annuity – “No Loss” Propositions
FE-C159-09: Countering the Biggest Risk of All, by Slywotzky and Drzik - Harvard Business Review, April 2005

FE-C160-09: Moody's Looks at Terrorism Risk in the U. S. Life Insurance Industry,
February 2006

FE-C169-09: Ch. 3, Pricing Assumptions of Atkinson & Dallas, *Life Insurance Products and Finance*

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/rm-2004-iss02-rudolph.pdf>

Fixed Annuities in a Low Interest Rate Environment, Product Development newsletter, April 2003 <http://www.soa.org/library/newsletters/product-development-news/2003/april/pdn0304.pdf>

Managing Variable Policyholder Behavior Risk, Product Development newsletter, March 2005 <http://www.soa.org/library/newsletters/product-development-news/2005/march/pdn0503.pdf>

Death Benefit Focused UL, Product Development section newsletter, April 2003
<http://www.soa.org/library/newsletters/product-development-news/2003/april/pdn0304.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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Enterprise Risk Management Specialty Guide, SOA 2006
<http://www.soa.org/library/professional-actuarial-specialty-guides/enterprise-risk-management/2005/august/spg0605erm.pdf>

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Topic: Accounting and Value Measures

Learning Objective:

2. **The candidate will understand measures of corporate value and be able to analyze the data in corporate financial statements.**

Learning Outcomes:

The candidate will be able to:

- a) Explain 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 the concept of economic measures of value (e.g. EVA; embedded value) and demonstrate their uses in the risk management and corporate decision-making processes.
- d) Demonstrate 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 economic capital may differ from external requirements of rating agencies and regulators.
 - Demonstrate the ability to develop an economic capital model for a representative financial firm.

RESOURCES

Fridson, Alvarez, *Financial Statement Analysis: A Practitioners Guide*, 2002

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

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

Ch. 24, Accounting Standards and Requirements, by E. Habayeh & S. Sethi

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

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

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

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>

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Topic: Risk Quantification and Risk Measures

Learning Objective:

- 3. The candidate will understand how the financial risks faced by an entity can be quantified and the use of metrics to measure risk.**

Learning Outcomes:

The candidate will be able to:

- a) Demonstrate the use of risk metrics to quantify major types of risk exposure in the context of an integrated risk management process.
 - Demonstrate how each of the financial risks faced by an entity can be amenable to quantitative analysis including an explanation of the advantages and disadvantages of various techniques such as Value at Risk (VaR), stochastic analysis, scenario analysis and stress testing.
 - Describe and evaluate risk aggregation techniques, incorporating the use of correlation, integrated risk distributions and copulas.
 - 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.
- b) Evaluate the properties of risk measures and explain their limitations.
- c) Define and evaluate model and parameter risk

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

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

FE-C142-07: "Theory and Practice of Model Risk Management," Ricardo Rebonato

FE-C143-07: Dynamic Financial Models of Property-Casualty Insurers

FE-C166-09: "Black Monday and Black Swans," J. Bogle, *Financial Analysts Journal*, 64:2(30-40) 2008

CSFB Credit Portfolio Modeling Handbook –

Ch. 2, The Default/No-Default World and Factor Model

Ch. 4, Demystifying Copulas

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Ch. 9, Risk Measures: How Long Is a Risky Piece of String?

<http://www.csfb.com/institutional/research/CreditPortfolioModeling.pdf>

Actuaries, Stochasticity and Risk Management: The Real Lessons of Long-term Capital Management”, B. Crompton, The Actuary, September 2007.

<http://www.soa.org/library/newsletters/the-actuary-magazine/2007/august/act2007aug.aspx>

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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Topic: Risk Management

Learning Objective:

- 4. The candidate will understand the means available for managing various risks and how an entity makes decisions about appropriate techniques.**

Learning Outcomes:

The candidate will be able to:

General

- a. Explain the rationale for managing risk and demonstrate the selection of the appropriate risk retention level.
- b. Demonstrate means for transferring risk to a third party, and analyze the costs and benefits of doing so.
- c. Demonstrate means for reducing risk without transferring it (internal hedges).
- d. Evaluate the performance of risk transference activities.
- e. Describe and evaluate risk management techniques that can be used to deal with financial and non-financial risks.
- f. Develop an appropriate choice of hedging strategy for a given situation (e.g., reinsurance, derivatives, financial contracting), which balances benefits with inherent costs, including exposure to credit risk, basis risk, moral hazard, and other risks.

Asset Liability Management

- g. Analyze funding and portfolio management strategies to control equity and 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.
- h. Demonstrate how derivatives, synthetic securities, and financial contracting may be used to manage interest rate risk, including key rate risks.
- i. Demonstrate how derivatives, synthetic securities, and financial contracting may be used to manage equity risk, in particular, equity market guarantees found in variable annuities.
- j. Analyze the practicalities of market risk hedging, including dynamic hedging.

Credit Risk Management

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

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Liquidity Risk Management

- p. Define liquidity risk.
- q. Explain methods for managing this risk, both pre-event and post-event.
- r. Evaluate 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

- s. Define strategic risk
- t. Explain methods for managing this risk, both pre-event and post-event
- u. Evaluate 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

- v. Define operational risk
- w. Explain methods for managing this risk, both pre-event and post-event
- x. Evaluate 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

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 Principle

Hardy, *Investment Guarantees*, 2003,

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- 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-C102-07: General American Life Can't Pay Investors, Looks at Suitors
FE-C117-07: Doherty, *Integrated Risk Management*,
Ch. 1, The Convergence of Insurance Risk Management & Financial Risk Management
Ch. 7, Why Is Risk Costly to a Firm?
Ch. 8, Risk Management Strategy: Duality and Globality
- 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, Recommendations 9-24 and Section III
FE-C155-09; Babbel & Fabozzi, *Investment Management for Insurers*, 1999
Ch. 1, "Risk Management by Insurers: An Analysis of the Process", Babbel & Santomero
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", Moody's October 2005
FE-C168-09: C. Smithson, Credit Portfolio Management
Ch. 1, The Revolution in Credit – Capital Is the Key
FE-C170-09: "Why COSO Is Flawed," by A. Samed-Khan, www.operationalriskonline.com, January 2005
FE-C174-10: Deciphering the Liquidity and Credit Crunch 2007-2008, Brunnermeier
- Liquidity Risk Measurement, CIA Educational Note
<http://www.actuaries.ca/members/publications/1996/9626e.pdf>

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Topic: Enterprise Risk Management Framework

Learning Objective:

- 5. The candidate will understand the components of an ERM framework and be able to evaluate the appropriateness of a framework in a given situation.**

Learning Outcomes:

The candidate will be able to:

- a. Define Enterprise Risk Management and explain the principal terms used in ERM.
- b. Describe the fundamental concepts of financial and non-financial risk management and evaluate a particular given risk-management framework.
- c. Demonstrate how an organization can create a risk management culture including: risk consciousness, accountabilities, discipline, collaboration, incentives, and communication.
- d. Explain the elements of risk governance, and demonstrate how governance issues are resolved through organizational structure.
- e. Compare and contrast 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. Explain the perspectives of regulators, rating agencies, stock analysts, and company stakeholders and how they evaluate the risks and the risk management of an organization.

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: Doherty, *Integrated Risk Management*,

Ch. 1, "The Convergence of Insurance Risk Management & Financial Risk Management"

Ch. 7, "Why Is Risk Costly to a Firm?"

Ch. 8, "Risk Management Strategy: Duality and Globality"

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/frn-2004-iss59->

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Enterprise Risk Management Specialty Guide, SOA 2006

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Topic: Enterprise Risk Management Process

Learning Objective:

- 6. The candidate will understand the structure of an ERM process in an entity and be able to demonstrate best practices in enterprise risk management.**

Learning Outcomes:

The candidate will be able to:

- a. Demonstrate 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. Assess how risk and opportunity influence the selection of a firm's vision and strategy and demonstrate how ERM can be appropriately embedded in an entity's strategic planning.
- c. Articulate risk objectives; demonstrate how to define and measure an organization's risk appetite; and demonstrate how an organization uses risk appetite to make strategic decisions.
- d. Determine a desired risk profile and appropriate risk filters, and analyze the risk and return trade-offs that result from changes in the organization's risk profile.
- e. Demonstrate how ERM is able to contribute to shareholder value creation and how the performance of a given firm or venture may be evaluated against its objectives including total returns.

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- f. Demonstrate how risk metrics can be incorporated into the risk monitoring function as part of an ERM framework.
- g. Explain means for managing risks and demonstrate 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.

RESOURCES:

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

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

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: Doherty, *Integrated Risk Management*,

Ch. 7, Why Is Risk Costly to Firms?

Ch. 8, Risk Management Strategy: Duality and Globality

FE-C124-07: Performance Measurement Using Transfer Pricing, 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 (exclude appendices)

FE-C143-07: Dynamic Financial Models of Property-Casualty Insurers

FE-C145-07: Dynamic Financial Condition Analysis Handbook, Ch. 1 (background only), Ch. 8 and Appendix A

FE-C171-09: Insurance Criteria: Refining the Focus of Insurer Enterprise Risk Management Criteria, Standard & Poor's, June 2006

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>

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