**Advanced Finance/ERM Exam**
**Final Spring 2012**

**<u>Important Exam Information</u>:**

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| 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. |
| Order Study Notes | Study notes are part of the required syllabus and are not available electronically but may be purchased through the online store. |
| 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. |

**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

e) Indentify and analyze systemic risks faced by an entity, including but not limited to financial contagion

**RESOURCES**

Kalberer, *Variable Annuities*, 2009
Ch. 1, History and Development of the Variable-Annuity Market (background only)
Ch. 2, North American Variable Annuities (background only)
Ch.5, Risks Underlying Variable Annuities

Tilman, *Asset/Liability Management of Financial Institutions*, 2003
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-C106-07: Mapping of Life Insurance Risks, AAA Report to NAIC
FE-C151-08: Ch. 13 (Sections 13.1 – 13.4), Annuity and Investment Products of Atkinson & Dallas, *Life Insurance Products and Finance*
FE-C159-09: Countering the Biggest Risk of All, by Slywotzky and Drzik - Harvard Business Review, April 2005
FE-C175-11: Learning from the 2009 H1N1 Influenza Pandemic
FE-C176-11: Chapter 10 "Insuring against Catastrophies" from Diebold et.al., *The Known, the Unknown and the Unknowable in Financial Risk Management*

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

## 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. MCEV) and demonstrate their uses in the risk management and corporate decision-making processes.

d) Demonstrate an understanding of economic capital as reported by financial institutions

**RESOURCES**

Fridson, Alvarez, *Financial Statement Analysis: A Practitioners Guide*, 2002 (Candidates may also use Fourth Edition, 2011)

Ch. 1, The Adversarial Nature of Financial Reporting
Ch. 2, The Balance Sheet
Ch. 3, The Income Statement
Ch. 4, The Statement of Cash Flows
Ch. 13, Credit Analysis

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

FE-C162-09: "EVA and Strategy"
FE-C177-11:CRO Forum "A Market Cost of Capital Approach to Market Value Margins" Paper (sections 1-3 background only)
FE-C178-11: Economic Capital Modeling – Practical Considerations - Milliman
FE-C179-11:*Insurance Industry Mergers & Acquisitions*, Toole and Herget,2005
Ch. 4: Valuation Techniques (sections 1-5 only)

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

**Topic: Risk Quantification and Risk Measures**

**Learning Objective:**

**3. The candidate will understand how the 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 how to calculate economic capital
   - 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.

b) 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.

c) Evaluate the properties of risk measures and explain their limitations.

d) Propose techniques for allocating the cost of risks taken for the purposes of risk adjusting performance measures

e) Define and evaluate model and parameter risk

f) Understand the theory and applications of extreme value theory in the measuring and modeling of risk

**<u>RESOURCES:</u>**

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

Saunders and Allen, *Credit Risk Management In and out of the Financial Crisis*
- Ch. 4, Loans as Options: The Moody's KMV Model
- Ch. 5, Reduced Form Models: Kamakura's Risk Manager
- Ch. 6, Other Credit Risk Models
- Ch. 7, A Critical Parameter: Loss Given Default

Segal, *Corporate Value of Enterprise Risk Management,*
Ch. 5, Risk Quantification

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

FE-C178-11:Economic Capital Modeling – Practical Considerations - Milliman

FE-C180-11: Measurement and Modeling of Dependencies in Economic Capital
Chapters 1-8 only

FE-C181-11: Value-at-Risk: Evolution, Deficiencies and Alternatives

CSFB Credit Portfolio Modeling Handbook –
Ch. 9, Risk Measures: How Long Is a Risky Piece of String?
http://www.csfb.com/institutional/research/CreditPortfolioModeling.pdf

Summary of "Variance of the CTE Estimator" ,Risk Management, August 2008
http://www.soa.org/library/newsletters/risk-management-newsletter/2008/august/rmn-2008-iss13.pdf

Modeling Tail Behavior with Extreme Value Theory, *Risk Management*, Sept 2009, Damon Levine
http://www.soa.org/library/newsletters/risk-management-newsletter/2009/september/jrm-2009-iss17-levine.pdf

**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 the application of Asset Liability Management principles to Investment Policy and Asset Allocation.

h. 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.

i. Demonstrate how derivatives, synthetic securities, and financial contracting may be used to manage interest rate risk, including key rate risks.

j. Demonstrate how derivatives, synthetic securities, and financial contracting may be used to manage equity risk, in particular, equity market guarantees found in variable annuities.

k. Analyze the practicalities of market risk hedging, including dynamic hedging.

*Credit Risk Management*

l. Define and evaluate credit risk as related to fixed income securities.

m. Define and evaluate spread risk as related to fixed income securities

n. Explain how to incorporate best practices in credit risk measurement, modeling, and management.

o. 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.

p. Describe and evaluate risk mitigation techniques and practices: credit derivatives, diversification, concentration limits, and credit support agreements.

*Liquidity Risk Management*

q. Define liquidity risk.

r. Explain methods for managing this risk, both pre-event and post-event.

s. 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*

t. Define strategic risk

u. Explain methods for managing this risk, both pre-event and post-event

v. 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*

w. Define operational risk

x. Explain methods for managing this risk, both pre-event and post-event

y. 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**

Anderson and Schroder, *Strategic Risk Management Practic*e,
Ch. 1, The Strategic Nature of Corporate Risk Management
Ch. 7, Stategic Risk Analysis
Ch. 8, Strategic Risk Management – ammendents to the ERM framework
Ch. 9, Stategic Risk Management

Kalberer, *Variable Annuities*, 2009
Section 3,
Introduction
Chapter 10, Overview of Commonly Used Risk Management Strategies
Chapter 11, Using Product Development to Manage Risks
Chapter 12, Using Reinsurance to Manage Risks
Chapter 13, Using Capital Markets to Manage Risks
Chapter 14, Putting It All Together: From Dynamic to Static

Saunders and Allen,*Credit Risk Management In and out of the Financial Crisis,* 2010
Ch. 8, The Credit Risk of Portfolios and Correlations
Ch 9, The VAR Approach: CreditMetrics and Other Models
Ch. 10, Stress Testing Credit Models: Algorithmics Mark-to-Future
Ch. 12, Credit Derivatives

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: Doherty, *Integrated Risk Management*, 2000
- 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-C130-07: Hedging with Derivatives in Traditional Insurance Products
FE-C147-07: Derivatives: Practice and Principles, Recommendations 9-24 and Section III
FE-C156-09: Key Rate Durations: Measures of Interest Rate Risks
FE-C159-09: Countering the Biggest Risk of All, by Slywotzky and Drzik - Harvard Business Review, April 2005
FE-C170-09: "Why COSO Is Flawed," by A. Samed-Khan, January 2005
FE-C174-10: Deciphering the Liquidity and Credit Crunch 2007-2008, Brunnermeier
FE-C182-11: Doherty, *Integrated Risk Management*, Chapter 16 , Case Study: The Securitization of Catastrophe Risk
FE-C183-11: Revisiting The Role of Insurance Company ALM within a Risk Management Framework

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

Measuring and Managing Reputational Risk, Risk Management, March 2008
http://www.soa.org/library/newsletters/risk-management-newsletter/2008/march/rmn-2008-iss12-diermeier.pdf

Strategic Planning Models, Risk Management, March 2007
http://www.soa.org/library/newsletters/risk-management-newsletter/2007/march/RMN0703.pdf

**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 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: Basel, Sarbanes-Oxley Act, , Dodd/Frank, Solvency II, 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.

g. Identify regulatory capital requirements and describe how they affect decisions.

**RESOURCES**

Segal, *Corporate Value of Enterprise Risk Management*, 2011
- Chapter 1, ERM Basics and Infrastructure **background only**
- Chapter 2, Defining ERM **background only**
- Chapter 3, ERM Framework

FE-C117-07: Doherty, *Integrated Risk Management*,
Ch. 1, The Convergence of Insurance Risk Management & Financial Risk Management

FE-C172-09: Enterprise Risk Management – Integrated Framework: Executive Summary, COSO, September 2004

FE-C184-11: A Comparative Analysis of U.S., Canadian and Solvency II Capital Adequacy Requirements in Life Insurance

FE-C185-11: A Principles-Based Reserves and Capital Standard

FE-C186-11: Methodology: Assessing Management's Commitment To And Execution Of Enterprise Risk Management Processes

FE-C187-11: Market Consistent Embedded Value Principles

Regulatory Capital Standards for Property and Casualty Insurers Under the U.S., Canadian and Proposed Solvency II (Standard) Formulas, Sharara, Hardy, Saunders
http://www.soa.org/files/pdf/research-2010-08-regulatory-cap.pdf

Actuarial Aspects of SOX 404", The Financial Reporter, Dec. 2004,
http://www.soa.org/library/newsletters/financial-reporter/2004/december/frn-2004-iss59-brownehay.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/frn-2004-iss59-auvinen.pdf

**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 quantitatively and qualitatively how ERM is able to contribute to shareholder value creation..

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:**

Segal, *Corporate Value of Enterprise Risk Management*, 2011

Chapter 6, Risk Decision-Making

Chapter 7, Risk Messaging

Chapter 8, Risk Governance and Other Topics

FE-C117-07: Doherty, *Integrated Risk Managemen*t,
Ch. 7, Why Is Risk Costly to Firms?
Ch. 8, Risk Management Strategy: Duality and Globality

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)

Risk Appetite Statements: What's on your Menu, Risk Management, June 2009
http://www.soa.org/library/newsletters/risk-management-newsletter/2009/june/jrm-2009-iss16.pdf