

# ERM – Enterprise Risk Management Exam

Spring 2023

## Important Exam Information:

[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.

Syllabus Readings

Readings listed in this syllabus may include study notes, online readings and textbooks. Candidates are responsible for all readings in their entirety, including sections such as Appendices, unless it is stated otherwise in the syllabus.

[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 2012-present are available on SOA website.

[Updates](#)

Candidates should be sure to check the Updates page on the exam home page periodically for additional corrections or notices to the current syllabus.

ERM – Enterprise Risk Management Exam  
Spring 2023

<b>1. Topic: Enterprise Risk Management Framework and Process</b>
<b>Learning Objectives</b>
The candidate will understand the ERM framework and process and be able to apply them to organizations.
<b>Learning Outcomes</b>
The Candidate will be able to: <ul style="list-style-type: none"><li>a) Recommend an appropriate framework for an organization’s enterprise risk management and an acceptable governance structure</li><li>b) Demonstrate an understanding of the perspectives of regulators, rating agencies, stock analysts, auditors, and company stakeholders and how they evaluate the risks and the risk management of an organization</li><li>c) Demonstrate how to articulate an organization’s risk appetite, desired risk profile, quantified risk tolerances, risk philosophy and risk objectives</li><li>d) Assess the overall risk exposure arising from an organization's current and emerging risks</li><li>e) Propose ERM solutions or strategies that effectively manage risk under different real (case study) and hypothetical situations facing financial and non-financial organizations</li></ul>
<b>Resources</b>
<ul style="list-style-type: none"><li>• <i>Financial Enterprise Risk Management</i>, Sweeting, Paul, 2<sup>nd</sup> Edition, 2017<ul style="list-style-type: none"><li>○ Ch. 8: Risk Identification</li><li>○ Ch. 14: Quantifying Particular Risks</li></ul></li><li>• <i>Value at Risk: The New Benchmark for Managing Financial Risk</i>, Jorion, Philippe, 3<sup>rd</sup> Edition, 2007<ul style="list-style-type: none"><li>○ Ch. 13: Liquidity Risk (excluding section 13.4)</li></ul></li><li>• ERM-101-12: Measurement and Modeling of Dependencies in Economic Capital, Ch. 4-5</li><li>• ERM-106-12: Economic Capital-Practical Considerations, Milliman</li><li>• ERM-107-12: Strategic Risk Management Practice, Andersen and Schroder, 2010, Ch. 7: Strategic Risk Analyses</li><li>• ERM-119-14: Aggregation of Risks and Allocation of Capital (sections 4-7, excluding section 6.3)</li><li>• ERM-131-18: Leveraging COSO Across the Three Lines of Defenses</li><li>• ERM-133-19: Emerging Risks and Enterprise Risk Management, pp. 2-6</li><li>• ERM-134-21: Group Insurance, Skwire, 2021, Ch. 41: Risk Based Capital Formulas</li><li>• ERM-135-20: Risk Management and the Rating Process for Insurance Companies</li><li>• ERM-136-20: Managing Liquidity Risk: Industry Practices and Recommendations for CROs (excluding Ch. 4)</li><li>• ERM-137-20: ORSA and the Regulator</li><li>• ERM-140-20: Risk Adjustments for Insurance Contracts under IFRS 17: Chapter 3: Risk Adjustment</li></ul>

ERM – Enterprise Risk Management Exam  
Spring 2023

Techniques & Chapter 7: Validation of Risk Adjustments

- ERM-142-20: Data Quality is the Biggest Challenge
- ERM-143-20: Internal Controls Toolkit, Doxey, Ch. 1, pp. 11-17 & 27-35
- ERM-148-22: Agency Theory and Asymmetric Information
- ERM-149-22: Managing 21<sup>st</sup> Century Political Risk
- ERM-702-12: IAA Note on ERM for Capital and Solvency Purposes in the Insurance Industry, pp.9-38
- [Regulatory Risk and North American Insurance Organizations](#), sections 6.1-6.14 & 7
- [Risk Appetite: Linkage with Strategic Planning Report](#)
- [National Risk Management A Practical ERM Approach for Federal Governments](#), CAS, CIA and SOA, Mar 2018, pp. 11-22
- [Economic Scenario Generators: A Practical Guide](#), pp. 7-17 (pp. 97-112 background only)
- [Embedding Cyber Risk in Risk Management: An Insurer's Perspective](#), pp. 12-15 of Cybersecurity: Impact on Insurance Business and Operations

## 2. Topic: Risk Categories and Identification

### Learning Objectives

The candidate will understand the types of risks faced by an entity and be able to identify and analyze these risks.

### Learning Outcomes

The Candidate will be able to:

- a) Describe different definitions and concepts of risk
- b) Discuss risk taxonomy, including an awareness of how individual risks might be categorized in different ways
- c) Identify and analyze specific risks faced by an organization, including but not limited to: financial, environmental, operational, legal, reputational and strategic risks

### Resources

- *Financial Enterprise Risk Management*, Sweeting, Paul, 2<sup>nd</sup> Edition, 2017
  - Ch. 8: Risk Identification
- *Value at Risk: The New Benchmark for Managing Financial Risk*, Jorion, Philippe, 3<sup>rd</sup> Edition, 2007
  - Ch. 13: Liquidity Risk (excluding section 13.4)
  - Ch. 18: Credit Risk Management (excluding Appendices)
- ERM-107-12: Strategic Risk Management Practice, Andersen and Schroder, 2010, Ch. 7: Strategic Risk Analyses
- ERM-130-18: AAA Model Governance Practice Note
- ERM-133-19: Emerging Risks and Enterprise Risk Management, pp. 2-6
- ERM-135-20: Risk Management and the Rating Process for Insurance Companies
- ERM-136-20: Managing Liquidity Risk: Industry Practices and Recommendations for CROs (excluding Ch. 4)
- ERM-137-20: ORSA and the Regulator
- ERM-145-21: IAA Paper: Importance of Climate-Related Risks for Actuaries, pp. 2-14
- ERM-146-21: Covid-19: Implications for Insurer Risk Management and the Insurability of Pandemic Risk
- ERM-148-22: Agency Theory and Asymmetric Information
- ERM-149-22: Managing 21st-Century Political Risk
- ERM-150-22 Exchange Rate Risk Measurement and Management
- ERM-702-12: IAA Note on ERM for Capital and Solvency Purposes in the Insurance Industry, pp. 9-38
- [Risk Appetite: Linkage with Strategic Planning Report](#)
- [National Risk Management A Practical ERM Approach for Federal Governments](#), CAS, CIA and SOA, Mar 2018, pp. 11-22

ERM – Enterprise Risk Management Exam  
Spring 2023

- [Embedding Cyber Risk in Risk Management: An Insurer's Perspective](#), pp. 12-15 of Cybersecurity: Impact on Insurance Business and Operations
- [Regulatory Risk and North American Insurance Organizations](#), sections 6.1-6.14 & 7

### 3. Topic: Risk Modeling and Aggregation of Risks

#### Learning Objectives

The candidate will understand the concepts of risk modeling and be able to evaluate and understand the importance of risk models.

#### Learning Outcomes

The Candidate will be able to:

- a) Demonstrate how each of the financial and non-financial risks faced by an organization can be amenable to quantitative analysis
- b) Demonstrate organization-wide risk aggregation techniques that illustrate the concept of risk diversification by incorporating the use of correlation
- c) Evaluate and select appropriate copulas as part of the process of modelling multivariate risks
- d) Demonstrate the use of scenario analysis and stress testing in the measurement of current and emerging risks
- e) Demonstrate the importance of the tails of distributions, tail correlations, and low frequency / high severity events, and the use of extreme value theory to analyze these situations
- f) Demonstrate an understanding of model and parameter risk
- g) Evaluate and select appropriate models to handle diverse risks, including models that use a stochastic approach

#### Resources

- *Financial Enterprise Risk Management*, Sweeting, Paul, 2<sup>nd</sup> Edition, 2017
  - Ch. 14: Quantifying Particular Risks
- *Value at Risk: The New Benchmark for Managing Financial Risk*, Jorion, Philippe, 3<sup>rd</sup> Edition, 2007
  - Ch. 7: Portfolio Risk: Analytical Methods
  - Ch. 9: Forecasting Risk Correlations (section 9.3 only)
  - Ch. 12: Monte Carlo Methods
  - Ch. 18: Credit Risk Management (excluding Appendices)
- ERM-101-12: Measurement and Modeling of Dependencies in Economic Capital, Ch. 4-5
- ERM-104-12: Study Note on Parameter Risk, Venter and Sahasrabuddhe (excluding section 3)
- ERM-106-12: Economic Capital-Practical Considerations, Milliman
- ERM-107-12: Strategic Risk Management Practice, Andersen and Schroder, 2010, Ch. 7: Strategic Risk Analyses
- ERM-110-12: Derivatives: Practice and Principles, Recommendations 9-24 & Section III
- ERM-119-14: Aggregation of Risks and Allocation of Capital (sections 4-7, excluding section 6.3)
- ERM-120-14: IAA Note on Stress Testing and Scenario Analysis (pp. 1-6, 14-17 & 19-25)
- ERM-124-15: Counterparty Credit Risk: The New Challenge for Global Financial Markets, Ch.2: Defining

ERM – Enterprise Risk Management Exam  
Spring 2023

Counterparty Credit Risk

- ERM-135-20: Risk Management and the Rating Process for Insurance Companies
- ERM-137-20: ORSA and the Regulator
- ERM-138-21: Quantitative Enterprise Risk Management, Hardy, Ch. 6: Extreme Value Theory
- ERM-139-21: Quantitative Enterprise Risk Management, Hardy, Ch. 7: Copulas
- ERM-140-20: Risk Adjustments for Insurance Contracts under IFRS 17: Chapter 3: Risk Adjustment Techniques & Chapter 7: Validation of Risk Adjustments
- ERM-141-20: Ch. 9: Risk Management, section 5 of Managing Investment Portfolios, Maginn and Tuttle, 3<sup>rd</sup> Edition, 2007
- ERM-145-21: IAA Paper: Importance of Climate-Related Risks for Actuaries, pp. 2-14
- ERM-146-21: Covid-19: Implications for Insurer Risk Management and the Insurability of Pandemic Risk
- ERM-151-22: Developing Key Risk Indicators to Strengthen Enterprise Risk Management
- [Risk Appetite: Linkage with Strategic Planning Report](#)
- [Modeling Tail Behavior with Extreme Value Theory](#), Risk Management, Sep 2009
- [A New Approach for Managing Operational Risk](#), Ch. 8
- [Economic Scenario Generators: A Practical Guide](#), pp. 7-17 (pp. 97-112 background only)
- [Embedding Cyber Risk in Risk Management: An Insurer's Perspective](#), pp. 12-15 of Cybersecurity: Impact on Insurance Business and Operations

ERM – Enterprise Risk Management Exam  
Spring 2023

**4. Topic: Risk Measures**

**Learning Objectives**

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) Determine risk exposures using common risk measures (e.g., VaR and TVaR) and compare the properties and limitations of such measures
- b) Analyze quantitative financial and non-financial data using appropriate statistical methods to assist in quantifying risk
- c) Analyze risks that are not easily quantifiable, such as liquidity, operational, and environmental risks

**Resources**

- *Financial Enterprise Risk Management*, Sweeting, Paul, 2<sup>nd</sup> Edition, 2017
  - Ch. 9: Some Useful Statistics (background only)
  - Ch. 14: Quantifying Particular Risks
- *Value at Risk: The New Benchmark for Managing Financial Risk*, Jorion, Philippe, 3<sup>rd</sup> Edition, 2007
  - Ch. 7: Portfolio Risk: Analytical Methods
  - Ch. 9: Forecasting Risk and Correlations
  - Ch. 12: Monte Carlo Methods
  - Ch. 13: Liquidity Risk (excluding section 13.4)
  - Ch. 18: Credit Risk Management (excluding Appendices)
- ERM-106-12: Economic Capital – Practical Considerations, Milliman
- ERM-133-19: Emerging Risks and Enterprise Risk Management, pp. 2-6
- ERM-135-20: Risk Management and the Rating Process for Insurance Companies
- ERM-136-20: Managing Liquidity Risk: Industry Practices and Recommendations for CROs (excluding Ch. 4)
- ERM-137-20: ORSA and the Regulator
- ERM-140-20: Risk Adjustments for Insurance Contracts under IFRS 17: Chapter 3: Risk Adjustment Techniques & Chapter 7: Validation of Risk Adjustments
- ERM-141-20: Ch. 9: Risk Management, section 5 of *Managing Investment Portfolios*, Maginn and Tuttle, 3<sup>rd</sup> Edition, 2007
- ERM-142-20: Data Quality is the Biggest Challenge
- ERM-146-21: Covid-19: Implications for Insurer Risk Management and the Insurability of Pandemic Risk
- ERM-149-22: Managing 21st-Century Political Risk



ERM – Enterprise Risk Management Exam  
Spring 2023

- ERM-150-22: Exchange Rate Risk Measurement and Management
- ERM-151-22: Developing Key Risk Indicators to Strengthen Enterprise Risk Management
- ERM-702-12: IAA Note on ERM for Capital and Solvency Purposes in the Insurance Industry, pp.9-38
- [A New Approach for Managing Operational Risk](#), Ch.8
- [Embedding Cyber Risk in Risk Management: An Insurer's Perspective](#), pp. 12-15 of Cybersecurity: Impact on Insurance Business and Operations

## 5. Topic: Risk Management Tools and Techniques

### Learning Objectives

The candidate will understand the approaches for managing risks and how an entity makes decisions about appropriate techniques.

### Learning Outcomes

The Candidate will be able to:

- a) Demonstrate risk optimization and analyze the risk and return trade-offs that result from changes in the organization's risk profile
- b) Demonstrate application of the following responses to risk, including consideration of their costs and benefits: avoidance, acceptance, reduction without transfer, and transfer to a third party
- c) Demonstrate the use of controls for retained and residual risks
- d) Demonstrate how derivatives, synthetic securities, and financial contracting may be used to reduce risk within a static or dynamic hedging program
- e) Determine an appropriate choice of mitigation strategy for a given situation, which balances benefits with inherent costs (including exposure to moral hazard, credit, basis and other risks)
- f) Demonstrate the use of tools and techniques for identifying and managing credit and counterparty risk
- g) Analyze how ALM and other risk management principles can be used to establish investment policy and strategy, including asset allocation
- h) Demonstrate possible risk management strategies for non-financial risks
- i) Choose appropriate techniques to measure, model and manage various financial and non-financial risks faced by an organization

### Resources

- *Financial Enterprise Risk Management*, Sweeting, Paul, 2<sup>nd</sup> Edition, 2017
  - Ch. 16: Responses to Risk
- *Value at Risk: The New Benchmark for Managing Financial Risk*, Jorion, Philippe, 3<sup>rd</sup> Edition, 2007
  - Ch. 7: Portfolio Risk: Analytical Methods
  - Ch. 18: Credit Risk Management (excluding Appendices)
- ERM-107-12: Strategic Risk Management Practice, Andersen and Schroder, 2010, Ch. 7: Strategic Risk Analyses
- ERM-110-12: Derivatives: Practice and Principles, Recommendations 9-24 & Section III
- ERM-120-14: IAA Note on Stress Testing and Scenario Analysis (pp. 1-6, 14-17 & 19-25)
- ERM-124-15: Counterparty Credit Risk: The New Challenge for Global Financial Markets, Ch.2: Defining Counterparty Credit Risk
- ERM-128-17: The Breadth and Scope of the Global Reinsurance Market and the Critical Role Such Market Plays in Supporting Insurance in the United States (III, IV & VI)
- ERM-130-18: AAA Model Governance Practice Note

ERM – Enterprise Risk Management Exam  
Spring 2023

- ERM-131-18: Leveraging COSO Across the Three Lines of Defenses
- ERM-135-20: Risk Management and the Rating Process for Insurance Companies
- ERM-136-20: Managing Liquidity Risk: Industry Practices and Recommendations for CROs (excluding Ch. 4)
- ERM-137-20: ORSA and the Regulator
- ERM-143-20: Internal Controls Toolkit, Doxey, Ch. 1, pp. 11-17 & 27-35
- ERM-144-20: Ch. 13: Asset Liability Management Techniques and Practices for Insurance Companies, IAA Risk Book
- ERM-145-21: IAA Paper: Importance of Climate-Related Risks for Actuaries, pp. 2-14
- ERM-146-21: Covid-19: Implications for Insurer Risk Management and the Insurability of Pandemic Risk
- ERM-147-21: Working with Inherent and Residual Risk
- ERM-149-22: Managing 21st-Century Political Risk
- ERM-150-22: Exchange Rate Risk Measurement and Management
- ERM-151-22: Developing Key Risk Indicators to Strengthen Enterprise Risk Management
- ERM-702-12: IAA Note on ERM for Capital and Solvency Purposes in the Insurance Industry, pp.9-38
- [Risk Appetite: Linkage with Strategic Planning Report](#)
- [Embedding Cyber Risk in Risk Management: An Insurer's Perspective](#), pp. 12-15 of Cybersecurity: Impact on Insurance Business and Operations
- [Regulatory Risk and North American Insurance Organizations](#), sections 6.1-6.14 & 7

<b>6. Topic: Capital Management</b>
<b>Learning Objectives</b>
The candidate will understand the concept of economic capital, risk measures in capital assessment and techniques to allocate the cost of risks within business units.
<b>Learning Outcomes</b>
The Candidate will be able to: <ul style="list-style-type: none"><li>a) Demonstrate a conceptual understanding of economic measures of value and capital requirements (e.g., EVA, embedded value, economic capital, regulatory measures, and accounting measures) and their uses in decision-making processes</li><li>b) Apply risk measures and demonstrate how to use them in value and capital assessment</li><li>c) Propose techniques of attributing the “cost” of risk/capital/hedge strategies to business units in order to gauge performance (e.g., returns on marginal capital)</li><li>d) Demonstrate the ability to develop a capital model for a hypothetical organization</li></ul>
<b>Resources</b>
<ul style="list-style-type: none"><li>• ERM-101-12: Measurement and Modelling of Dependencies in Economic Capital, Ch. 3</li><li>• ERM-106-12: Economic Capital – Practical Considerations, Milliman</li><li>• ERM-119-14: Aggregation of Risks and Allocation of Capital (sections 4-7, excluding section 6.3)</li><li>• ERM-134-21: Group Insurance, Skwire, 2021, Ch. 41: Risk Based Capital Formulas</li><li>• ERM-135-20: Risk Management and the Rating Process for Insurance Companies</li><li>• ERM-137-20: ORSA and the Regulator</li><li>• ERM-151-22: Developing Key Risk Indicators to Strengthen Enterprise Risk Management</li><li>• <a href="#">Risk Appetite: Linkage with Strategic Planning Report</a></li><li>• <a href="#">Corporate Pension Risk Management and Corporate Finance: Bridging the Gap between Theory and Practice in Pension Risk Management</a>, Aug 2015</li></ul>