Enterprise Risk Management (ERM) Module

SECTION 1: MODULE OVERVIEW

Introduction

Welcome to the Enterprise Risk Management module. This online module is designed to improve your understanding and practice of Enterprise Risk Management (ERM). It is assumed that candidates have already completed the CFE101 course.

During your module study, you'll expand your knowledge of ERM. Specifically, you'll

- Understand how ERM applies not only to insurance companies, but also to other industries.
- Learn about the tasks and processes that are typically involved in enterprise risk management.
- Practice what you have learned about ERM in the context of case studies.

Ultimately, this module is intended to help you learn how to identify, measure and manage risk while understanding core regulatory requirements and implications.

As part of this module, you will be working in R to do computations. If you need a refresher for R, please review the material in the **Introduction to R** module, which is an optional part of this curriculum. This module also explains how to download R and RStudio.

Successful completion of the Enterprise Risk Management module is a requirement for earning the Chartered Enterprise Risk Analyst (CERA) credential.

Artificial Intelligence
We may use Artificial Intelligence (AI) tools to assist in the editing and review of content. These tools are used solely for efficiency and quality purposes and do not materially alter the substance or meaning of the content.

What Is ERM?

Enterprise Risk Management (ERM) is a strategic and integrated approach to identifying, assessing, managing, and monitoring risks across an organization. ERM enhances organizational resilience by embedding risk considerations into strategic and operational decisions.

Modern ERM frameworks, such as those outlined by the International Actuarial Association (IAA),[1] promote a holistic risk view—aligning risk and opportunity, enabling informed decision-making, and strengthening capital and solvency positions.

ERM is a practical and strategic discipline that enables organizations to understand, manage, and mitigate risk across functions and time horizons. It supports business resilience by aligning risk awareness with strategic planning and operational execution.

ERM is a holistic, value-focused discipline that aligns risk, capital, and strategy. It emphasizes integration across departments and business lines.

Module Learning Objectives

After you complete this module, you will be able to:

- Demonstrate the application of a risk control process such as the Enterprise Risk Management Cycle.
- Evaluate the health of an organization's risk management culture.
- Describe how individual risks might be categorized in different ways.
- Describe the characteristics of effective risk communication appropriate for the target audience.
- Describe how an organization can adapt to unforeseen changes in its risk environment.
- Explain how to manage the impact of significant events after they have occurred (e.g. customer remediation).
- Analyze risks that can be quantified using appropriate methods.
- Demonstrate risk aggregation using copulas.
- Demonstrate how events of low frequency and high severity can be modeled.
- Determine how an organization’s risks and opportunities influence the selection of strategy.
- Assess how an organization’s risk decisions affect its stakeholders.
- Determine how ERM can be appropriately embedded into an organization’s strategic planning.
- Propose ERM solutions or strategies that effectively manage risk under different real (case study) and hypothetical situations facing organizations.

Module Sections

The Enterprise Risk Management module consists of ten sections:

- Risk Control Process and Risk Culture
- Risk Categorization
- Risk Communication
- Organizational Adaptation
- Risk Remediation in ERM
- Risk Quantification
- Risk Aggregation
- Extreme Value Modeling
- ERM Strategy and Framework

[1] International Actuarial Association, *Note on Enterprise Risk Management for Capital and Solvency Purposes in the Insurance Industry* (Ottawa: International Actuarial Association, 2009), 4-6.

- ERM Case Studies

After you have viewed all the pages in the module, you will be required to pass (with a score of 80% or better) a short End-of-Module Test.

After you have passed the End-of-Module Test, you will be able to proceed to the End-of-Module Exercise.

SECTION 2: RISK CONTROL PROCESS AND RISK CULTURE

Overview

Risk Control Process

Enterprise Risk Management (ERM) is a continuous process that applies to all industries. It is applied from the top and is a primary responsibility of the Board of Directors of a firm. The primary challenge of ERM is to ensure that risks are identified, understood, and evaluated appropriately. The overall approach to managing risk must align with the company's strategic goals. To effectively meet this challenge, it is crucial to systematically follow the Enterprise Risk Management Cycle. This involves understanding the company's risk appetite, risk tolerance, risk limits, and risk culture, as well as identifying, evaluating, and mitigating risks.

Risk Culture

Risk culture is a term describing the values, beliefs, knowledge and understanding about risk shared by a group of people with a common purpose, in particular the employees of an organization or teams or groups within an organization. Every organization has a risk culture: the question is whether that culture is effectively supporting or undermining the longer-term success of the organization.

Individuals contribute to an organization’s risk culture by their behavior, but their behaviors are themselves influenced by the risk culture. Understanding this means that problematic risk cultures can be changed, starting with assessing the current risk culture and its impacts on these behaviors.

An effective risk culture is one that enables and rewards individuals and groups for taking the right risks in an informed manner.

Objectives

In this section, candidates will:

- Apply a risk control process, such as the Enterprise Risk Management Cycle.[2]

[2] The materials are based on Section 1.12 from Hardy, Mary and Saunders, David. *Quantitative Enterprise Risk Management*, Cambridge: Cambridge University Press, 2022. Throughout this module, we will adopt the terminology of “Enterprise Risk Management Cycle” used by Hardy and Saunders. The CERA Global Association calls it the “Risk Management Control Cycle,” but it is the same process.

- Analyze the reasons behind a company's risk management failure.
- Explain what risk culture is, including its contributors.
- Describe what a good risk culture looks like.
- Explain why risk culture is important, including the implications of different types of risk cultures.
- Describe the interaction between individual and organizational values, beliefs and attitudes towards risk.
- Describe considerations and a process for changing an organization's risk culture
- Qualitatively assess ten key ERM principles and corresponding healthy risk culture practices.

SECTION 3: RISK CATEGORIZATION

Overview

When assessing risks within an organization, different people can not only have different opinions of what the most important risks are, but even different interpretations and definitions of similar risks. A risk taxonomy is a comprehensive and hierarchical structured framework that categorizes and defines different types of risks an organization may face. By using a risk taxonomy, organizations can better identify, assess, and prioritize risks.

Objectives

When you complete this section, you will be able to:

- Define risk taxonomy and explain how risk categorization is used
- Explain the benefits of a good risk taxonomy
- Explain how to implement a risk taxonomy, including key considerations

SECTION 4: RISK COMMUNICATION

Overview

In this section, candidates will understand and analyze the characteristics of effective risk communication, and the application of effective risk communication tailored to the target audience. Effective risk communication starts with effective communication in general, both individual and organizational. The section will include:

- The types of cognitive biases that may affect individual and organizational communication
- What constitutes effective communication
- The key components of effective risk communication

Objectives

By the end of this section, you will be able to:

- Explain the components of effective communication and mitigate bias to enhance communication.
- Apply the principles of effective communication to improve risk communication.

- Analyze the application of effective risk communication in real-world environments.

SECTION 5: ORGANIZATIONAL ADAPTATION

Overview

Former U.S. Secretary of Defense Donald Rumsfeld said, “There are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know.”[1] This statement effectively describes the content in this section.

An unforeseen event falls into the category of "unknown unknowns." When COVID-19 emerged, were you aware of it, and did you understand it? Everyone—individuals, companies, and governments—struggled to find ways to deal with it.

Objectives

In this section, you will:

- Explain the classification of various risk hazards a company faces, especially unforeseen events.
- Analyze how a company can utilize its resources to adapt to various challenges from unforeseen risk events.
- Apply actual case studies to understand how a company adapts to unforeseen changes.

SECTION 6: RISK EVENT REMEDIATION

Overview

Crises are defined as events with the potential to endanger an organization’s reputation, profitability, and, perhaps, its survival.

Crisis management is the part of risk management relating to crisis preparation and response. While risk management is predominately proactive, crisis management is more reactive, although some general preparation can mitigate the impact of the crisis when it arises. (Hardy and Saunders, *Quantitative Enterprise Risk Management*, p. 594)

Objectives

After you complete this section, you will be able to:

- Assess and categorize crises and responses to crises
- Identify aspects of a successful crisis management plan and response
- Analyze situations to identify and manage novel risks

- Compare and contrast companies' responses to different crises

SECTION 7: RISK QUANTIFICATION

Overview

Risk quantification is a foundational element of an ERM framework, enabling organizations to measure and prioritize risks based on their potential impact and likelihood. It incorporates analytical methods to model and forecast certain risks, supporting proactive decision-making and enhancing organizational resilience.

Objectives

In this section, you will:

- Review and analyze different approaches and techniques to quantify risks
- Apply different approaches and techniques to different types of risks
- Compare and contrast approaches to determine the appropriate approach, given the risk category and situation

SECTION 8: RISK AGGREGATION

Overview

You have most likely already completed CFE 101, the ERM course. In that course, you learned about risk aggregation techniques, such as simple summation and the use of a variance-covariance matrix. Copulas were also introduced. In this section, we will take a deeper dive into copulas. The goal is to understand how to use copulas to aggregate dependent risks from different business units.

Objectives

When you complete this section, you will be able to:

- Explain the structure of copula models and why they are appropriate for risk aggregation
- Understand and apply the normal and *t* copulas
- Estimate copula parameters and select an appropriate copula model
- Explain the advantages and disadvantages of using copulas to aggregate risks
- Determine risk measures using copulas

SECTION 9: EXTREME VALUE MODELS

Overview

Extreme Value Theory (EVT) is a branch of statistics that has been around for many decades. While that term is commonly used, in this section the focus will be more on the models than on the theory. Whatever term is used, the goal is to have an inventory of models that are suitable for tail events; those with low frequency and high severity.

To model tail events, you can use EV models to supplement traditional statistical analysis to analyze the very rare, very extreme losses. They can be used to estimate the largest loss over a period of time or the distribution of losses in excess of a threshold. For example, an insurer might model the claims exceeding some extreme threshold to access the mitigation benefits of a reinsurance strategy.

In this section, you will learn how to use EV models to predict real-life tail events.

Objectives

After completing this section, you will be able to:

- Explain why EV models are useful for modeling extremely rare, high severity events
- Understand the origin and structure of two heavy-tailed models, generalized Pareto and inverse Weibull
- Calculate VaR and CTE for heavy-tailed single loss models
- Estimate parameters for an EV model
- Approximate VaR and CTE for aggregate models with a heavy-tailed severity distribution
- Apply these models to quantify operational risk
- Describe applications for modeling the distribution of the maximum loss over a given time period

The topics covered here do not constitute the entire body of EVT. The objective here is to provide a flavor of the subject.

SECTION 10: ERM STRATEGY AND FRAMEWORK

Overview

In this section, you will review concepts and requirements from a life insurance company's Own Risk Solvency Assessment (ORSA) and apply these outside of a traditional insurance context. These concepts can be applied broadly across multiple industries and/or jurisdictions, even though they are rooted in an actuarial context for insurance companies in the United States.

Objectives

After completing this section, you will be able to:

- Evaluate current and new opportunities through incorporating risk assessment, budgeting, appetite and/or tolerance into the strategic planning process.
- Analyze the impact of risk decisions on key stakeholders (e.g., employees, customers, shareholders, regulators).

- Evaluate current ERM processes.

SECTION 11: RISK MANAGEMENT CASE STUDIES

Overview

You have covered the core ideas of ERM. In this section, you will apply them. We will review real cases to see how ERM worked in practice and where it broke down. You will analyze what companies did well, what they missed, and how a better ERM design could have changed the outcome.

Why ERM Matters:

- **Real Failures:** Companies like **HIH (Australia)** and **AIG (U.S.)** illustrate the catastrophic impact of poor governance, unrealistic assumptions, and unmitigated external risks.
- **Emerging Risks:** Climate mandates, energy transitions, cyber threats, and evolving regulations demand adaptive and forward-looking ERM practices.

Objectives

After you complete this section, you will be able to:

- Apply ERM frameworks to both real and hypothetical organizational contexts
- Propose governance structures and cultural enhancements to support ERM
- Prioritize and quantify risks using registers and scenario analysis

END-OF MODULE TEST

END-OF-MODULE EXERCISE