

# Enterprise Risk Management

## **Illinois State University Actuarial Research Presentation**

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## Overview

- The evolution toward ERM
- Definitions of ERM
- The risk management process
- ERM core concepts
- The future of ERM

## Where Did ERM Come From?

- “Traditional” risk management formally developed as a field in the 1960s
- Focused on “pure” risks
  - No loss/loss situation
  - Often involves insurance
- Used by insurance purchasing area

## The 1970s: Increased Financial Risk

- FX risk
  - 1972: Collapse of Bretton Woods
- Commodity price risk
  - 1973-4: OPEC embargo
- Interest rate risk
  - 1979: Fed policy shift
- Equity risk

## Financial Risk Management Develops

- Failures from financial risk expanded risk management field
  - Laker Airlines
  - S&L crisis
- Hedging and use of derivatives
  - Forwards and futures
  - Options
  - Swaps
- Financial engineering
  - Custom made products
  - Exotics and Hybrids

## FRM Breakdowns of the 1990s

- Gibson Greetings and Orange County
  - Inappropriate use and/or misunderstanding
- Barings Bank
  - Inadequate controls and accounting
- Metallgesellschaft (MG)
  - Liquidity risk
- Long-Term Capital Management
  - Model failures

## Introduction of macro risks

- Y2K
- Catastrophe and weather
- 9/11 and terrorism
- Corporate scandals

## Risk Management in the New Millennium

- SarbOx (SOX)
- Basel II
- Enterprise Risk Management

## ERM Definition 1: COSO

- “Enterprise risk management is a process ... designed to identify potential events that may affect the entity ... to provide reasonable assurance regarding the achievement of entity objectives.”
- Focus appears to be on pure risks

## ERM Definition 2: Casualty Actuarial Society

- “The process by which organizations in all industries assess, control, exploit, finance and monitor risks from all sources for the purpose of increasing the organization's short and long term value to its stakeholders.”
- Indicates risk opportunities
- Link to corporate value

# What is ERM?

- Other names for ERM
  - Enterprise-wide risk management
  - Holistic risk management
  - Integrated risk management
  - Strategic risk management
  - Global risk management
- Application of the risk management process to all risks facing an organization

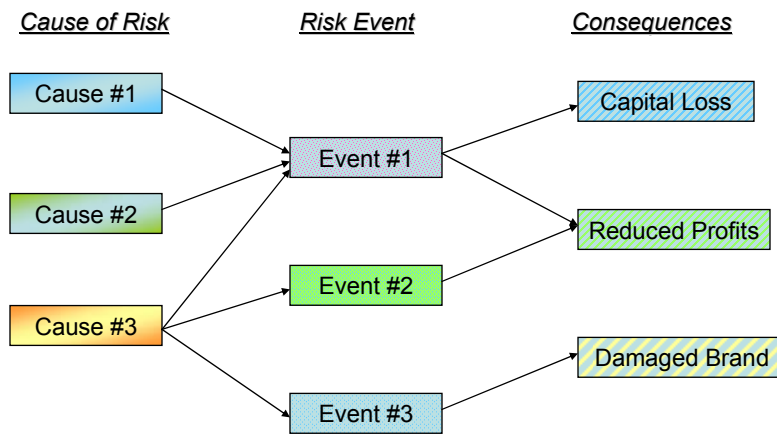
## Risk Management Process

### 1. Risk identification

# Risk Awareness

- CEO must establish and convey risk management paradigm
- Each department identifies key risks
- Communicate risks across the company

## Risk Identification: Cause-Effect-Consequence



## Risk Identification

- Process may help determine origins of the risks
- Reduce duplication of effort
- End result is a taxonomy of risks
  - Explicitly defined risks (common definitions)
  - Catalog along common themes

## Hazard Risk

- Property
- Liability
- Business interruption
- Usually independent risks

## Financial Risk

- Foreign exchange rate
- Equity
- Interest rate
- Commodity price
- Credit risk
- Highly correlated

## Operational Risk

- Product recall
- Information technology
- Labor dispute
- Management fraud
- Reputational risk
- Regulation/compliance
- Correlation?

## Bank View of Risks: Basel II

- Market risk (financial risk)
- Credit risk
  - Loan and counterparty risk
- Operational risk

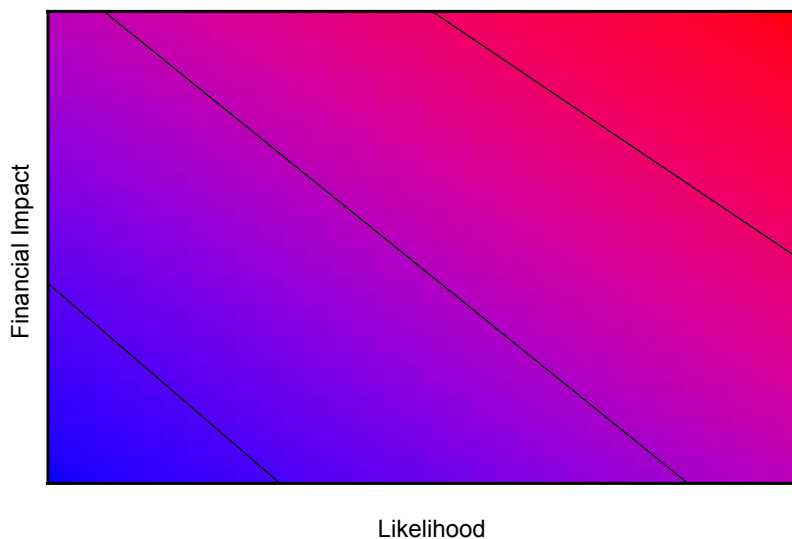
## Insurance View of Risks: Risk-Based Capital (RBC)

- Asset risk
- Pricing (underwriting) risks
- Asset-liability mismatch (C-3)
- Reinsurance
- Other (operational?)

# Risk Management Process

1. Risk identification
- 2. Risk measurement**

## Risk Mapping

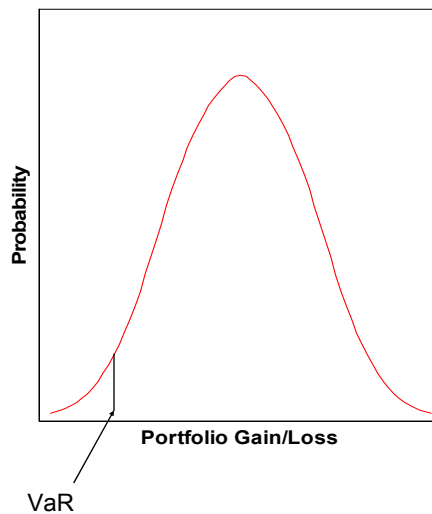


# Financial Risk Measurement

- Duration and convexity
- The “Greeks” (delta, gamma, vega, theta, rho)
- Dynamic modeling
  - Term structure modeling
  - Dynamic financial analysis
- Value at Risk (VaR)

# Value at Risk

- Model potential outcomes
- “Worst case scenario” is one point on the distribution
- Often used to define capital needs
- Variations include TVaR, CTE, and EPD



## Risk Measurement

- Rank top risks
- Determine allocation of resources

## Basic Risk Management Principles

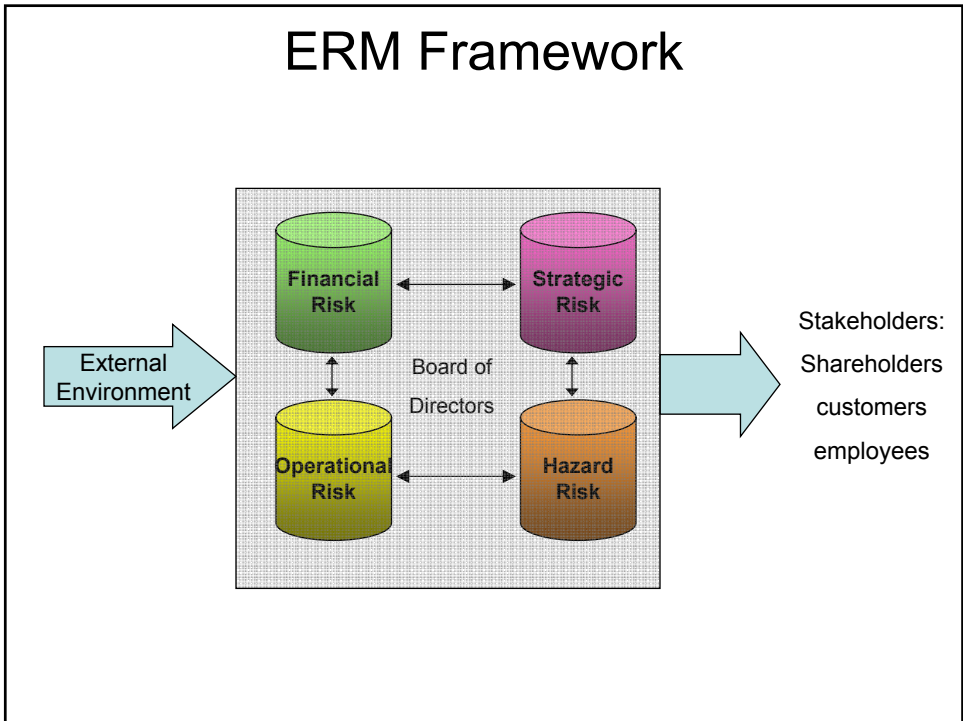
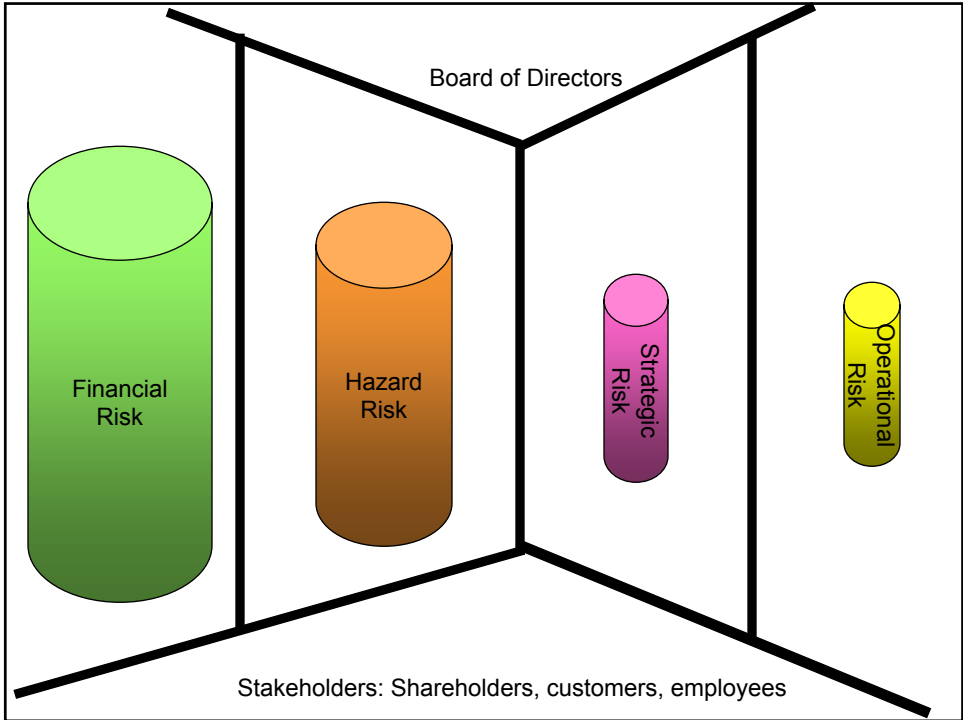
1. Risk identification
2. Risk measurement
3. **Evaluating different methods to mitigate risk**

## Risk Mitigation

- Depending on the perceived size of the risk, we may employ different strategies
  - Risk assumption
  - Risk reduction
  - Risk transfer
  - Other
- ERM helps keep risk at reasonable levels as defined by individual firms

## Basic Risk Management Principles

1. Risk identification
2. Risk measurement
3. Evaluating different methods to mitigate risk
- 4. Selecting a method**



## Basic Risk Management Principles

1. Risk identification
2. Risk measurement
3. Evaluating different methods to mitigate risk
4. Selecting a method
5. **Monitor results and update**

## What does ERM do?

- Improves a company's response to predictable risks
  - No need to perfect predictors
- Make better investment decisions
  - Fewer failures
  - Reduced damage impact
- Bottom line:
  - Better risk-adjusted return to shareholders*

## Keys to Effective ERM

- Defined organizational risk policy and appetite
- Organizational structure
  - Chief Risk Officer (CRO)
  - Risk office and risk training
- Risk culture
- Systems and information technology

## Training the Organization

- Common risk definitions
- Employees need to understand risk concepts:
  - Exposure
  - Volatility
  - Probability
  - Severity
  - Correlation

## Future Directions and/or Impediments to Effective ERM

- Risk models and technology
  - Especially for operational risk (data problems)
- Corporate structure
- Motivation
  - Time and effort
- Need better links among:
  - Capital
  - Corporate value
  - Role of ERM

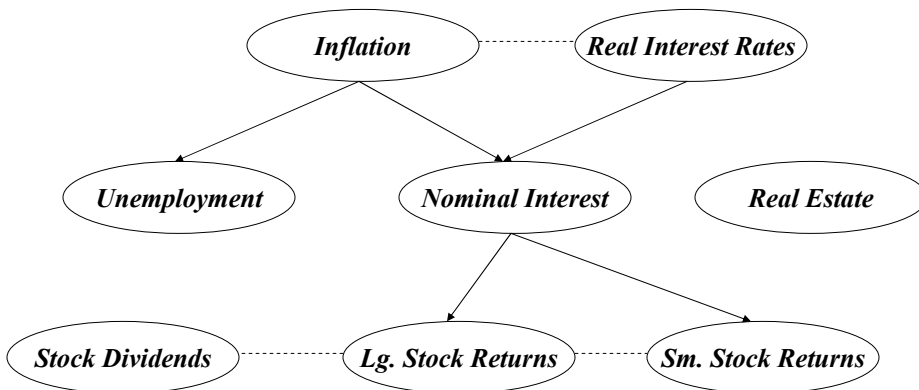
## Summary

- ERM is a new interpretation of 40-year old risk management process
  - More global definition of “risk”
- ERM helps companies optimize risk/return tradeoff by coordinating activities
  - Common risk definitions
  - Integrated mitigation strategies

# Financial Scenario Generator

- Sponsors – CAS and SOA
- Creators
  - Kevin Ahlgrim, ISU
  - Steve D’Arcy, U of I
  - Rick Gorvett, U of I
- <http://casact.org/research/econ/>
- <http://www.soa.org/ccm/content/areas-of-practice/finance/mod-econ-series-coor-int-rate-scen/>

## Relationship between Modeled Economic Series



## Model Description

- Excel spreadsheet using @RISK add-in
- 50 years of projections
- Users can select different parameters for financial processes and track any variable

## Applications of the Financial Scenario Generator

- Financial engine behind many types of analysis
- Actuaries can project insurer operations under a variety of economic conditions
  - Dynamic financial analysis
- Useful for demonstrating solvency to regulators
- May assist in determining operating strategies
  - Including risk management