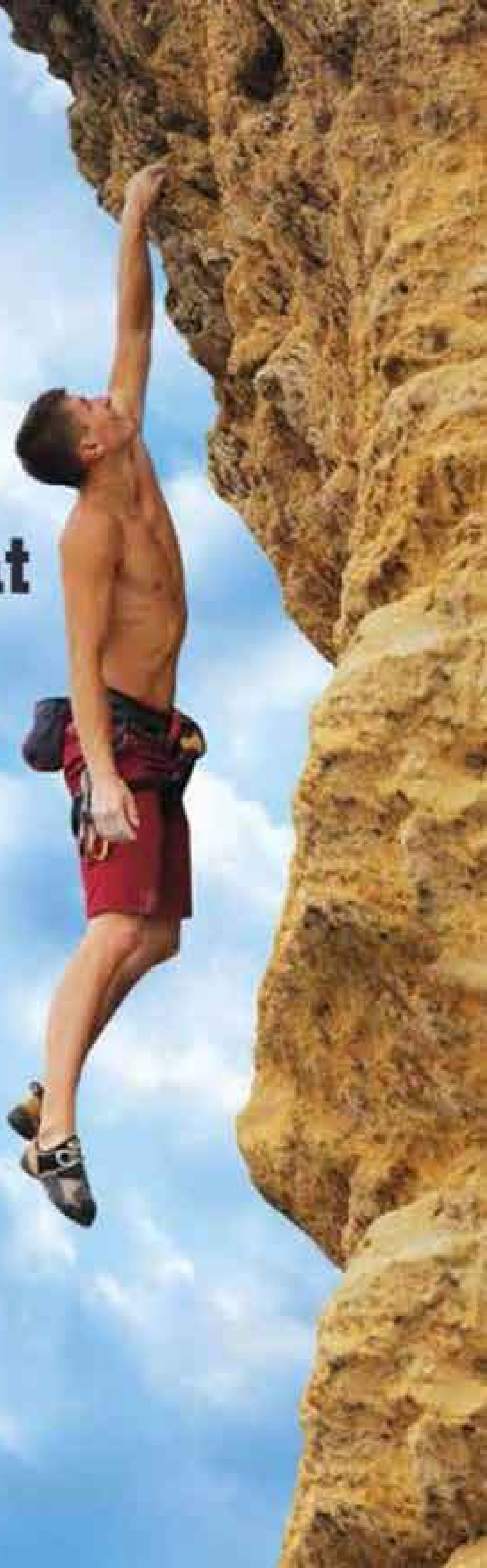
THIRTEENTH EDITION

Principles of Risk Management and Insurance



George E. Rejda
Michael J. McNamara

Principles of
Risk Management and Insurance

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PEARSON

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Contents

Preface

This text deals with risk and its management. Since the last edition of the text appeared, several tragedies have occurred that clearly demonstrate the deadly presence of risk in our society. A suicide bomber entered a market near Baghdad, detonated a bomb, and killed 11 people. Malaysia Flight 360 mysteriously disappeared with 239 passengers aboard, causing an enormous amount of pain and suffering to the surviving families. A deadly earthquake struck Nepal, a low-income country in Asia, which killed more than 8,600 people and destroyed or damaged tens of thousands of houses. Meanwhile, in the United States, a gunman killed nine members of a Bible study group in an historical African American church in Charleston, South Carolina, and a student enrolled at Umpqua Community College in Oregon killed nine people and himself in a tragic and senseless shooting.

In addition to reporting events making national headlines, the media routinely report on tragic events at the local level that clearly show the destructive presence of risk. A runner is hit by a car while jogging; a tornado touches down and destroys most of a small town; a house fire leaves a family homeless; a drunk driver fails to stop at a red light and smashes into another motorist; a plant explosion kills two people and injures several employees; and a blinding snowstorm and ice-packed interstate highway cause a chain-like accident and collision damage to 10 cars. To say that we live in a risky and dangerous world is an enormous understatement.

This thirteenth edition of *Principles of Risk Management and Insurance* discusses these issues and other insurance issues as well. As in previous editions, the text is designed for a beginning undergraduate course in risk management and insurance with no prerequisites. This edition provides an in-depth treatment of major risk management and insurance topics. Topics discussed include basic concepts of risk and insurance, introductory and advanced topics in traditional risk management and enterprise risk management, functional and financial operations of insurers, legal principles, life and health insurance, property and liability insurance, employee benefits, and social insurance. In addition, the Affordable Care Act is discussed in depth. Once again, *Principles of Risk Management and Insurance* places primary emphasis on insurance consumers and blends basic risk management and insurance principles with consumer considerations. With this user-friendly text, students can apply basic concepts immediately to their own personal risk management and insurance programs.

KEY CONTENT CHANGES IN THE THIRTEENTH EDITION

Thoroughly revised and updated, this edition provides an in-depth analysis of current insurance industry issues and practices, which readers have come to expect from *Principles of Risk Management and Insurance*. Key content changes in this edition include the following:

- *Capital retention approach eliminated.* In Chapter 11, the capital retention approach for determining the amount of life insurance has been eliminated. This method generally is not discussed in the online websites of life insurers. In contrast, the needs approach is heavily stressed in the available online calculators.
- *Healthcare reform.* Chapter 15 has an in-depth discussion and update of the broken healthcare delivery system in the United States, which led to enactment of the Affordable Care Act.
- *Update on the Affordable Care Act.* Chapters 15 and 16 provide an update on the Affordable Care Act (ACA) and its impact on individual and group health insurance coverages. Primary attention is devoted to provisions that have a major financial impact on individuals, families, and employers. Chapter 18 summarizes the possible desirable and

undesirable effects of the ACA on both workers compensation programs and employers.

- *Current developments in employer-sponsored group health insurance plans.* Employers continue to grapple with the rapid increase in group health insurance premiums and to seek new solutions for holding down costs. Chapter 16 discusses current trends in group health insurance to contain higher healthcare costs and premiums.
- *Change in sequence of homeowners and auto insurance chapters.* In previous editions, homeowners insurance was discussed prior to auto insurance. This thirteenth edition reverses the sequence of homeowners and auto insurance chapters. Auto insurance is discussed first because it is more relevant and interesting to students than homeowners insurance. In addition, discussion of liability coverage in the Personal Auto Policy (now Chapter 20) logically follows the general discussion of the liability risk treated in the previous chapter (Chapter 19).
- *Legalization of medical marijuana and opiate overuse in workers compensation.* The medical use of marijuana has been legalized in at least 20 states and the District of Columbia. The increased use of medical marijuana and opiate overuse, and their impact on workers compensation programs, are important issues discussed in Chapter 18.
- *Cyber-liability insurance.* Computer hackers have been successful in accessing the credit card records and other personal information of millions of customers of major retail firms. Cyber-liability insurance covers damages arising from the failure of a data holder to protect private information from being accessed by an unauthorized party. Chapter 26 discusses some basic concepts in cyber-liability insurance.
- *New Insurance Services Office (ISO) Forms.* The latest revisions of the ISO Commercial Property form, the Commercial General Liability form, and the Commercial/Government Crime Forms are discussed in these pages. The text also covers the new Auto Dealers Coverage form.
- *New Insight boxes.* A number of new and timely Insight boxes appear. Insights are valuable learning tools that provide real-world applications of a concept or principle discussed in the text.
- *Technical accuracy.* As in previous editions, numerous experts have reviewed the text for technical accuracy, especially in areas where changes occur rapidly. This new edition presents technically accurate and up-to-date material.

INSTRUCTOR RESOURCES

At the Instructor Resource Center, www.pearsonhighered.com/irc, instructors can easily register to gain access to a variety of instructor resources available with this text in downloadable format. If assistance is needed, our dedicated technical support team is ready to help with the media supplements that accompany this text. Visit http://247.pearsoned.com for answers to frequently asked questions and toll-free user support phone numbers.

The following supplements are available with this text:

- **Companion Website**
  - **Internet exercises**
  - **A multiple choice practice quiz for each chapter**
- **Instructor's Resource Manual & Test Bank**
- **TestGen® Computerized Test Bank**
- **PowerPoint Presentations**
- **Student Study Guide**

ACKNOWLEDGMENTS

A market-leading text is never written alone. We owe an enormous intellectual debt to numerous risk management and insurance professors, risk management experts, insurance industry personnel, and other professionals for their kind and gracious assistance. These experts provided supplementary materials, made valuable comments, answered technical questions, or provided other help. As a result, this new edition is a substantially improved educational product. Our experts include the following:

- Steve Avila, Ball State University
- Burton T. Beam, Jr., The American College (retired)
- Patricia Born, Florida State University
- Nick Brown, Chief Executive Officer, Global Aerospace
- Leon Chen, Minnesota State University, Mankato
- Ann Costello, University of Hartford
- Edward Graves, The American College (retired)
- Jane Henderson, LIMRA
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- William H. Rabel, The University of Alabama
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- Johnny Vestal, Texas Tech University
- Eric Wiening, Insurance and Risk Management Author/Educator/Consultant
- Millicent W. Workman, Research Analyst, International Risk Management Institute, Inc. (IRMI), and Editor, *Practical Risk Management*

The views expressed in the text are those solely of the authors and do not necessarily reflect the viewpoints or positions of the reviewers whose assistance we gratefully acknowledge.

Finally, the fundamental objective underlying this thirteenth edition remains the same as in the first edition: We have attempted to write an intellectually stimulating and visually attractive textbook from which students can learn and professors can teach.

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CHAPTER

1

Risk and Its Treatment

"When we take a risk, we are betting on an outcome that will result from a decision we have made, though we do not know for certain what the outcome will be."

Peter L. Bernstein
Against the Gods: The Remarkable Story of Risk

Learning Objectives

After studying this chapter, you should be able to

- Explain the historical definition of risk.
- Explain the meaning of loss exposure.
- Understand the following types of risk:
  - Pure risk
  - Speculative risk
  - Diversifiable risk
  - Nondiversifiable risk
  - Enterprise risk
  - Systemic risk
- Identify the major pure risks that are associated with great economic insecurity.
- Show how risk is a burden to society.
- Explain the major techniques for managing risk.

Jason, age 24, is a senior at a large Midwestern university. He has a part-time job as a cashier in a liquor store located near the university campus. Around midnight, on a Saturday night, an intoxicated customer entered the store, grabbed a bottle of wine, and attempted to leave without paying. When Jason blocked his exit, the enraged customer pulled a knife and stabbed Jason repeatedly in the chest and neck, severing a major artery. Jason died while being transported to a local hospital.

Jason's tragic and untimely death shows that we live in a risky, dangerous, and violent world. The news media report daily on similar tragic events that clearly illustrate the widespread presence of a risk in our society. Examples abound—two terrorists armed with assault weapons stormed into the newsroom of a satirical magazine killing 12 people; a drunk driver on a crowded expressway changed lanes suddenly and severely injured four people; a tornado touched down and wiped out a small town; a river overflows, and thousands of acres of farm crops are lost; and an executive is found guilty of defrauding his company of several millions of dollars. In addition, people often experience personal tragedies and financial setbacks that seldom make the news headlines but nevertheless cause great economic insecurity—the unexpected death of a family head; catastrophic medical bills that wipe out a family's savings; the loss of a good-paying job and long-term unemployment during a severe business recession; and total disability from an accident of sickness that results in a significant loss of earnings.

This chapter discusses the nature and treatment of risk in our society. Topics discussed include the meaning of risk, the major types of personal risks that affect individuals and families, major commercial risks that affect business firms, the burden of risk on society, and the major methods for managing risk.

DEFINITIONS OF RISK

There is no single definition of *risk*. Economists, behavioral scientists, risk theorists, statisticians, actuaries, and historians each have their own concept of risk.

Employees in the insurance industry often use the term *risk* in a different manner to identify the property or life that is being considered for insurance. For example, in the insurance industry, it is common to hear statements such as "That driver is a poor risk" or "That building is an unacceptable risk."

Traditional Definition of Risk

Risk traditionally has been defined in terms of uncertainty. Based on this concept, **risk** *is defined as uncertainty concerning the occurrence of a loss*. For example, the risk of being killed in an auto accident is present because uncertainty is present. The risk of lung cancer for smokers is present because uncertainty is present. The risk of flunking a required college course is present because uncertainty is present.

Risk Distinguished from Uncertainty

In the economics and finance literature, authors and actuaries often make a distinction between risk and uncertainty. According to the American Academy of Actuaries, the term *risk* is used in situations where the probabilities of possible outcomes are known or can be estimated with some degree of accuracy, whereas *uncertainty* is used in situations where such probabilities cannot be estimated.[1] For example, the probability of dying at each attained age can be estimated with considerable accuracy. In contrast, the probability of destruction of your home by a meteorite from outer space is only a guess and generally cannot be accurately estimated. As such, many authors have developed their own concept of risk, and numerous definitions of risk exist in the professional literature.[2]

Loss Exposure

Because *risk* is an ambiguous term and has different meanings, many authors and corporate risk managers use the term *loss exposure* to identify potential losses. *A* **loss exposure** *is any situation or circumstance in which a loss is possible, regardless of whether a loss actually occurs*. Examples of loss exposures include manufacturing plants that may be damaged by an earthquake or flood, defective products that may result in lawsuits against the manufacturer, possible theft of company property because of inadequate security, and potential injury to employees because of unsafe working conditions.

Finally, when the definition of risk includes the concept of uncertainty, some authors make a careful distinction between objective risk and subjective risk.

Objective Risk

Objective risk (also called *degree of risk*) *is defined as the relative variation of actual loss from expected loss*. For example, assume that a property insurer has 10,000 houses insured over a long period and, on average, 1 percent, or 100 houses, burn each year. However, it would be rare for exactly 100 houses to burn each year. In some years, as few as 90 houses may burn; in other years, as many as 110 houses may burn. Thus, there is a variation of 10 houses from the expected number of 100, or a variation of 10 percent. This relative variation of actual loss from expected loss is known as objective risk.

Objective risk declines as the number of exposures increases. More specifically, *objective risk varies inversely with the square root of the number of cases under observation*. In our previous example, 10,000 houses were insured, and objective risk was 10/100, or 10 percent. Now assume that 1 million houses are insured. The expected number of houses that will burn is now 10,000, but the variation of actual loss from expected loss is only 100. Objective risk is now 100/10,000, or 1 percent. Thus, as the square root of the number of houses increased from 100 in the first example to 1,000 in the second example (10 times), objective risk declined to one-tenth of its former level.

Objective risk can be statistically calculated by some measure of dispersion, such as the standard deviation or the coefficient of variation. Because objective risk can be measured, it is an extremely useful concept for an insurer or a corporate risk manager. As the number of exposures increases, an insurer can predict its future loss experience more accurately because it can rely on the law of large numbers. The **law of large numbers** *states that as the number of exposure units increases, the more closely the actual loss experience will approach the expected loss experience*. For example, as the number of homes under observation increases, the greater is the degree of accuracy in predicting the proportion of homes that will burn. The law of large numbers is discussed in greater detail in Chapter 2.

Subjective Risk (Perceived Risk)

Subjective risk (**perceived risk**) is *defined as uncertainty based on a person's mental condition or state of mind*. Another name for subjective risk is *perceived risk*; some authors use the term in their discussion of the perception of risk by individuals. For example, assume that a driver with several convictions for drunk driving is drinking heavily in a neighborhood bar and foolishly attempts to drive home. The driver may be uncertain whether he will arrive home safely without being arrested by the police for drunk driving. This mental uncertainty or perception is called subjective risk.

The impact of subjective risk varies depending on the individual. Two persons in the same situation can have a different perception of risk, and their behavior may be altered accordingly. If an individual experiences great mental uncertainty concerning the occurrence of a loss, that person's behavior may be affected. High subjective risk often results in conservative and prudent behavior, whereas low subjective risk may result in less conservative behavior. For example, assume that a motorist previously arrested for drunk driving is aware that he has consumed too much alcohol. The driver may then compensate for the mental uncertainty by getting someone else to drive the car home or by taking a cab. Another driver in the same situation may perceive the risk of being arrested as slight. This second driver might drive in a more careless and reckless manner; a low subjective risk results in less conservative driving behavior.

CHANCE OF LOSS

Chance of loss is closely related to the concept of risk. **Chance of loss** *is defined as the probability that an event will occur*. Like risk, *probability* has both objective and subjective aspects.

Objective Probability

Objective probability *refers to the long-run relative frequency of an event based on the assumptions of an infinite number of observations and of no change in the underlying conditions*. Objective probabilities can be determined in two ways. First, they can be determined by deductive reasoning. These probabilities are called *a priori probabilities*. For example, the probability of getting a head from the toss of a perfectly balanced coin is 1/2 because there are two sides, and only one is a head. Likewise, the probability of rolling a 6 with a single die is 1/6, since there are six sides and only one side has six dots.

Second, objective probabilities can be determined by inductive reasoning rather than by deduction. For example, the probability that a person age 21 will die before age 26 cannot be logically deduced. However, by a careful analysis of past mortality experience, life insurers can estimate the probability of death and sell a five-year term life insurance policy issued at age 21.

Subjective Probability

Subjective probability *is the individual's personal estimate of the chance of loss*. Subjective probability need not coincide with objective probability. For example, people who buy a lottery ticket on their birthday may believe it is their lucky day and overestimate the small chance of winning. A wide variety of factors can influence subjective probability, including a person's age, gender, intelligence, education, and the use of alcohol or drugs.

In addition, a person's estimate of a loss may differ from objective probability because there may be ambiguity in the way in which the probability is perceived. For example, assume that a slot machine in a casino requires a display of three lemons to win. The person playing the machine may perceive the probability of winning to be quite high. But if there are 10 symbols on each reel and only one is a lemon, the objective probability of hitting the jackpot with three lemons is quite small. Assuming that each reel spins independently of the others, the probability that all three will simultaneously show a lemon is the product of their individual probabilities ($1/10 \times 1/10 \times 1/10 = 1/1{,}000$). This knowledge is advantageous to casino owners, who know that most gamblers are not trained statisticians and are therefore likely to overestimate the objective probabilities of winning.

Chance of Loss versus Objective Risk

Chance of loss can be distinguished from objective risk. *Chance of loss* is the probability that an event that causes a loss will occur. *Objective risk* is the relative variation of actual loss from expected loss. *The chance of loss may be identical for two different groups, but objective risk may be quite different*. For example, assume that a property insurer has 10,000 homes insured in Los Angeles and 10,000 homes insured in Philadelphia and that the chance of a fire in each city is 1 percent. Thus, on average, 100 homes should burn annually in each city. However, if the annual variation in losses ranges from 75 to 125 in Philadelphia, but only from 90 to 110 in Los Angeles, objective risk is greater in Philadelphia even though the chance of loss in both cities is the same.

PERIL AND HAZARD

The terms *peril* and *hazard* should not be confused with the concept of risk discussed earlier.

Peril

Peril *is defined as the cause of loss*. If your house burns because of a fire, the peril, or cause of loss, is the fire. If your car is damaged in a collision with another car, collision is the peril, or cause of loss. Common perils that cause loss to property include fire, lightning, windstorm, hail, tornado, earthquake, flood, burglary, and theft.

Hazard

A **hazard** *is a condition that creates or increases the frequency or severity of loss*. There are four major types of hazards:

- Physical hazard
- Moral hazard
- Attitudinal hazard (morale hazard)
- Legal hazard

Physical Hazard A **physical hazard** *is a physical condition that increases the frequency or severity of loss*. Examples of physical hazards include icy roads that increase the chance of an auto accident, defective wiring in a building that increases the chance of fire, and a defective lock on a door that increases the chance of theft.

Moral Hazard **Moral hazard** *is dishonesty or character defects in an individual that increase the frequency or severity of loss*. Examples of moral hazard in insurance include faking an accident to collect benefits from an insurer, submitting a fraudulent claim, inflating the amount of a claim, and intentionally burning unsold merchandise that is insured. Murdering the insured to collect the life insurance proceeds is another important example of moral hazard.

Moral hazard is present in all forms of insurance, and it is difficult to control. Dishonest individuals often rationalize their actions on the grounds that "the insurer has plenty of money." This view is incorrect because the insurer can pay claims only by collecting premiums from other insureds. Because of moral hazard, insurance premiums are higher for everyone.

Insurers attempt to control moral hazard by the careful underwriting of applicants for insurance and by various policy provisions, such as deductibles, waiting periods, exclusions, and riders. These provisions are examined in Chapter 10.

Attitudinal Hazard (Morale Hazard) **Attitudinal hazard** *is carelessness or indifference to a loss, which increases the frequency or severity of a loss*. Examples of attitudinal hazard include leaving car keys in an unlocked car, which increases the chance of theft; leaving a door unlocked, which allows a burglar to enter; and changing lanes suddenly on a congested expressway without signaling, which increases the chance of an accident. Careless acts like these increase the frequency and severity of loss.

The term *morale hazard* has the same meaning as attitudinal hazard. *Morale hazard* is a term that appeared in earlier editions of this text to describe someone who is careless or indifferent to a loss. However, the term *attitudinal hazard* is more widely used today and is less confusing to students and more descriptive of the concept being discussed.

Legal Hazard **Legal hazard** *refers to characteristics of the legal system or regulatory environment that increase the frequency or severity of losses*. Examples include adverse jury verdicts or large damage awards in liability lawsuits; statutes that require insurers to include coverage for certain benefits in health insurance plans, such as coverage for alcoholism; and regulatory action by state insurance departments that prevents insurers from withdrawing from a state because of poor underwriting results.

CLASSIFICATION OF RISK

Risk can be classified into several distinct classes. The most important include the following:

- Pure and speculative risk
- Diversifiable risk and nondiversifiable risk
- Enterprise risk
- Systemic risk

Pure Risk and Speculative Risk

Pure risk *is defined as a situation in which there are only the possibilities of loss or no loss*. The only possible outcomes are adverse (loss) and neutral (no loss). Examples of pure risks include premature death, job-related accidents, catastrophic medical expenses, and damage to property from fire, lightning, flood, or earthquake.

In contrast, **speculative risk** *is defined as a situation in which either profit or loss is possible*. For example, if you purchase 100 shares of common stock, you would profit if the price of the stock increases but would lose if the price declines. Other examples of speculative risks include betting on a horse race, investing in real estate, and going into business for yourself. In these situations, both profit and loss are possible.

It is important to distinguish between pure and speculative risks for three reasons. First, private insurers generally concentrate on pure risks and do not emphasize the insurance of speculative risks. However, there are exceptions. Some insurers will insure institutional portfolio investments and municipal bonds against loss. Also, enterprise risk management (discussed later) is another important exception where certain speculative risks can be insured.

Second, the law of large numbers can be applied more easily to pure risks than to speculative risks. The law of large numbers is important because it enables insurers to predict future loss experience. In contrast, it is generally more difficult to apply the law of large numbers to speculative risks to predict future loss experience. An exception is the speculative risk of gambling, where casino operators can apply the law of large numbers in a most efficient manner.

Finally, society may benefit from a speculative risk even though a loss occurs, but is harmed if a pure risk is present and a loss occurs. For example, a firm may develop new technology for producing inexpensive computers. As a result, some competitors may be forced into bankruptcy. Despite the bankruptcy, society benefits because the computers are produced at a lower cost. However, society normally does not benefit when a loss from a pure risk occurs, such as a flood or earthquake that destroys a town or area.

Diversifiable Risk and Nondiversifiable Risk

Diversifiable risk *is a risk that affects only individuals or small groups and not the entire economy*. It is a risk that can be reduced or eliminated by diversification. For example, a diversified portfolio of stocks, bonds, and certificates of deposit (CDs) is less risky than a portfolio that is 100 percent invested in common stocks. Losses on one type of investment, say stocks, may be offset by gains from bonds and CDs. Likewise, there is less risk to a property and liability insurer if different lines of insurance are underwritten rather than only one line. Losses on one line can be offset by profits on other lines. Because diversifiable risk affects only specific individuals or small groups, it is also called *nonsystematic risk* or *particular risk*. Examples include car thefts, robberies, and dwelling fires. Only individuals and business firms that experience such losses are affected, not the entire economy.

In contrast, **nondiversifiable risk** *is a risk that affects the entire economy or large numbers of persons or groups within the economy*. It is a risk that cannot be eliminated or reduced by diversification. Examples include rapid inflation, cyclical unemployment, war, hurricanes, floods, and earthquakes because large numbers of individuals or groups are affected. Because nondiversifiable risk affects the entire economy or large numbers of persons in the economy, it is also called as *fundamental risk*.

The distinction between a diversifiable and nondiversifiable (fundamental) risk is important because government assistance may be necessary to insure nondiversifiable risks. Social insurance and government insurance programs, as well as government guarantees or subsidies, may be necessary to insure certain nondiversifiable risks in the United States. For example, the risks of widespread unemployment and flood are difficult to insure privately because the characteristics of an ideal insurable risk (discussed in Chapter 2) are not easily met. As a result, state unemployment compensation programs are necessary to provide weekly income to workers who become involuntarily unemployed. Likewise, the federal flood insurance program makes property insurance available to individuals and business firms in flood zones.

Enterprise Risk

Enterprise risk *is a term that encompasses all major risks faced by a business firm. Such risks include pure risk, speculative risk, strategic risk, operational risk, and financial risk*. We have already explained the meaning of pure and speculative risk. *Strategic risk* refers to uncertainty regarding the firm's financial goals and objectives; for example, if a firm enters a new line of business, the line may be unprofitable. *Operational risk* results from the firm's business operations. For example, a bank that offers online banking services may incur losses if "hackers" break into the bank's computer.

Enterprise risk also includes financial risk, which is becoming more important in a commercial risk management program. **Financial risk** *refers to the uncertainty of loss because of adverse changes in commodity prices, interest rates, foreign exchange rates, and the value of money*. For example, a food company that agrees to deliver cereal at a fixed price to a supermarket chain in 6 months may lose money if grain prices rise. A bank with a large portfolio of Treasury bonds may incur losses if interest rates rise. Likewise, an American corporation doing business in Japan may lose money when Japanese yen are exchanged for American dollars.

Enterprise risk is becoming more important in commercial risk management, which is a process that organizations use to identify and treat major and minor risks. In the evolution of commercial risk management, some risk managers are now considering all types of risk in one program. **Enterprise risk management** *combines into a single unified treatment program all major risks faced by the firm.* As explained earlier, these risks include pure risk, speculative risk, strategic risk, operational risk, and financial risk. By packaging major risks into a single program, the firm can offset one risk against another. As a result, overall risk can be reduced. As long as all risks are not perfectly correlated, the combination of risks can reduce the firm's overall risk. In particular, if some risks are negatively correlated, overall risk can be significantly reduced. Chapter 4 discusses enterprise risk management in greater detail.

Treatment of financial risks typically requires the use of complex hedging techniques, financial derivatives, futures contracts, options, and other financial instruments. Some firms appoint a chief risk officer (CRO), such as the treasurer, to manage the firm's financial risks. Chapter 4 discusses financial risk management in greater detail.

Systemic Risk

Systemic risk is an economic risk that is extremely important in the monetary policy of the Federal Reserve, fiscal policies of the federal government, and government regulation of the economy. Systemic risk is especially important with respect to large commercial banks and other financial institutions that are considered too large to fail without doing major financial harm to a large part of the American economy.

Systemic risk *is the risk of collapse of an entire system or entire market due to the failure of a single entity or group of entities that can result in the breakdown of the entire financial system.* The severe 2008–2009 business recession in the United States was the second-worst economic downswing in U.S. history, which was caused largely by systemic risk. The economy experienced a massive financial meltdown and a brutal stock market crash that wiped out the life savings of many Americans; the national unemployment rate soared to historically high levels; the housing market collapsed and foreclosures increased; more than 100 commercial banks and financial institutions failed or merged with other entities, which produced a credit crunch and a freezing of credit markets; commercial banks and some insurers sold billions of complex derivatives that were largely unregulated and resulted in massive losses to investors worldwide; and state and federal regulation of the financial services industry, including insurance companies, proved inadequate and broken. Chapter 8 discusses in greater detail the economic impact of systemic risk on the insurance industry and government regulation of insurance.

MAJOR PERSONAL RISKS AND COMMERCIAL RISKS

The preceding discussion shows several ways of classifying risk. However, in this text, we emphasize primarily the identification and treatment of pure risk. Certain pure risks are associated with great economic insecurity for both individuals and families, as well as for commercial business firms. This section discusses (1) important personal risks that affect individuals and families and (2) major commercial risks that affect business firms.

Personal Risks

Personal risks *are risks that directly affect an individual or family*. They involve the possibility of the loss or reduction of earned income, extra expenses, and the depletion of financial assets. Major personal risks that can cause great economic insecurity include the following:[3]

- Premature death
- Inadequate retirement income
- Poor health
- Unemployment

Premature Death **Premature death** *is defined as the death of a family head with unfulfilled financial* *obligations*. These obligations include dependents to support, a mortgage to be paid off, children to educate, and credit cards or installment loans to be repaid. If the surviving family members have insufficient replacement income or past savings to replace the lost income, they will be exposed to considerable economic insecurity.

Premature death can cause economic insecurity only if the deceased has dependents to support or dies with unsatisfied financial obligations. Thus, the death of a 7-year-old child is not "premature" in the economic sense, as small children generally are not working and contributing to the financial support of the family.

There are at least four costs that result from the premature death of a family head. First, the human life value of the family head is lost forever. The **human life value** *is defined as the present value of the family's share of the deceased breadwinner's future earnings*. This loss can be substantial; the actual or potential human life value of most college graduates can easily exceed $500,000. Second, additional expenses may be incurred because of funeral expenses, uninsured medical bills, probate and estate settlement costs, and estate and inheritance taxes for larger estates. Third, because of insufficient income, some families may have trouble making ends meet or covering expenses. Finally, certain noneconomic costs are also incurred, including emotional grief, loss of a role model, and counseling and guidance for the children.

Inadequate Retirement Income The major risk during retirement is inadequate income. The majority of workers in the United States retire before age 65. When they retire, they lose their earned income. Unless they have sufficient financial assets on which to draw, or have access to other sources of retirement income—such as Social Security or a private pension, a 401(k) plan, or an individual retirement account (IRA)—they will be exposed to considerable economic insecurity.

The majority of workers experience a substantial reduction in their money incomes when they retire, which can result in a reduced standard of living. *For example, according to the 2015 Current Population Survey, median money income for all households in the United States was $53,567 in 2014. In contrast, median income for householders aged 65 and older was only 36,895, or 31 percent less.*[4] This amount generally is inadequate for retired workers with substantial additional expenses, such as high uninsured medical bills, catastrophic long-term care costs in a skilled nursing facility, high property taxes, or a substantial mortgage to be paid off.

In addition, most retired workers have not saved enough for a comfortable retirement. During the next 15 years, millions of American workers will retire. However, an alarming number will be financially unprepared for a comfortable retirement. According to a 2015 survey by the Employee Benefit Research Institute, the amounts saved for retirement by the majority of retirees are relatively small. *Retirees* are individuals who are retired or who are age 65 or older and not employed full-time. *The 2015 survey found that 53 percent of the retirees who responded to the survey reported total savings and investment of less than $25,000, which did not include their primary residence or any defined benefit pension plan.* A disturbing percentage of retirees (35 percent) *reported relatively small and insignificant savings and investments of only $1,000 or less. Only 19 percent reported saving $250,000 or more for retirement* (see Exhibit 1.1). In general, these amounts are relatively small and will not provide a comfortable retirement.

Finally, many retired people are living in poverty and are economically insecure. New poverty data show that aged poverty in old age is more severe than the official rate indicates. For 2014, the official poverty rate by the Census Bureau showed that only 10.0 percent of the people age 65 and over were counted as poor. However, the official figure does not include the value of food stamps, payroll taxes, the earned income tax credit, work-related expenses, medical costs, child-care expenses, and geographical differences. The Census Bureau has developed a supplemental poverty measure that includes these factors and shows that the poverty rate for the aged is significantly higher than is commonly believed. *The new measure showed that the poverty rate for those individuals age 65 and older was estimated 15.5 percent, or about 55 percent higher than the official rate.*[5]

Poor Health Poor health is another major personal risk that can cause great economic insecurity. The risk of poor health includes both the payment of catastrophic medical bills and the loss of earned income.

Exhibit 1.1
Total Savings and Investments Reported by Retirees Among Those Providing a Response

	2004	2010	2011	2012	2013	2014	2015	2015 Have Plan*	2015 No Plan
Less than $1,000		27%	28%	28%	31%	29%	35%	12%	61%
$1,000–$9,999	49%	15	14	19	16	17	11	10	13
$10,000–$24,999		14	12	8	8	12	7	9	5
$25,000–$49,999	13	11	6	9	9	8	8	11	5
$50,000–$99,999	7	6	11	8	9	7	10	14	5
$100,000–$249,999	17	15	12	12	10	11	10	15	5
$250,000 or More	15	12	17	15	17	17	19	30	6

*Have retirement plan defined as respondent or spouse having at least one of the following IRA, defined contibution plan or defined benifit plan.

Source: Employee Benefit Research Institute, " The 2015 Retirement Confidence Survey: Having a Retirement Savings Plan a Key Factor in Americans' Retirement Confidence," *Issue Brief No 413*, April 2015, Table 19.

The costs of hospitalization, major surgery, diagnostic tests, and prescription drugs have increased substantially in recent years. Today, an open-heart operation can cost more than $300,000, a kidney or heart transplant can cost more than $500,000, and the costs of a crippling accident requiring several major operations, plastic surgery, and rehabilitation can exceed $600,000. In addition, long-term care in a nursing home can cost $100,000 or more each year. Expensive prescription drugs taken daily present additional financial problems to many people. Chapter 15 discusses in greater detail the economic problem of poor health and problems of the uninsured.

The loss of earned income is another major cause of economic insecurity if the disability is severe and lengthy. In cases of long-term disability, there is substantial loss of earned income; medical bills are incurred; employee benefits may be lost or reduced; and savings are reduced or depleted. There is also the additional cost of providing care to a disabled person who is confined to the home. Most workers seldom think about the financial consequences of long-term disability. The probability of becoming disabled before age 65 is much higher than is commonly believed, especially by the young. According to the Social Security Administration, a 20-year-old worker has a 1-in-4 chance of becoming disabled before reaching the full retirement age.[6] The financial impact of total disability on savings, assets, and the ability to earn an income can be severe. In particular, the loss of earned income during a lengthy disability can be financially devastating.

Students should know their chances of being unable to work because of sickness of injury and the estimated financial impact if they become disabled. Insight 1.1 provides a valuable disability income calculator by the Council of Disability Awareness (CDA) that shows the probability of becoming disabled and the financial impact of a long-term disability. The calculator provides a personal disability quotient, which shows the probability of becoming disabled and the estimated total financial loss if you cannot work for 3 months or longer. The results are based on your age, gender, occupation, anticipated retirement age, health status, and certain diseases. Check it out. You will be surprised at what you find.

Unemployment Unemployment is a major cause of economic insecurity in the United States. Unemployment can result from business cycle downswings,