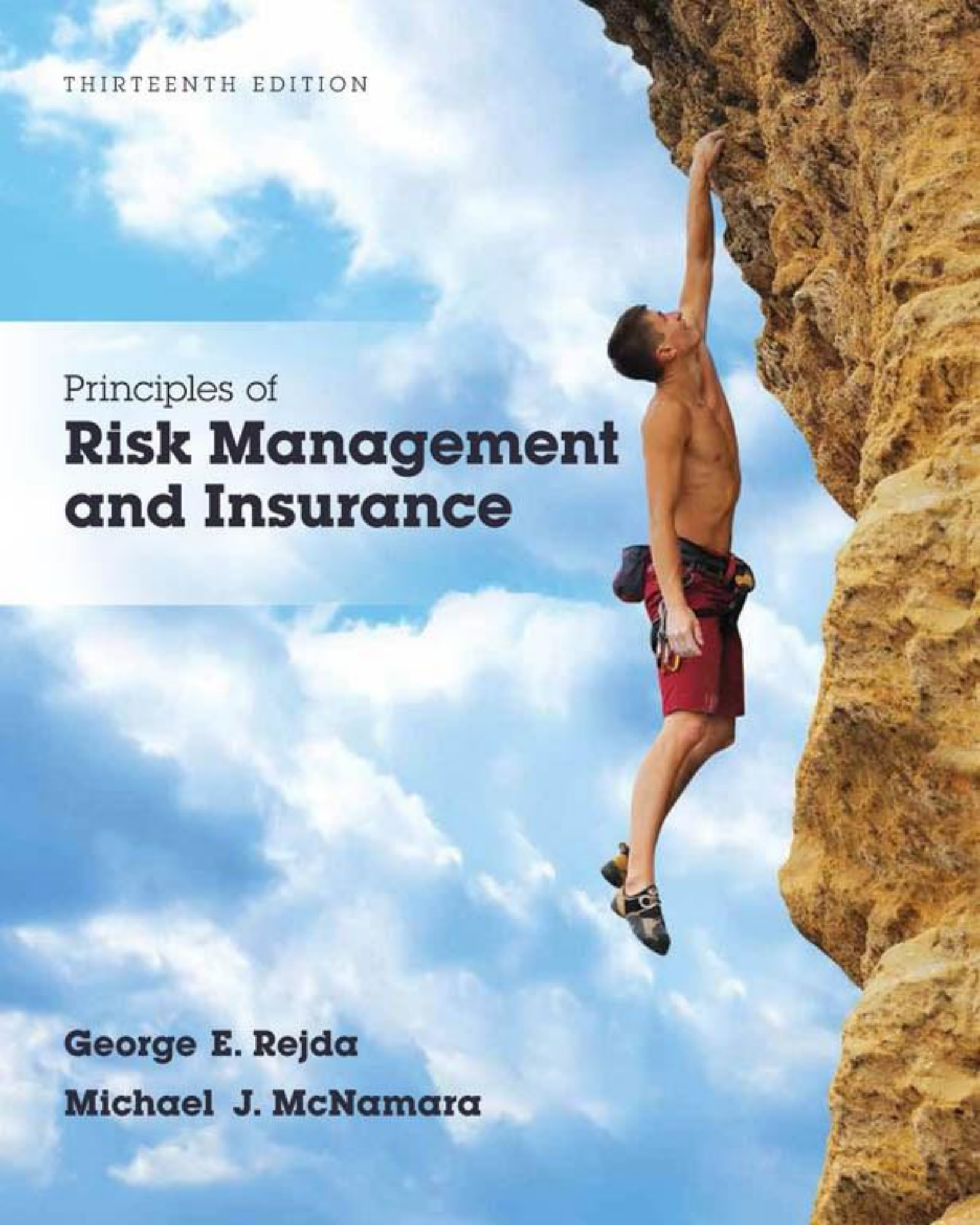
THIRTEENTH EDITION



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
- Robert Klein, Georgia State University

- Yu-Luen Ma, Illinois State University
- Rebecca A. McQuade, Director of Risk Management, PACCAR, Inc.
- William H. Rabel, The University of Alabama
- Bill Rives, The Ohio State University
- Fred Travis, University of Missouri-Columbia
- 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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Mutual of Enumclaw/Field Distinguished Professor of Insurance, Washington State University

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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.

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.

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."

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,

INSIGHT 1.1

What Are Your Chances of Not Being Able to Earn an Income? Calculate Your Personal Disability Quotient

The Council of Disability Awareness has developed a valuable disability income calculator, which enables you to calculate your personal disability quotient (PDQ), which is a way to calculate your odds of an injury or illness that could force you to miss work for weeks, months, or even years. The calculator, which gives you an estimate of the total financial impact of a severe illness or injury over your working career, is based on a variety of actuarial data and assumptions to determine the estimated odds of disability.

The calculation of your PDQ requires you to answer several questions—age and gender, height and weight, health status, tobacco use, whether you work indoors or outside, and whether you have been treated for certain diseases. In addition, you are asked your current income amount, expected rate of salary increases, and anticipated retirement age. It is a simple calculator to use, and you can calculate your PDQ in minutes.

Example: Brandon is age 25, 5 feet, 10 inches tall, weighs 170 pounds, and does indoor office work. He does not use tobacco, believes his health is average, and has not been treated for certain diseases, such as cancer or heart disease. He earns $30,000 annually, expects salary increases of 3 percent annually, and plans to retire at age 67. If Brandon becomes totally disabled at age 25, what is his PDQ?

- Based on Brandon's input, his PDQ is 13 percent, which reflects his own chance of becoming ill or injured and unable to work for 3 months or longer.
- If Brandon becomes disabled for 3 months, his chance of the disability lasting 5 years or longer is 32 percent.
- The average length of disability for someone like Brandon is 74 months.
- If Brandon can no longer earn an income, the loss of his earnings potential over the rest of his career is $2,460,696. This figure is a rough calculation based on his current income, expected rate of salary increases, and number of years until retirement.

Source: Calculated from the PDQ calculator, Council for Disability Awareness at http://www.disabilitycanhappen.org/chances_disability/pdq.asp

technological and structural changes in the economy, seasonal factors, imperfections in the labor market, and other causes as well.

At the time of this writing, the economy in the United States continues to recover from the brutal 2008–2009 recession, which was one of the most severe recessions in the nation's history, exceeded only by the Great Depression of the 1930s. In December 2014, the total unemployment rate was 5.6 percent,[7] down from its peak of 10 percent in October 2009. However, totals conceal as much as they reveal. The true unemployment rate is understated because the official rate does not count certain groups as unemployed. These groups include workers who drop out the labor force because they are discouraged, workers forced into part-time employment because of economic conditions, and workers with a marginal attachment to the labor force. When a broader measurement of unemployment is used, the unemployment rate is 11.2 percent. *Stated differently roughly one in nine workers in the United States is either unemployed or underemployed*. As a result, millions of unemployed workers are currently experiencing serious problems of economic insecurity because of unemployment or underemployment.

Extended unemployment can cause economic insecurity in at least four ways. First, workers lose their earned income and employer-sponsored employee benefits. Unless there is sufficient replacement income or substantial past savings on which to draw, unemployed workers will be exposed to economic insecurity. Second, as stated earlier, hours of work may be cut, thereby reducing employees' hours to only parttime. The reduced income may be insufficient in terms of the workers' needs. Third, the problem of long-term unemployment has worsened in recent years. *In December 2014, those jobless for 27 weeks or longer accounted for 31.9 percent of the unemployed in the United States*.[8] If the duration of unemployment extends over a long period, past savings and unemployment benefits may be exhausted.

Finally, because of complex laws and tighter eligibility requirements, state unemployment

insurance programs have significant limitations and defects, which have increased the financial burden on unemployed workers. Not all unemployed workers receive unemployment insurance benefits; a relatively high percentage of claimants exhaust their unemployment benefits during business recessions and are still unemployed; and many state programs are inadequately financed. These issues are discussed in greater detail in Chapter 18.

Property Risks

Persons owning property are exposed to **property risks**—the risk of having property damaged or destroyed from numerous causes. Homes and other real estate and personal property can be damaged or destroyed because of fire, lightning, tornado, windstorm, and numerous other causes. There are two major types of loss associated with the destruction or theft of property: direct loss and indirect or consequential loss.

Direct Loss A **direct loss** *is defined as a financial loss that results from the physical damage, destruction, or theft of the property*. For example, if you own a home that is damaged or destroyed by a fire, the physical damage to the home is a direct loss.

Indirect or Consequential Loss *An* **indirect loss** *is a financial loss that results indirectly from the occurrence of a direct physical damage or theft loss*. For example, as a result of the fire to your home, you may incur additional living expenses to maintain your normal standard of living. You may have to get a motel room or rent an apartment while the home is being repaired. You may have to eat some or all of your meals at local restaurants. You may also lose rental income if a room is rented and the house is not habitable. These additional expenses that resulted from the fire would be a **consequential loss**.

Liability Risks

Liability risks are another important type of pure risk that most persons face. Under the U.S. legal system, you can be held legally liable if you do something that results in bodily injury or property damage to someone else. A court of law may order you to pay substantial damages to the person you have injured.

The United States is a litigious society, and lawsuits are common. Motorists can be held legally liable for the negligent operation of their vehicles; homeowners may be legally liable for unsafe conditions on the premises where someone is injured; dog owners can be held liable if their dog bites someone; operators of boats can be held legally liable because of bodily injury to boat occupants, swimmers, and water skiers. Likewise, if you are a physician, attorney, accountant, or other professional, you can be sued by patients and clients because of alleged acts of malpractice. Finally, business firms can be sued for defective products or services that result in bodily injury, property damage, and other harm to users of the product or service.

Liability risks are of great importance for several reasons. *First, there is no maximum upper limit with respect to the amount of the loss*. You can be sued for any amount. In contrast, if you own property, there is a maximum limit on the loss. For example, if your car has an actual cash value of $25,000, the maximum physical damage loss is $25,000. But if you are negligent and cause an accident that results in serious bodily injury to the other driver, you can be sued for any amount—$50,000, $500,000, $1 million, or more—by the person or party you have injured.

Second, a lien can be placed on your income and financial assets to satisfy a legal judgment. For example, assume that you injure someone, and a court of law orders you to pay damages to the injured party. If you cannot pay the judgment, a lien may be placed on your income and financial assets to satisfy the judgment. If you declare bankruptcy to avoid payment of the judgment, your credit rating will be impaired.

Finally, legal defense costs can be enormous. If you have no liability insurance, the cost of hiring an attorney to defend you can be staggering. If the suit goes to trial, attorney fees and other legal expenses can be substantial.

Commercial Risks

Business firms also face a wide variety of pure risks that can financially cripple or bankrupt the firm if a loss occurs. These risks include (1) property risks,

(2) liability risks, (3) loss of business income, (4) cybersecurity and identity theft, and (5) other risks.

Property Risks Business firms own valuable business property that can be damaged or destroyed by numerous perils, including fires, windstorms, tornadoes, hurricanes, earthquakes, and other perils. Business property includes plants and other buildings; furniture, office equipment, and supplies; computers and computer software and data; inventories of raw materials and finished products; company cars, boats, and planes; and machinery and mobile equipment. The firm also has accounts receivable records and may have other valuable business records that could be damaged or destroyed and expensive to replace.

Liability Risks Business firms often operate in highly competitive markets where lawsuits for bodily injury and property damage are common. The lawsuits range from small nuisance claims to multimillion-dollar demands. Firms are sued for numerous reasons, including defective products that harm or injure others, pollution of the environment, damage to the property of others, injuries to customers, discrimination against employees and sexual harassment, violation of copyrights and intellectual property, and numerous other reasons. In addition, directors and officers may be sued by stockholders and other parties because of financial losses and mismanagement of the company. Finally, commercial banks, other financial institutions, and other business firms are exposed to enormous potential liability because of cyber security and identify theft crimes that have occurred in recent years.

Loss of Business Income Another important risk is the potential loss of business income when a covered physical damage loss occurs. The firm may be shut down for several months because of a physical damage loss to business property due to a fire, tornado, hurricane, earthquake, or other perils. During the shutdown period, the firm would lose business income, which includes the loss of profits, the loss of rents if business property is rented to others, and the loss of local markets.

In addition, during the shutdown period, certain expenses may still continue, such as rent, utilities, leases, interest, taxes, some salaries, insurance premiums, and other overhead costs. Fixed costs and continuing expenses that are not offset by revenues can be sizeable if the shutdown period is lengthy.

Finally, the firm may incur extra expenses during the period of restoration that would not have been incurred if the loss had not taken place. Examples include the cost of relocating temporarily to another location, increased rent at another location, and the rental of substitute equipment.

Cybersecurity and Identity Theft Cybersecurity and identity theft by thieves breaking into a firm's computer system and database are major problems for many firms. Computer hackers have been able to steal hundreds of thousands of consumer credit records, which have exposed individuals to identity theft and violation of privacy. As a result, commercial banks, financial institutions, and other business firms are exposed to enormous legal liabilities. Other crime exposures include robbery and burglary; shoplifting; employee theft and dishonesty; fraud and embezzlement; piracy and theft of intellectual property, and computer crimes.

Other Risks Business firms must cope with a wide variety of additional risks, summarized as follows:

- *Human resources exposures*. These include job-related injuries and disease of workers; death or disability of key employees; group life and health and retirement plan exposures; and violation of federal and state laws and regulations.
- *Foreign loss exposures*. These include acts of terrorism, political risks, kidnapping of key personnel, damage to foreign plants and property, and foreign currency risks.
- *Intangible property exposures*. These include damage to the market reputation and public image of the company, the loss of goodwill, and loss of intellectual property. For many companies, the value of intangible property is greater than the value of tangible property.
- *Government exposures*. Federal and state governments may pass laws and regulations that have a significant financial impact on the company. Examples include laws that increase safety standards, laws that require reduction in plant emissions and contamination, and new laws to protect the environment that increase the cost of doing business.

BURDEN OF RISK ON SOCIETY

The presence of risk results in certain undesirable social and economic effects. Risk entails three major burdens on society:

- The size of an emergency fund must be increased.
- Society is deprived of certain goods and services.
- Worry and fear are present.

Larger Emergency Fund

It is prudent to set aside funds for an emergency. However, in the absence of insurance, individuals and business firms would have to increase substantially the size of their emergency fund to pay for unexpected losses. For example, assume you have purchased a $300,000 home and want to accumulate a fund for repairs if the home is damaged by fire, hail, windstorm, or some other peril. Without insurance, you would have to save at least $50,000 annually to build up an adequate fund within a relatively short period of time. Even then, an early loss could occur, and your emergency fund may be insufficient to pay for the loss. If you are a middle- or low-income earner, you would find such saving difficult. In any event, the higher the amount that must be saved, the more current consumption spending must be reduced, which results in a lower standard of living.

Loss of Certain Goods and Services

A second burden of risk is that society is deprived of important goods and services. For example, because of the risk of a liability lawsuit, many corporations have discontinued manufacturing certain products. Numerous examples can be given. Some 250 companies in the world once manufactured childhood vaccines; today, only a small number of firms manufacture vaccines, due in part to the threat of liability suits. Other firms have discontinued the manufacture of specific products, including asbestos products, football helmets, silicone-gel breast implants, and certain birth-control devices, because of fear of legal liability.

In addition, as a result of the September 11, 2001, terrorist attacks, Congress feared that companies manufacturing anti-terrorism technologies (such as airport security devices) would not manufacture their products for fear of being sued if the technology failed. To deal with this risk, Congress included a provision in the Homeland Security Act of 2002, which limits the legal liability of companies that produce anti-terrorism technology. Without this provision, many anti-terrorism technologies would not be produced because the liability risk is too great.

Worry and Fear

The final burden of risk is that of worry and fear. Numerous examples illustrate the mental unrest and fear caused by risk. Parents may be fearful if a teenage son or daughter departs on a ski trip during a blinding snowstorm because the risk of being killed on an icy road is present. Some passengers in a commercial jet may become extremely nervous and fearful if the jet encounters severe turbulence during the flight. A college student who needs a grade of C in a course to graduate may enter the final examination room with a feeling of apprehension and fear.

TECHNIQUES FOR MANAGING RISK

Techniques for managing risk can be classified broadly as either risk control or risk financing. **Risk control** *refers to techniques that reduce the frequency or severity of losses*. **Risk financing** *refers to techniques that provide for the funding of losses*. Risk managers typically use a combination of techniques for treating each loss exposure.

Risk Control

Risk control is a generic term to describe techniques for reducing the frequency or severity of losses. Major risk-control techniques include the following:

- Avoidance
- Loss prevention
- Loss reduction
  - Duplication
  - Separation
  - Diversification

Avoidance **Avoidance** is one technique for managing risk. For example, you can avoid the risk of being mugged in a high-crime area by staying away from

high-crime rate areas; you can avoid the risk of divorce by not marrying; and business firms can avoid the risk of being sued for a defective product by not producing the product.

Not all risks should be avoided, however. For example, you can avoid the risk of death or disability in a plane crash by refusing to fly. But is this choice practical or desirable? The alternatives—driving or taking a bus or train—often are not appealing. Although the risk of a plane crash is present, the safety record of commercial airlines is excellent, and flying is a reasonable risk to assume.

Loss Prevention **Loss prevention** is a technique that reduces the probability of loss so that the frequency of losses is reduced. Several examples of personal loss prevention can be given. Auto accidents can be reduced if motorists take a safe-driving course and drive defensively. The number of heart attacks can be reduced if individuals control their weight, stop smoking, and eat healthy diets.

Loss prevention is also important for business firms. For example, strict security measures at airports and aboard commercial flights can reduce acts of terrorism; boiler explosions can be prevented by periodic inspections by safety engineers; occupational accidents can be reduced by the elimination of unsafe working conditions and by strong enforcement of safety rules; and fires can be prevented by forbidding workers to smoke in a building where highly flammable materials are used. In short, the goal of loss prevention is to reduce the probability that losses with occur.

Loss Reduction Strict loss prevention efforts can reduce the frequency of losses; however, some losses will inevitably occur. Thus, another objective of loss control is to reduce the severity of a loss after it occurs. For example, a department store can install a sprinkler system so that a fire will be promptly extinguished, thereby reducing the severity of loss; a plant can be constructed with fire-resistant materials to minimize fire damage; fire doors and fire walls can be used to prevent a fire from spreading; and a community warning system can reduce the number of injuries and deaths from an approaching tornado.

Duplication Losses can also be reduced by **duplication.** This technique refers to having back-ups or copies of important documents or property available in case a loss occurs. For example, back-up copies of key business records (e.g., accounts receivable) are available in case the original records are lost or destroyed.

Separation Another technique for reducing losses is **separation.** The assets exposed to loss are separated or divided to minimize the financial loss from a single event. For example, a manufacturer may store finished goods in two warehouses in different cities. If one warehouse is damaged or destroyed by a fire, tornado, or other peril, the finished goods in the other warehouse are unharmed.

Diversification Finally, losses can be reduced by **diversification.** This technique reduces the chance of loss by spreading the loss exposure across different parties. Risk is reduced if a manufacturer has a number of customers and suppliers. For example, if the entire customer base consists of only four domestic purchasers, sales will be impacted adversely by a domestic recession. However, if there are foreign customers and additional domestic customers as well, this risk is reduced. Similarly, the risk of relying on a single supplier can be minimized by having contracts with several suppliers.

From the viewpoint of society, loss control is highly desirable for two reasons. *First, the indirect costs of losses may be large, and in some instances can easily exceed the direct costs*. For example, a worker may be injured on the job. In addition to being responsible for the worker's medical expenses and a certain percentage of earnings (direct costs), the firm may incur sizeable indirect costs: A machine may be damaged and must be repaired; the assembly line may have to be shut down; costs are incurred in training a new worker to replace the injured worker; and a contract may be canceled because goods are not shipped on time. By preventing the loss from occurring, both indirect costs and direct costs are reduced.

Second, the social costs of losses are reduced. For example, assume that the worker in the preceding example dies from the accident. Society is deprived forever of the goods and services the deceased worker could have produced. The worker's family loses its share of the worker's earnings and may experience considerable grief and economic insecurity. And the worker may personally experience great pain and suffering before dying. In short, these social costs can be reduced through an effective loss-control program.

Risk Financing

As stated earlier, risk financing refers to techniques that provide for the payment of losses after they occur. Major risk-financing techniques include the following:

- Retention
- Noninsurance transfers
- Insurance

Retention Retention is an important technique for managing risk. **Retention** means that an individual or a business firm retains part of all of the losses that can result from a given risk. Risk retention can be active or passive.

- **Active Retention** *Active risk retention* means that an individual is consciously aware of the risk and deliberately plans to retain all or part of it. For example, a motorist may wish to retain the risk of a small collision loss by purchasing an auto insurance policy with a $500 or higher deductible. A homeowner may retain a small part of the risk of damage to the home by purchasing a homeowners policy with a substantial deductible. A business firm may deliberately retain the risk of petty thefts by employees, shoplifting, or the spoilage of perishable goods by purchasing a property insurance policy with a sizeable deductible. In these cases, a conscious decision is made to retain part or all of a given risk. Active risk retention is used for two major reasons. First, it can save money. Insurance may not be purchased, or it may be purchased with a deductible; either way, there is often substantial savings in the cost of insurance. Second, the risk may be deliberately retained because commercial insurance is either unavailable or unaffordable.
- **Passive Retention** Risk can also be retained passively. Certain risks may be unknowingly retained because of ignorance, indifference, laziness, or failure to identify an important risk. Passive retention is very dangerous if the risk retained has the potential for financial ruin. For example, many workers with earned incomes are not insured against the risk of total and permanent disability. However, the adverse financial consequences of total and permanent disability generally are more severe than the financial consequences of premature death. Therefore, people who are not insured against this risk are using the technique of risk retention in a most dangerous and inappropriate manner.

Self-Insurance Our discussion of retention would not be complete without a brief discussion of self-insurance. **Self-insurance** *is a special form of planned retention by which part or all of a given loss exposure is retained by the firm.* Another name for self-insurance is *self-funding,* which expresses more clearly the idea that losses are funded and paid for by the firm. For example, a large corporation may self-insure or fund part or all of the group health insurance benefits paid to employees.

Self-insurance is widely used in corporate risk management programs primarily to reduce both loss costs and expenses. There are other advantages as well. Self-insurance is discussed in greater detail in Chapter 3.

In summary, risk retention is an important technique for managing risk, especially in modern corporate risk management programs, which are discussed in Chapters 3 and 4. Risk retention, however, is appropriate primarily for high-frequency, low-severity risks where potential losses are relatively small. Except under unusual circumstances, risk retention should not be used to retain low-frequency, high-severity risks, such as the risk of catastrophic medical expenses, long-term disability, or legal liability.

Noninsurance Transfers **Noninsurance transfers** are another technique for managing risk. The risk is transferred to a party other than an insurance company. A risk can be transferred by several methods, including:

- Transfer of risk by contracts
- Hedging price risks
- Incorporation of a business firm

Transfer of Risk by Contracts Undesirable risks can be transferred by contracts. For example, the risk of a defective television or stereo set can be transferred to the retailer by purchasing a service contract, which makes the retailer responsible for all repairs after the warranty expires. The risk of a rent increase can be transferred to the landlord by a long-term lease.

The risk of a price increase in construction costs can be transferred to the builder by having a guaranteed price in the contract.

Finally, a risk can be transferred by **a hold-harmless clause**. For example, if a manufacturer of scaffolds inserts a hold-harmless clause in a contract with a retailer, the retailer agrees to hold the manufacturer harmless in case a scaffold collapses and someone is injured.

Hedging Price Risks Hedging price risks is another example of risk transfer. **Hedging** is a technique for transferring the risk of unfavorable price fluctuations to a speculator by purchasing and selling futures contracts on an organized exchange, such as the Chicago Board of Trade or New York Stock Exchange.

For example, the portfolio manager of a pension fund may hold a substantial position in long-term U.S. Treasury bonds. If interest rates rise, the value of the Treasury bonds will decline. To hedge that risk, the portfolio manager can sell Treasury bond futures. Assume that interest rates rise as expected, and bond prices decline. The value of the futures contract will also decline, which will enable the portfolio manager to make an offsetting purchase at a lower price. The profit obtained from closing out the futures position will partly or completely offset the decline in the market value of the Treasury bonds owned. Of course, interest rates do not always move as expected, so the hedge may not be perfect. Transaction costs also are incurred. However, by hedging, the portfolio manager has reduced the potential loss in bond prices if interest rates rise.

Incorporation of a Business Firm **Incorporation** is another example of risk transfer. If a firm is a sole proprietorship, the owner's personal assets can be attached by creditors for satisfaction of debts. If a firm incorporates, personal assets cannot be attached by creditors for payment of the firm's debts. In essence, by incorporation, the liability of the stockholders is limited, and the risk of the firm having insufficient assets to pay business debts is shifted to the creditors.

Insurance For most people, insurance is the most practical method for dealing with major risks. Although private insurance has several characteristics, three major characteristics should be emphasized. First, *risk transfer* is used because a pure risk is transferred to the insurer. Second, the *pooling technique* is used to spread the losses of the few over the entire group so that average loss is substituted for actual loss. Finally, the risk may be reduced by application of the *law of large numbers* by which an insurer can predict future loss experience with greater accuracy. These characteristics are discussed in greater detail in Chapter 2.

Case Application

Michael is a college senior who is majoring in marketing. He owns a high-mileage 2005 Ford that has a current market value of $2,500. The current replacement value of his clothes, television, stereo, cell phone, and other personal property in a rented apartment totals $10,000. He uses disposable contact lenses, which cost $200 for a six-month supply. He also has a waterbed in his rented apartment that has leaked in the past. An avid runner, Michael runs five miles daily in a nearby public park that has the reputation of being extremely dangerous because of drug dealers, numerous assaults and muggings, and drive-by shootings. Michael's parents both work to help him pay his tuition.

For each of the following risks or loss exposures, identify an appropriate risk management technique that could have been used to deal with the exposure. Explain your answer.

a. Physical damage to the 2005 Ford because of a collision with another motorist
b. Liability lawsuit against Michael arising out of the negligent operation of his car
c. Total loss of clothes, television, stereo, and personal property because of a grease fire in the kitchen of his rented apartment
d. Disappearance of one contact lens
e. Waterbed leak that causes property damage to the apartment
f. Physical assault on Michael by gang members who are dealing drugs in the park where he runs
g. Loss of tuition assistance from Michael's father, who is killed by a drunk driver in an auto accident

SUMMARY

- There is no single definition of risk. *Risk* historically has been defined as uncertainty concerning the occurrence of a loss.
- A *loss exposure* is any situation or circumstance in which a loss is possible, regardless of whether a loss occurs.
- *Objective risk* is the relative variation of actual loss from expected loss. *Subjective risk* is uncertainty based on an individual's mental condition or state of mind.
- *Chance of loss* is defined as the probability that an event will occur; it is not the same thing as risk.
- *Peril* is defined as the cause of loss. *Hazard* is any condition that creates or increases the chance of loss.
- There are four major types of hazards. *Physical hazard* is a physical condition that increases the frequency or severity of loss. *Moral hazard* is dishonesty or character defects in an individual that increase the chance of loss. *Attitudinal hazard (morale hazard)* is carelessness or indifference to a loss that increases the frequency or severity of loss. *Legal hazard* refers to characteristics of the legal system or regulatory environment that increase the frequency or severity of losses.
- A *pure risk* is a risk where there are only the possibilities of loss or no loss. A *speculative risk* is a risk where either profit or loss is possible.
- *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. In contrast, *nondiversifiable risk* is a risk that affects the entire economy or large numbers of persons or groups within the economy, such as inflation, war, or a business recession. It is a risk that cannot be eliminated or reduced by diversification.
- *Enterprise risk* is a term that encompasses all major risks faced by a business firm. *Enterprise risk management* combines into a single unified treatment program all major risks faced by the firm. Such risks include pure risk, speculative risk, strategic risk, operational risk, and financial risk.
- *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.
- *Systemic risk* is the risk of collapse of an entire system or entire market in which the failure of a single entity or group of entities can result in the breakdown of the entire financial system.
- The following types of *pure risk* can threaten an individual's economic security:
  - Personal risks
  - Property risks
  - Liability risks
- *Personal risks* are those risks that directly affect an individual. Major personal risks include the following:
  - Premature death
  - Inadequate retirement income
  - Poor health
  - Unemployment
- A *direct loss* to property is a financial loss that results from the physical damage, destruction, or theft of the property.
- An *indirect, or consequential, loss* is a financial loss that results indirectly from the occurrence of direct physical damage or theft loss. Examples of indirect losses are the loss of use of the property, loss of profits, loss of rents, and extra expenses.
- *Liability risks* are extremely important because there is no maximum upper limit on the amount of the loss; a lien can be placed on income and assets to satisfy a legal judgment; and substantial court costs and attorney fees may also be incurred.
- Business firms face a wide variety of major risks that can financially cripple or bankrupt the firm if a loss occurs. These risks include property risks, liability risks, loss of business income, crime risks, and certain other risks.
- *Risk* entails three major burdens on society:
  - The size of an emergency fund must be increased.
  - Society is deprived of needed goods and services.
  - Worry and fear are present.
- *Risk control* refers to techniques that reduce the frequency or severity of losses. Major risk-control techniques include avoidance, loss prevention, loss reduction, duplication, separation, and diversification.
- *Risk financing* refers to techniques that provide for the funding of losses after they occur. Major risk-financing techniques include retention, noninsurance transfers, and insurance.

KEY CONCEPTS AND TERMS

Attitudinal hazard (5)
Avoidance (13)
Chance of loss (4)
Consequential loss (11)
Direct loss (11)
Diversification (risk management) (14)
Duplication (risk management) (14)
Diversifiable risk (6)
Enterprise risk (6)
Enterprise risk management (7)
Financial risk (6)
Hazard (5)
Hedging (16)
Hold-harmless clause (16)
Human life value (8)
Incorporation (16)
Indirect loss (11)
Law of large numbers (3)
Legal hazard (5)
Liability risks (11)
Loss exposure (3)
Loss prevention (14)
Moral hazard (5)
Nondiversifiable risk (6)
Noninsurance transfers (15)
Objective probability (4)
Objective risk (3)
Peril (4)
Personal risks (7)
Physical hazard (5)
Premature death (7)
Property risks (11)
Pure risk (5)
Retention (15)
Risk (2)
Risk control (13)
Risk financing (13)
Self-insurance (15)
Separation (risk management) (14)
Speculative risk (5)
Subjective probability (4)
Subjective risk (3)
Systemic risk (7)

REVIEW QUESTIONS

1. a. Explain the historical definition of risk.
   b. What is a loss exposure?
   c. How does objective risk differ from subjective risk?
2. a. Define chance of loss.
   b. What is the difference between objective probability and subjective probability?
3. a. What is the difference between peril and hazard?
   b. Define physical hazard, moral hazard, attitudinal hazard, and legal hazard.
4. a. Explain the difference between pure risk and speculative risk.
   b. How does diversifiable risk differ from nondiversifiable risk?
5. a. Explain the meaning of enterprise risk.
   b. What is financial risk?
   c. What is systemic risk?
6. a. What is enterprise risk management?
   b. How does enterprise risk management differ from traditional risk management?
7. List the major types of pure risk that are associated with economic insecurity.
8. Describe the major social and economic burdens of risk on society.
9. Explain the difference between a direct loss and an indirect or consequential loss.
10. Identify the major risks faced by business firms.
11. a. Briefly explain each of the following risk-control techniques for managing risk:
    1. Avoidance
    2. Loss prevention
    3. Loss reduction
    4. Duplication
    5. Separation
    6. Diversification
    b. Briefly explain each of the following risk-financing techniques for managing risk:
    1. Retention
    2. Noninsurance transfers
    3. Insurance

APPLICATION QUESTIONS

1. Assume that the chance of loss is 3 percent for two different fleets of trucks. Explain how it is possible that objective risk for both fleets can be different even though the chance of loss is identical.
2. Several types of risk are present in the U.S. economy. For each of the following, identify the type of risk that is present. Explain your answer.
   a. The Department of Homeland Security alerts the nation of a possible attack by terrorists.
   b. A house may be severely damaged in a fire.
   c. A family head may be totally disabled in a plant explosion.
   d. An investor purchases 100 shares of Microsoft stock.
   e. A river that periodically overflows may cause substantial property damage to thousands of homes in the floodplain.
   f. Home buyers may be faced with higher mortgage payments if the Federal Reserve raises interest rates at its next meeting.
   g. A worker on vacation plays the slot machines in a casino.

3. There are several techniques available for managing risk. For each of the following risks, identify an appropriate technique, or combination of techniques, that would be appropriate for dealing with the risk.
   a. A family head may die prematurely because of a heart attack.
   b. An individual's home may be totally destroyed in a hurricane.
   c. A new car may be severely damaged in an auto accident.
   d. A negligent motorist may be ordered to pay a substantial liability judgment to someone who is injured in an auto accident.
   e. A surgeon may be sued for medical malpractice.
4. Andrew owns a gun shop in a high-crime area. The store does not have a camera surveillance system. The high cost of burglary and theft insurance has substantially reduced his profits. A risk management consultant points out that several methods other than insurance can be used to handle the burglary and theft exposure. Identify and explain two noninsurance methods that could be used to deal with the burglary and theft exposure.
5. Risk managers use a number of methods for managing risk. For each of the following, what method for handling risk is used? Explain your answer.
   a. The decision not to carry earthquake insurance on a firm's manufacturing plant
   b. The installation of an automatic sprinkler system in a hotel
   c. The decision not to produce a product that might result in a product liability lawsuit
   d. Requiring retailers who sell the firm's product to sign an agreement releasing the firm from liability if the product injures someone

INTERNET RESOURCES

- The **American Risk and Insurance Association** (**ARIA**) is the premier professional association of risk management and insurance educators and professionals. ARIA is the publisher of *The Journal of Risk and Insurance* and *Risk Management and Insurance Review*. Links are provided to research, teaching, and other risk and insurance sites. Visit the site at
  aria.org
- The **Council of Disability Awareness** (**CDA**) has a personal disability quotient (PDQ) calculator that shows the probability of becoming disabled and the estimated financial impact if you cannot work for three months or longer. The results are based on your age, gender, occupation, anticipated retirement age, state of your health, and certain diseases. Visit the calculator site at
  disabilitycanhappen.org/chances_disability/pdq.asp
- The **Employee Benefit Research Institute** (**EBRI**) focuses solely on analyzing employee benefits. There is no lobbying or advocacy. EBRI stands alone in employee benefits research as an independent, nonprofit, and nonpartisan organization. EBRI reports research data without spin or an underlying agenda. As such, research results are objective, independent, and nonpartisan and are widely used by private analysts, government policymakers, and the media. Visit this important site at
  ebri.org
- The **Huebner Foundation** and **Geneva Association** act as an international clearinghouse for researchers and educators in insurance economics and risk management. The Huebner foundation at Georgia State University provides graduate fellowships to promising scholars in the areas of risk management and insurance education. The Geneva Association is an international organization that promotes research dealing with worldwide insurance activities. Visit the site at
  huebnergeneva.org
- The **Insurance Information Institute** is a trade association that provides consumers with information relating to property and casualty insurance coverages and current issues. Visit the site at
  iii.org
- **Risk Theory Society** is an organization within the American Risk and Insurance Association that promotes research in risk theory and risk management. Papers are distributed in advance to the members and are discussed critically at its annual meeting. Visit the site at
  aria.org/rts
- The **Society for Risk Analysis** (**SRA**) provides an open forum for all persons interested in risk analysis, including risk assessment, risk management, and policies related to risk. SRA considers threats from physical, chemical, and biological agents and from a variety of human activities and natural events. It is multidisciplinary and international. Visit the site at
  sra.org
- **S.S. Huebner Foundation for Insurance Education** supports the advancement of university-level risk management and insurance courses, research, scholarship, and learning. Named for Professor Solomon S. Huebner, the

father of collegiate risk and insurance education, the Huebner Foundation is now located at Georgia State University in the J. Mack Robinson School of Business. The Huebner Foundation provides generous graduate fellowships to Ph.D. candidates who are capable of leading and developing risk and insurance programs at universities throughout the world. Visit the site at http://: huebnerfoundation.org

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NOTES

1. American Academy of Actuaries, Risk Classification Work Group. *On Risk Classification,* A Public Policy Monograph (Washington, DC: American Academy of Actuaries, 2011), note 2, p.1.
2. *Risk* has also been defined as (1) variability in future outcomes, (2) chance of loss, (3) possibility of an adverse deviation from a desired outcome that is expected or hoped for, (4) variation in possible outcomes that exist in a given situation, and (5) possibility that a sentient entity can incur a loss.
3. George E. Rejda, *Social Insurance and Economic Security,* 7th ed. (Armonk, NY: M.E. Sharpe, 2012), 5–14.
4. U.S. Census Bureau, *Income and Poverty in the United States: 2014* (Washington, DC: U.S.Government Printing Office, September 2015), Table 1.
5. U.S. Census Bureau, *The Supplemental Poverty Measure: 2014,* Current Population Reports, P60-254, September 2015, Table 4b.
6. *Disability Benefits,* SSA Publication No. 05-10029, 2014.
7. Bureau of Labor Statistics, "The Employment Situation—December 2014," January 9, 2015. Accessed at http://www.bls.gov/news.release/pdf/empsit.pdf, January 21, 2015.
8. Ibid.

Students may take a self-administered test on this chapter at

www.pearsonhighered.com/rejda

CHAPTER

2

Insurance and Risk

"Insurance: An ingenious modern game of chance in which the player is permitted to enjoy the comfortable conviction that he is beating the man who keeps the table."

Ambrose Bierce

Learning Objectives

After studying this chapter, you should be able to

- Explain the basic characteristics of insurance.
- Explain the law of large numbers.
- Describe the characteristics of an ideally insurable risk from the viewpoint of a private insurer.
- Identify the major insurable and uninsurable risks in our society.
- Describe the major types of insurance.
- Explain the social benefits and social costs of insurance.

Michael, age 25, graduated from a large eastern university with an accounting degree and accepted a job with a national accounting firm in Dallas, Texas. His immediate financial goal was to pay off a sizeable student loan of $40,000. Shortly after moving into a furnished apartment, Michael carelessly started a kitchen fire when he was cooking dinner. Personal property valued at $30,000 was totally destroyed. His apartment and an adjacent apartment were severely damaged. The management company sued Michael for the fire damage to the apartments and was awarded $125,000. Michael did not own a renters homeowners policy, which would have paid a substantial amount of the total loss. Michael's goal of early repayment of the student loans received a serious financial setback.

Michael learned in a painful way the financial problem of being uninsured for the risk of fire and personal liability. In Chapter 1, we identified major personal and commercial risks that can cause great economic insecurity. For most people, private insurance is the most important technique for managing risk. Consequently, you should understand how insurance works. This chapter discusses the basic characteristics of insurance, characteristics of an ideally insurable risk, major types of private and government insurance, and the social benefits and costs of insurance. The appendix at the end of the chapter discusses basic insurance statistics and the law of large numbers.

DEFINITION OF INSURANCE

There is no single definition of *insurance*. Insurance can be defined from the viewpoint of several disciplines, including law, economics, history, actuarial science, risk theory, and sociology. But each possible definition will not be examined at this point. Instead, we will examine the common elements that are typically present in any insurance plan. However, before proceeding, a working definition of *insurance*—one that captures the essential characteristics of a true insurance plan—must be established.

After careful study, the Commission on Insurance Terminology of the American Risk and Insurance Association has defined insurance as follows.[1] **Insurance** *is the pooling of fortuitous losses by transfer of such risks to insurers, who agree to indemnify insureds for such losses, to provide other pecuniary benefits on their occurrence, or to render services connected with the risk*. Although this lengthy definition may not be acceptable to all risk managers and insurance scholars, it is useful for analyzing the common elements of a true insurance plan.

BASIC CHARACTERISTICS OF INSURANCE

Based on the preceding definition, an insurance plan or arrangement typically includes the following characteristics:

- Pooling of losses
- Payment of fortuitous losses
- Risk transfer
- Indemnification

Pooling of Losses

Pooling or the sharing of losses is the essence of insurance. **Pooling** *is the spreading of losses incurred by the few over the entire group, so that in the process,*

average loss is substituted for actual loss. In addition, pooling involves the grouping of a large number of exposure units so that the law of large numbers can operate to provide a substantially accurate prediction of future losses. Ideally, there should be a large number of similar, but not necessarily identical, exposure units that are subject to the same perils. Thus, pooling implies (1) the sharing of losses by the entire group and (2) the prediction of future losses with some accuracy based on the law of large numbers.

The primary purpose of pooling, or the sharing of losses, is to reduce the variation in possible outcomes as measured by the standard deviation or some other measure of dispersion, which reduces risk. For example, assume that two business owners each own an identical storage building valued at $50,000. Assume there is a 10 percent chance in any year that each building will be destroyed by a peril, and that a loss to either building is an independent event. The expected annual loss for each owner is $5,000 as shown below:

$$\begin{aligned}\text{Expected loss} &= .90 \times \$0 + .10 \times \$50{,}000 \\ &= \$5{,}000\end{aligned}$$

A common measure of risk is the standard deviation, which is the square root of the variance. The standard deviation (SD) for the expected value of the loss is $15,000, as shown below:

$$\begin{aligned}\text{SD} &= \sqrt{.90(0 - \$5{,}000)^2 + .10(\$50{,}000 - \$5{,}000)^2} \\ &= \$15{,}000\end{aligned}$$

Suppose instead of bearing the risk of loss individually, the two owners decide to pool (combine) their loss exposures, and each agrees to pay an equal share of any loss that might occur. Under this scenario, there are four possible outcomes:

Possible Outcomes	*Probability*
Neither building is destroyed	**.90 × .90 = .81**
First building destroyed, second building no loss	**.10 × .90 = .09**
First building no loss, second building destroyed	**.90 × .10 = .09**
Both buildings are destroyed	**.10 × .10 = .01**

If neither building is destroyed, the loss for each owner is $0. If one building is destroyed, each owner pays $25,000. If both buildings are destroyed, each owner must pay $50,000. The expected loss for each owner remains $5,000 as shown below:

$$\begin{aligned}\text{Expected loss} &= .81 \times \$0 + .09 \times \$25{,}000 \\ &\quad + .90 \times \$25{,}000 + .01 \times \$50{,}000 \\ &= \$5{,}000\end{aligned}$$

Note that while the expected loss remains the same, the probability of the extreme values, $0 and $50,000, have declined. The reduced probability of the extreme values is reflected in a lower standard deviation as shown below:

$$\begin{aligned}\text{SD} &= \sqrt{\begin{array}{l}.81(0-\$5{,}000)^2 + .09(\$25{,}000-\$5{,}000)^2 \\ +.09(\$25{,}000 - \$5{,}000)^2 \\ +.01(\$50{,}000 - \$5{,}000)^2\end{array}} \\ \text{SD} &= \$10{,}607\end{aligned}$$

Thus, as additional individuals are added to the pooling arrangement, the standard deviation continues to decline while the expected value of the loss remains unchanged. For example, with a pool of 100 insureds, the standard deviation is $1,500; with a pool of 1,000 insureds, the standard deviation is $474; and with a pool of 10,000, the standard deviation is $150.

In addition, by pooling or combining the loss experience of a large number of exposure units, an insurer may be able to predict future losses with greater accuracy. From the viewpoint of the insurer, if future losses can be predicted, objective risk is reduced. Thus, another characteristic often found in many lines of insurance is risk reduction based on the law of large numbers.

The **law of large numbers** *states that the greater the number of exposures, the more closely will the actual results approach the probable results that are expected from an infinite number of exposures*.[2] For example, if you flip a balanced coin into the air, the *a priori* probability of getting "heads" is 0.5. If you flip the coin only 10 times, you may get heads eight times. Although the observed probability of getting heads is 0.8, the true probability is still 0.5. If the coin were flipped 1 million times, however, the actual number of heads would be approximately 500,000. Thus, as the number of random tosses increases, the actual results approach the expected results.

A practical illustration of the law of large numbers is the National Safety Council's prediction of the

number of motor vehicle deaths during a typical holiday weekend. Because millions of vehicles are on the road, the National Safety Council has been able to predict with some accuracy the number of motorists who will die during a typical Fourth of July weekend. For example, assume that 500 to 700 motorists are expected to die during a typical July 4th weekend. Although individual motorists cannot be identified, the actual number of deaths for the group of motorists as a whole can be predicted with some accuracy.

However, for most insurance lines, actuaries generally do not know the true probability and severity of loss. Therefore, estimates of both the average frequency and the average severity of loss must be based on previous loss experience. If there is a large number of exposure units, the actual loss experience of the past may be a good approximation of future losses. As we noted earlier, as the number of exposure units increases, the relative variation of actual loss from expected loss will decline. Thus, actuaries can predict future losses with a greater degree of accuracy. This concept is important because an insurer must charge a premium that will be adequate for paying all losses and expenses during the policy period. The lower the degree of objective risk, the more confidence an insurer has that the actual premium charged will be sufficient to pay all claims and expenses and provide a margin for profit.

A more rigorous statement of pooling and the law of large numbers can be found in the appendix at the end of this chapter.

Payment of Fortuitous Losses

A second characteristic of private insurance is the payment of fortuitous losses. Most insurance policies exclude intentional losses. A **fortuitous loss** *is one that is unforeseen and unexpected by the insured and occurs as a result of chance*. In other words, the loss must be accidental. The law of large numbers is based on the assumption that losses are accidental and occur randomly. For example, a person may slip on an icy sidewalk and break a leg. The loss would be fortuitous.

Risk Transfer

Risk transfer is another essential element of insurance. With the exception of self-insurance, a true insurance plan always involves risk transfer. **Risk transfer** *means that a pure risk is transferred from the insured to the insurer, who typically is in a stronger financial position to pay the loss than the insured*. From the viewpoint of the individual, pure risks that are typically transferred to insurers include the risk of premature death, excessive longevity, poor health, disability, destruction and theft of property, and personal liability lawsuits.

Indemnification

A final characteristic of insurance is indemnification for losses. **Indemnification** *means that the insured is restored to his or her approximate financial position prior to the occurrence of the loss*. Thus, if your home burns in a fire, a homeowners policy will indemnify you or restore you to your previous position. If you are sued because of the negligent operation of an automobile, your auto liability insurance policy will pay those sums that you are legally obligated to pay. Similarly, if you become seriously disabled, a disability-income insurance policy will restore at least part of the lost wages.

CHARACTERISTICS OF AN IDEALLY INSURABLE RISK

Private insurers generally insure only pure risks. However, some pure risks are not privately insurable. From the viewpoint of a private insurer, an insurable risk ideally should have certain characteristics. There are ideally six characteristics of an **insurable risk**:

- There must be a large number of exposure units.
- The loss must be accidental and unintentional.
- The loss must be determinable and measurable.
- The loss should not be catastrophic.
- The chance of loss must be calculable.
- The premium must be economically feasible.

Large Number of Exposure Units

The first requirement of an insurable risk is a large number of exposure units. Ideally, there should be a large group of roughly similar, but not necessarily identical, exposure units that are subject to the same peril or group of perils. For example, a large number of wood frame dwellings in a city can be grouped together for purposes of providing property insurance on the dwellings.

The purpose of this first requirement is to enable the insurer to predict losses based on the law of large

numbers. Loss data can be compiled over time, and losses for the group as a whole can be predicted with some accuracy. The loss costs can then be spread over all insureds in the underwriting class.

Accidental and Unintentional Loss

A second requirement is that the loss should be accidental and unintentional; ideally, the loss should be unforeseen and unexpected by the insured and outside of the insured's control. Thus, if an individual deliberately causes a loss, he or she should not be indemnified for the loss.

There are several reasons for this requirement. First, the loss should be accidental because the law of large numbers is based on the random occurrence of events. A deliberately caused loss is not a random event because the insured knows when the loss will occur. Thus, prediction of future experience may be highly inaccurate if a large number of intentional or nonrandom losses occur. Second, moral hazard is increased if the insured deliberately intends to cause a loss. Finally, it is poor public policy to allow insureds to collect for intentional losses.

Determinable and Measurable Loss

A third requirement is that the loss should be both determinable and measurable. This means the loss should be definite as to cause, time, place, and amount. Life insurance, in most cases, meets this requirement easily. The cause and time of death can usually be readily determined, and if the person is insured, the face amount of the life insurance policy is the amount paid.

Some losses, however, are difficult to determine and measure. For example, under a disability-income policy, the insurer promises to pay a monthly benefit to the disabled person if the definition of *disability* stated in the policy is satisfied. Some dishonest claimants may deliberately fake sickness or injury to collect from the insurer. Even if the claim is legitimate, the insurer must still determine whether the insured satisfies the definition of disability stated in the policy. Sickness and disability are highly subjective, and the same event can affect two persons quite differently. For example, two accountants who are insured under separate disability-income contracts may be injured in an auto accident, and both may be classified as totally disabled. One accountant, however, may be more determined to return to work. If that accountant undergoes rehabilitation and returns to work, the disability-income benefits will terminate. Meanwhile, the other accountant would still continue to receive disability-income benefits according to the terms of the policy. In short, it is often difficult to determine when a person is actually disabled. However, all losses ideally should be both determinable and measurable.

The basic purpose of this requirement is to enable an insurer to determine if the loss is covered under the policy, and if it is covered, how much should be paid. For example, assume that Shannon has an expensive fur coat that is insured under a homeowners policy. It makes a great deal of difference to the insurer if a thief breaks into her home and steals the coat, or the coat is missing because her husband stored it in a dry-cleaning establishment but forgot to tell her. The loss is covered in the first example but not in the second.

No Catastrophic Loss

The fourth requirement is that ideally the loss should not be catastrophic. This means that a large proportion of exposure units should not incur losses at the same time. As we stated earlier, pooling is the essence of insurance. If most or all of the exposure units in a certain class simultaneously incur a loss, then the pooling technique breaks down and becomes unworkable. Premiums must be increased to prohibitive levels, and the insurance technique is no longer a viable arrangement by which losses of the few are spread over the entire group.

Insurers ideally wish to avoid all catastrophic losses. In reality, however, that is impossible, because catastrophic losses periodically result from floods, hurricanes, tornadoes, earthquakes, forest fires, and other natural disasters. Catastrophic losses can also result from acts of terrorism.

Several approaches are available for meeting the problem of a catastrophic loss. First, reinsurance can be used by which insurance companies are indemnified by reinsurers for catastrophic losses. **Reinsurance** *is an arrangement by which the primary insurer that initially writes the insurance transfers to another insurer (called the reinsurer) part or all of the potential losses associated with such insurance*. The reinsurer is then responsible for the payment of its share of the loss. Reinsurance is discussed in greater detail in Chapter 6.

Second, insurers can avoid the concentration of risk by dispersing their coverage over a large geographical area. The concentration of loss exposures in a geographical area exposed to frequent floods, earthquakes, hurricanes, or other natural disasters can result in periodic catastrophic losses. If the loss exposures are geographically dispersed, the possibility of a catastrophic loss is reduced.

Finally, financial instruments are now available for dealing with catastrophic losses. These instruments include catastrophe bonds, which are designed to help fund catastrophic losses. Catastrophe bonds are discussed in Chapters 4 and 6.

Calculable Chance of Loss

Another requirement is that the chance of loss should be calculable. The insurer must be able to calculate both the average frequency and the average severity of future losses with some accuracy. This requirement is necessary so that a proper premium can be charged that is sufficient to pay all claims and expenses and yields a profit during the policy period.

Certain losses, however, are difficult to insure because the chance of loss cannot be accurately estimated, and the potential for a catastrophic loss is present. For example, floods, wars, and cyclical unemployment occur on an irregular basis, and prediction of the average frequency and severity of losses is difficult. Thus, without government assistance, these losses are difficult for private carriers to insure.

Economically Feasible Premium

A final requirement is that the premium should be economically feasible. The insured must be able to afford the premium. In addition, for the insurance to be an attractive purchase, the premiums paid must be substantially less than the face value, or amount, of the policy.

To have an economically feasible premium, the chance of loss must be relatively low. One view is that if the chance of loss exceeds 40 percent, the cost of the policy will exceed the amount that the insurer must pay under the contract.[3] For example, an insurer could issue a $1,000 life insurance policy on a man who is age 99, but the pure premium would be close to that amount, and an additional amount for expenses would also have to be added. The total premium would exceed the face amount of insurance.

Based on the preceding requirements, most personal risks, property risks, and liability risks can be privately insured because the ideal characteristics of an insurable risk generally can be met. In contrast, most market risks, financial risks, production risks, and political risks are difficult to insure by private insurers.[4] These risks are speculative, and calculation of a correct premium may be difficult because the chance of loss cannot be accurately estimated. For instance, insurance that protects a retailer against loss because of a change in consumer tastes, such as a style change, generally is not available. Accurate loss data are not available. Thus, it would be difficult to calculate an accurate premium. The premium charged may or may not be adequate to pay all losses and expenses. Since private insurers are in business to make a profit, certain risks are difficult to insure because of the possibility of substantial losses.

TWO APPLICATIONS: THE RISKS OF FIRE AND UNEMPLOYMENT

You will understand more clearly the **requirements of an insurable risk** if you can apply these requirements to a specific risk. For example, consider the risk of fire to a private dwelling. This risk can be privately insured because the requirements of an insurable risk are generally fulfilled (see Exhibit 2.1).

Consider next the risk of unemployment. How well does the risk of unemployment meet the ideal requirements of an insurable risk? As is evident in Exhibit 2.2, the risk of unemployment does not completely meet the requirements.

First, predicting unemployment is difficult because of the different types of unemployment and labor. There are professional, highly skilled, semiskilled, unskilled, blue-collar, and white-collar workers. Moreover, unemployment rates vary significantly by occupation, age, gender, education, marital status, city, state, and a host of other factors, including government programs and economic policies that frequently change. In addition, the outsourcing of jobs to foreign countries by major corporations is another major problem in the United States, which makes the risk of unemployment more difficult to measure and insure privately. Also, the duration of unemployment varies widely among the different groups. Because a large number of workers can become unemployed at

EXHIBIT 2.1
Fire as an Insurable Risk

Requirements	*Does the risk of fire satisfy the requirements?*
1. Large number of exposure units	Yes. Numerous exposure units are present.
2. Accidental and unintentional loss	Yes. With the exception of arson, most fire losses are accidental and unintentional.
3. Determinable and measurable loss	Yes. If there is disagreement over the amount paid, a property insurance policy has provisions for resolving disputes.
4. No catastrophic loss	Yes. Although catastrophic fires have occurred, all exposure units normally do not burn at the same time.
5. Calculable chance of loss	Yes. Chance of fire can be calculated, and the average severity of a fire loss can be estimated in advance.
6. Economically feasible premium	Yes. Premium rate per $100 of fire insurance is relatively low.

EXHIBIT 2.2
Unemployment as an Insurable Risk

Requirements	*Does the risk of unemployment satisfy the requirements?*
1. Large number of exposure units	Not completely. Although there are a large number of employees, predicting unemployment is often difficult because of the different types of unemployment and different types of labor.
2. Accidental and unintentional loss	Not always. Some unemployment is due to individuals who voluntarily quit their jobs.
3. Determinable and measurable loss	Not completely. The level of unemployment can be determined, but the measurement of loss may be difficult. Most unemployment is involuntary because of layoffs or because workers have completed temporary jobs. However, some unemployment is voluntary; workers voluntarily change jobs because of higher wages, a change in careers, family obligations, relocation to another state, or other reasons.
4. No catastrophic loss	No. A severe national recession or depressed local business conditions in a town or city could result in a catastrophic loss.
5. Calculable chance of loss	Not completely. The different types of unemployment in specific occupations can make it difficult for actuaries to estimate the chance of loss accurately.
6. Economically feasible premium	Not completely. Adverse selection, moral hazard, policy design, and the potential for a catastrophic loss could make the insurance too expensive to purchase. Some plans, however, will pay unemployment benefits in certain cases where the unemployment is involuntary, and the loss payments are relatively small, such as waiver of life insurance premiums for six months, or payment of credit card minimum payments for a limited period.

the same time, a potential catastrophic loss is also present. And because certain types of unemployment occur irregularly, it may be difficult to calculate the chance of loss accurately. For these reasons, the risk of widespread unemployment is difficult to insure by private insurers. However, unemployment can be insured by social insurance programs. Social insurance programs are discussed later in the chapter.

ADVERSE SELECTION AND INSURANCE

When insurance is sold, insurers must deal with the problem of adverse selection. **Adverse selection** *is the tendency of persons with a higher-than-average chance of loss to seek insurance at standard (average) rates, which, if not controlled by underwriting, results in higher-than-expected loss levels.* For example, adverse selection can result from high-risk drivers who seek auto insurance at standard rates, from persons with serious health problems who seek life or health insurance at standard rates, and from business firms that have been repeatedly robbed or burglarized and seek crime insurance at standard rates. If the applicants for insurance with a higher-than-average chance of loss succeed in obtaining the coverage at standard rates, we say that the insurer is "adversely selected against." If not controlled by underwriting, adverse selection can result in higher-than-expected loss levels.

Adverse selection can be controlled by careful underwriting. **Underwriting** *refers to the process of selecting and classifying applicants for insurance.* Applicants who meet the underwriting standards are insured at standard or preferred rates. If the underwriting standards are not met, the insurance is denied, or an extra premium must be paid, or the coverage offered may be more limited. Insurers frequently sell insurance to applicants who have a higher-than-average chance of loss, but such applicants must pay higher premiums. The problem of adverse selection arises when applicants with a higher-than-average chance of loss succeed in obtaining the coverage at standard or average rates.

Policy provisions are also used to control adverse selection. Examples are the suicide clause in life insurance and the preexisting conditions clause in individual medical expense policies prior to enactment of the Affordable Care Act, also known as "Obamacare." These policy provisions are discussed in greater detail later in the text when specific insurance contracts are analyzed.

INSURANCE AND GAMBLING COMPARED

Insurance is often erroneously confused with gambling. There are two important differences between them. *First, gambling creates a new speculative risk, whereas insurance is a technique for handling an already existing pure risk.* Thus, if you bet $500 on a horse race, a new speculative risk is created, but if you pay $500 to an insurer for a homeowners policy, which includes coverage for a fire, the risk of fire is already present. No new risk is created by the transaction.

The second difference is that gambling can be socially unproductive, because the winner's gain comes at the expense of the loser. In contrast, insurance is always socially productive, because neither the insurer nor the insured is placed in a position where the gain of the winner comes at the expense of the loser. Both the insurer and the insured have a common interest in the prevention of a loss. Both parties win if the loss does not occur. Moreover, frequent gambling transactions generally never restore the losers to their former financial position. In contrast, insurance contracts restore the insureds financially in whole or in part if a loss occurs.

INSURANCE AND HEDGING COMPARED

In Chapter 1, we discussed the concept of hedging, by which risk can be transferred to a speculator through the purchase of a futures contract. An insurance contract, however, is not the same thing as hedging. Although both techniques are similar in that risk is transferred by a contract, and no new risk is created, there are some important differences between them. *First, an insurance transaction typically involves the transfer of pure risks because the characteristics of an insurable risk generally can be met.* However, hedging is a technique for handling speculative risks that may be uninsurable, such as protection against a decline in the price of agricultural products and raw materials.

A second difference between insurance and hedging is that moral hazard and adverse selection are more severe problems for insurers than for speculators who buy or sell futures contracts. Purchasers of insurance contracts can directly influence the profit or loss on the transaction because of intentional losses, fraudulent claims, or inflated claims. In contrast, individual entities, such as corn or wheat producers, generally cannot directly influence the financial outcome of the transaction when

a futures contract is used to hedge a potential price decline.

TYPES OF INSURANCE

Insurance can be classified as either private or government insurance. *Private insurance* includes life and health insurance as well as property and liability insurance. *Government insurance* includes social insurance programs and other government insurance plans.

Private Insurance

Life Insurance At the end of 2013, 850 life insurers were doing business in the United States, down from a peak of 2,343 in 1988. The decline is the result of mergers and consolidations to reduce operating and general overhead costs and to increase efficiency.[5]

Life insurance pays death benefits to designated beneficiaries when the insured dies. The benefits pay for funeral expenses, uninsured medical bills, estate taxes, and other expenses. The death proceeds can also provide periodic income payments to the deceased's beneficiary. Life insurers also sell annuities, individual retirement account (IRA) plans, 401(k) plans, and individual and group retirement plans. Some life insurers also sell (1) individual and group health insurance plans that cover medical expenses because of sickness or injury, (2) disability income plans that replace income lost during a period of disability, and (3) long-term care policies that cover care in nursing facilities.

Health Insurance Although many life insurers we described also sell some type of individual or group health insurance plan, the health insurance industry overall is highly specialized and controlled by a relatively small number of insurers. These companies include Blue Cross Blue Shield Association, AETNA, United Health Group, and Well Point. Medical expense plans pay for hospital and surgical expenses, physician fees, prescription drugs, and a wide variety of additional medical costs. Health insurance plans are covered in greater detail in Chapters 15–16.

Property and Liability Insurance In 2012, there were 2,660 property and liability insurers in the United States.[6] **Property insurance** indemnifies property owners against the loss or damage of real or personal property caused by various perils, such as fire, lightning, windstorm, or tornado. **Liability insurance** covers the insured's legal liability arising out of property damage or bodily injury to others; legal defense costs are also paid.

Property and liability insurance is also called property and casualty insurance. In practice, nonlife insurers typically use the term *property and casualty insurance* (rather than property and liability insurance) to describe the various coverages and operating results. **Casualty insurance** *is a broad field of insurance that covers whatever is not covered by fire, marine, and life insurance; casualty lines include auto, liability, burglary and theft, workers compensation, and health insurance.*

Exhibit 2.3 identifies the major property and casualty coverages sold today. Although there is some overlap, the various coverages can be grouped into two major categories—personal lines and commercial lines.

EXHIBIT 2.3
Property and Casualty Insurance Coverages

1. Personal lines
   - Private passenger auto insurance
   - Homeowners insurance
   - Personal umbrella liability insurance
   - Earthquake insurance
   - Flood insurance
2. Commercial lines
   - Fire and allied lines insurance
   - Commercial multiple-peril insurance
   - General liability insurance
   - Products liability insurance
   - Workers compensation insurance
   - Commercial auto insurance
   - Accident and health insurance
   - Inland marine and ocean marine insurance
   - Professional liability insurance
   - Directors and officers liability insurance
   - Boiler and machinery insurance (also known as mechanical breakdown, equipment breakdown, or systems breakdown coverage)
   - Fidelity bonds and surety bonds
   - Crime insurance
   - Other coverages

1. *Personal Lines*. **Personal lines** *refer to coverages that insure the buildings and personal property of individuals and families or provide them with protection against legal liability*. Major personal lines include the following:
   - *Private passenger auto insurance* protects the insured against legal liability arising out of auto accidents that cause property damage or bodily injury to others. Auto insurance also includes physical damage insurance on a covered auto for damage or loss resulting from a collision, theft, or other perils. Medical expense coverage and uninsured motorist coverage are also available.
   - *Homeowners insurance* is a package policy that provides property insurance and personal liability insurance in one policy. There are a number of homeowners policies available that cover the dwelling, other structures, and personal property against loss or damage from numerous perils, including fire, lightning, windstorm, or tornado. The policies also include theft coverage and personal liability insurance. A homeowners policy is an example of a *multiple-line policy*, which refers to state legislation that allows insurers to write property and casualty lines in one policy.
   - *Personal umbrella liability insurance* provides protection against a catastrophic lawsuit or judgment. Coverage applies on an excess basis after any underlying insurance coverages are exhausted. Policy limits typically range from $1 million to $10 million.
   - *Earthquake insurance* covers damage that can result from the shaking and cracking of buildings and damage to personal property in an earthquake. Homeowners policies and business insurance policies do not cover damage from earthquake. However, coverage can be obtained by an endorsement to the policy or by a separate policy.
   - *Federal flood insurance* is a federal program that provides coverage for flood losses to homeowners and business firms in flood zones. Flood losses are excluded under standard homeowners and renters policies. Flood insurance is typically sold by participating property and casualty insurers.
2. *Commercial Lines*. **Commercial lines** *refer to property and casualty coverages for business firms, nonprofit organizations, and government agencies*. Major commercial lines include the following:
   - *Fire insurance* covers losses caused by fire and lightning; it is usually sold as part of a package policy, such as a commercial multiple-peril policy. *Allied lines* refer to coverages that are usually purchased with fire insurance, such as coverage for windstorm, hail, and vandalism. Indirect losses can also be covered, including the loss of business income, rents, and extra expenses.
   - *Commercial multiple-peril insurance* is a package policy, which can be written to include property insurance, general liability insurance, business income insurance, equipment breakdown insurance, and crime insurance.
   - *General liability insurance* covers the legal liability of business firms and other organizations that arise out of property damage or bodily injury to others. Legal liability can arise out of the ownership of business property, sale or distribution of products, and manufacturing or contracting operations. However, general liability insurance does not include products liability insurance, which is a separate line.
   - *Products liability insurance* covers the legal liability of manufacturers, wholesalers, and retailers to persons who are injured or incur property damage from defective products.
   - *Workers compensation insurance* covers workers for a job-related accident or disease. The insurance pays for medical bills, disability income benefits, rehabilitation benefits, and death benefits to the dependents of an employee whose death is job-related.
   - *Commercial auto insurance* covers the legal liability of business firms arising out of the ownership or operation of business vehicles. It also includes physical damage insurance on covered business vehicles for damage or loss resulting from a collision, theft, or other perils.
   - *Accident and health insurance* is also sold by some property and casualty insurers. This line is similar to the health insurance coverages sold by life and health insurers.
   - **Inland marine insurance** covers goods being shipped on land, which include imports, exports, domestic shipments, and instrumentalities of transportation (for example, bridges, tunnels, and

pipelines). Inland marine insurance also covers personal property such as fine art, jewelry, and furs.

- **Ocean marine insurance** covers ocean-going vessels and their cargo from loss or damage because of perils of the sea; contracts are also written to cover the legal liability of shippers and owners.
- *Professional liability insurance* provides protection against malpractice lawsuits or lawsuits that result from a substantial error or omission. Professional liability insurance covers the professional acts or omissions of physicians, surgeons, attorneys, accountants, and other professionals. For example, *medical malpractice insurance* covers physicians and other healthcare providers for liability claims arising out of harm or injury to patients.
- *Directors and officers (D&O)* liability insurance provides financial protection for the directors and officers and the corporation if the directors and officers are sued for mismanagement of the company's affairs.
- *Boiler and machinery insurance (also known as mechanical breakdown, equipment breakdown, or systems breakdown coverage)* is a highly specialized line that covers losses due to the accidental breakdown of covered equipment. Such equipment includes steam boilers, air conditioning and refrigeration equipment, and electrical generating equipment.
- **Fidelity bonds** cover loss caused by the dishonest or fraudulent acts of employees, such as embezzlement and the theft of money. **Surety bonds** provide for monetary compensation in the case of failure by bonded persons to perform certain acts, such as failure of a contractor to construct a building on time.
- *Crime insurance* covers the loss of money, securities, and other property because of burglary, robbery, theft, and other crime perils.
- *Other coverages* include *aircraft insurance*, which provides physical damage insurance on covered aircraft and liability coverage for legal liability arising out of the ownership or operation of aircraft. *Credit insurance* covers manufacturers and wholesalers against loss because an account receivable is uncollectible. *Financial guaranty insurance* guarantees the payment of principal and interest on debt instruments issued by the insured. *Private mortgage insurance* (PMI) guarantees the mortgage lender for a loss up to certain limits for a property foreclosure if the borrower defaults on the mortgage.

Government Insurance

Numerous government insurance programs are in operation at the present time. Government insurance can be divided into social insurance programs and other government insurance programs.

Social Insurance **Social insurance** programs are government insurance programs with certain characteristics that distinguish them from other government insurance plans. These programs are financed entirely or in large part by mandatory contributions from employers, employees, or both, and not primarily by the general revenues of government. The contributions are usually earmarked for special trust funds; the benefits, in turn, are paid from these funds. In addition, the right to receive benefits is ordinarily derived from or linked to the recipient's past contributions or coverage under the program; the benefits and contributions generally vary among the beneficiaries according to their prior earnings, but the benefits are heavily weighted in favor of low-income groups. Moreover, most social insurance programs are compulsory. Covered workers and employers are required by law to pay contributions and participate in the programs. Finally, eligibility requirements and benefit rights are usually prescribed exactly by statute, leaving little room for administrative discretion in the award of benefits.[7]

Major social insurance programs in the United States include the following:

- Old-Age, Survivors, and Disability Insurance (Social Security)
- Medicare
- Unemployment insurance
- Workers compensation
- Compulsory temporary disability insurance
- Railroad Retirement Act
- Railroad Unemployment Insurance Act

Old-Age, Survivors, and Disability Insurance, commonly known as Social Security, is a massive public income-maintenance program that provides

retirement, survivor, and disability benefits to eligible individuals and families.

Medicare is part of the total Social Security program and covers the medical expenses of most people age 65 and older and certain disabled people younger than age 65.

Unemployment insurance programs provide weekly cash benefits to eligible workers who experience short-term involuntary unemployment. Regular state unemployment benefits are typically paid up to 26 weeks after certain eligibility requirements are met. In recent years, temporary emergency unemployment programs have also been enacted to provide additional weeks of benefits to beneficiaries who have exhausted their regular benefits during severe business recessions. In addition, extended benefits also may be available to unemployed workers in states with high unemployment who exhaust their regular benefits. Unemployment insurance is discussed in greater detail in Chapter 18.

As stated earlier, *workers compensation insurance* covers workers against a job-related accident or disease. Although workers compensation is a casualty line sold by private insurers, it is also an important form of social insurance. The social insurance aspects of workers compensation are discussed in Chapter 18.

In addition, *compulsory temporary disability insurance,* which exists in five states, Puerto Rico, and the railroad industry, provides for the partial replacement of wages that may be lost because of a temporary nonoccupational disability.[8]

The *Railroad Retirement Act* provides retirement benefits, survivor benefits, and disability income benefits to railroad workers who meet certain eligibility requirements.

Finally, the *Railroad Unemployment Insurance Act* provides unemployment and sickness benefits to railroad employees.

Other Government Insurance Programs Other government insurance programs exist at both the federal and state levels. However, these programs do not have the distinguishing characteristics of social insurance programs. Important federal insurance programs include the following:

- The *Federal Employees Retirement System (FERS)* provides retirement, survivor, and disability benefits to federal employees hired after 1983.
- The *Civil Service Retirement System* provides retirement, survivor, and disability benefits to federal employees hired before 1984.
- The *Federal Deposit Insurance Corporation (FDIC)* provides insurance on checking and savings accounts in commercial banks, credit unions, and savings and loan association.
- The *Pension Benefit Guaranty Corporation (PBGC)* is a federal corporation that guarantees (up to certain limits) the pension benefits of workers if a private defined-benefit pension plan is terminated.
- The *National Flood Insurance Program (NFIP)* makes property insurance available (up to certain limits) to homeowners and business firms who reside in flood zones.
- *Other federal programs* include various life insurance programs to veterans, federal crop insurance, war risk insurance, and numerous additional programs.

A wide variety of insurance programs also exist at the state level. They include the following:

- As stated earlier, *state workers compensation programs* provide medical, disability, rehabilitation, and survivor benefits if workers are injured or die as a result of a job-related accident or disease.
- *State children's health insurance programs (SCHIP)* are joint state-federal programs that provide low-cost health insurance to low-income children and families.
- *Residual market plans (also called shared or involuntary market plans)* exist in a number of states, which provide insurance to high-risk policyholders in certain states who may have difficulty in obtaining basic insurance in the standard markets. These plans include (1) FAIR (Fair Access to Insurance) Plans, which provide basic property insurance to high-risk policyholders; (2) Beach and Windstorm Plans, which provide windstorm and hurricane coverage to property owners along the Atlantic and Gulf Coast seaboard; (3) Citizens Property Insurance Corporation, a nonprofit, tax-exempt government insurercreated by the Florida Legislature

in 2002, which provides insurance protection to Florida policyholders who are entitled to but are unable to find property insurance coverage in the private markets, (4) Louisiana Citizens Property Insurance Corporation, a nonprofit corporation that provides insurance to residential and commercial applicants in Louisiana who are unable to procure insurance in the private markets, and (5) Automobile Insurance Plans operated by private insurers, which provide auto insurance to high-risk drivers who cannot obtain protection in the voluntary markets.

- *Other state programs* include the California Earthquake Authority, the Florida Hurricane Catastrophe Fund, the Maryland Automobile Insurance Fund, and the State Life Insurance Fund in Wisconsin.

BENEFITS OF INSURANCE TO SOCIETY

The major social and economic benefits of insurance include the following:

- Indemnification for loss
- Reduction of worry and fear
- Source of investment funds
- Loss prevention
- Enhancement of credit

Indemnification for Loss

Indemnification permits individuals and families to be restored to their former financial position after a loss occurs. As a result, they can maintain their financial security. Because insureds are restored either in part or in whole after a loss occurs, they are less likely to apply for public assistance or welfare benefits, or to seek financial assistance from relatives and friends.

Indemnification to business firms also permits firms to remain in business and employees to keep their jobs. Suppliers continue to receive orders, and customers receive the goods and services they desire. The community also benefits because its tax base is not eroded. In short, the indemnification function contributes greatly to family and business stability and therefore is one of the most important social and economic benefits of insurance.

Reduction of Worry and Fear

A second benefit of insurance is that worry and fear are reduced. This is true both before and after a loss. For example, if heads of families have adequate amounts of life insurance, they are less likely to worry about the financial security of their dependents in the event of premature death; persons insured for long-term disability do not have to worry about the loss of earnings if a serious illness or accident occurs; and property owners who are insured enjoy greater peace of mind because they know they are covered if a loss occurs. Worry and fear are also reduced after a loss occurs, because the insureds know that they have insurance that will pay for the loss.

Source of Investment Funds

Insurance companies perform an important role as financial intermediaries in the economy. The insurance industry is an important source of funds for capital investment and accumulation. Premiums are collected in advance of the loss, and funds not needed to pay immediate losses and expenses can be loaned to business firms. These funds typically are invested in shopping centers, hospitals, factories, housing developments, and new machinery and equipment. The investments increase society's stock of capital goods, and promote economic growth and full employment. Insurers also invest in social investments, such as housing, nursing homes, and economic development projects. In addition, because the total supply of loanable funds is increased by the advance payment of insurance premiums, the cost of capital to business firms that borrow is lower than it would be in the absence of insurance.

Loss Prevention

Insurance companies are actively involved in numerous loss-prevention programs and also employ a wide variety of loss-prevention personnel, including safety engineers and specialists in fire prevention, occupational safety and health, and products liability. Some important loss-prevention activities that property and casualty insurers strongly support include the following:

- Highway safety and reduction of auto accidents and deaths
- Fire prevention

- Reduction of work-related injuries and disease
- Prevention of auto thefts
- Prevention and detection of arson losses
- Prevention of defective products that could injure the user
- Prevention of boiler explosions
- Educational programs on loss prevention

The loss-prevention activities reduce both direct and indirect, or consequential, losses. Society benefits, because both types of losses are reduced.

Enhancement of Credit

A final benefit is that insurance enhances a person's credit. Insurance makes a borrower a better credit risk because it guarantees the value of the borrower's collateral or gives greater assurance that the loan will be repaid. For example, when a house is purchased, the lending institution normally requires property insurance on the house before the mortgage loan is granted. The property insurance protects the lender's financial interest if the property is damaged or destroyed. Similarly, a business firm seeking a temporary loan for Christmas or seasonal business may be required to insure its inventories before the loan is made. If a new car is purchased and financed by a bank or other lending institution, physical damage insurance on the car may be required before the loan is made. Thus, insurance can enhance a person's credit.

COSTS OF INSURANCE TO SOCIETY

Although the insurance industry provides enormous social and economic benefits to society, the social costs of insurance must also be recognized. The major social costs of insurance include the following:

- Cost of doing business
- Fraudulent claims
- Inflated claims

Cost of Doing Business

One important cost is the cost of doing business. Insurers consume scarce economic resources—land, labor, capital, and business enterprise—in providing insurance to society. In financial terms, an expense loading must be added to the pure premium to cover the expenses incurred by insurance companies in their daily operations. *An* **expense loading** *is the amount needed to pay all expenses, including underwriting and loss-adjustment expenses, commissions, general administrative expenses, state premium taxes, acquisition expenses, and an allowance for contingencies and profit*. In 2013, property and casualty insurers had an expense ratio of 28.2 percent, which is the ratio of underwriting expenses to premiums written. Expenses are incurred for sales and administration, taxes, licenses and fees, and other acquisition costs. In 2013, operating expenses, taxes, and investment expenses of life insurers accounted for 18 percent of total expenditures.[9] As a result, total costs to society are increased. For example, assume that a small country with no property insurance has an average of $100 million of fire losses each year. Also assume that property insurance becomes available later, and the expense loading is 30 percent of losses. Thus, total costs to this country are increased to $130 million.

However, these additional costs can be justified for several reasons. First, from the insured's viewpoint, uncertainty concerning the payment of a covered loss is reduced because of insurance. Second, the costs of doing business are not necessarily wasteful, because insurers engage in a wide variety of loss-prevention activities. Finally, the insurance industry provides jobs to millions of workers in the United States. However, because economic resources are used up in providing insurance to society, a real economic cost is incurred.

Fraudulent Claims

A second cost of insurance comes from the submission of fraudulent claims. Examples of fraudulent claims include the following:

- Auto accidents are faked or staged to collect benefits.
- Dishonest claimants inflate or pad an insurance claim to cover a required deductible.
- Dishonest claimants fake slip-and-fall accidents.
- Phony burglaries, thefts, or acts of vandalism are reported to insurers.
- False health insurance claims are submitted to collect benefits.

- Dishonest policyholders take out life insurance policies on unsuspecting insureds and later arrange to have them killed.

The payment of such fraudulent claims results in higher premiums to all insureds. The existence of insurance also prompts some insureds to deliberately cause a loss to profit from insurance. These social costs fall directly on society.

Some types of insurance fraud are especially outrageous. The Coalition against Insurance Fraud publishes an annual "Hall of Shame" for insurance scams that are strikingly shocking, brazen, and outrageous (see Insight 2.1).

INSIGHT 2.1

Insurance Fraud Hall of Shame—Shocking Examples of Insurance Fraud

The Coalition against Insurance Fraud annually compiles a list of insurance fraud cases that are especially shocking, brazen, and outrageous. The following is a summary of several cases from 2014:

- **Home insurance arson shrouds child murder plot.** Two toddlers died of smoke inhalation in a blackened bedroom from a fire Angela Garcia started in order to steal insurance money and remove her unwanted children from her life. Firefighters found two children, ages 3 and 2, dead in their Cleveland home after a fierce blaze had turned the place into piles of smoldering rubble. The children lay on opposite sides of a bed. One was wrapped with the cord from a window blind to keep her from escaping the fire, prosecutors charged. Garcia received life in prison.
- **Bogus romance is game plan for murder.** Buddy Musso dreamed of being a cowboy singer. He also yearned for the romance that had eluded him for years. All that was about to change. Buddy thought he had finally found romance. In fact, his new wife plotted to have him killed for a meager life-insurance policy. Musso had the intellect of an 8-year-old and resided at an assisted-living facility. Sue Basso and Buddy met at a church carnival in New Jersey and became friends. She romanced him, and Buddy soon fell hard, calling her his "lady love." Basso took over Buddy's Social Security checks, and they married. The couple lived in a dumpy home filled with dogs and cats. She bought a small $15,000 insurance policy on Buddy's life and named herself as beneficiary. The policy had a clause raising the payout to $60,000 if Buddy died a violent death. Basso assembled a thuggish crew to do away with Buddy. The gang kicked Buddy with steel-toed shoes, and they beat him with belts and baseball bats. They also scrubbed his body with a wire brush and doused him with a mixture of chlorine bleach and pine-scented disinfectant. Police found his body dumped on a roadside. A jury convicted Basso, and she was executed by lethal injection.
- **Staged-crash ring crashes.** Hijacking often-dazed crash victims, personal-injury lawyer Joseph Haddad built a crime cartel that exposed these victims to worthless and possibly dangerous medical treatment. The Bridgeport, Connecticut, man recruited crash victims to receive questionable medical treatment, whether or not the motorists were actually hurt. It was all a setup to try to steal millions of dollars of insurance money with false crash-injury claims. Haddad's cohorts hounded the motorists to get treatment at medical facilities associated with Haddad. Recruiting crash victims is illegal in Connecticut, so Haddad usually paid his cohorts cash under the table. He was sentenced to more than 4 years in federal prison in July 2014.
- **Bugatti dunk for insurance cash all washed up.** Selling exotic sports cars was Andy House's specialty. Sinking one for insurance money was amateurish; his plot was captured on camera, and he became an Internet sensation. House rocketed a rare $1 million Bugatti Veyron into a salty East Texas lagoon for an inflated $2.2 million insurance claim. Only 300 Veyrons were ever made. Geared to reach more than 250 mph, the car was one of the world's rarest street-legal sports cars. House bought the car with a loan from a friend and then insured it for double the sale price as a collector's car. House was caught and faces up to 20 years in federal prison.
- **Useless chemo attacks healthy patients.** Cancer was good to Dr. Farid Fata. He pumped toxic levels of chemotherapy drugs into patients, whether they needed it or not. These people suffered greatly as the drugs launched massive attacks on their cells and suppressed their immune systems, often for months. The patients were his slot machines, and Fata hit the insurance jackpot with each false diagnosis. The Detroit-area cancer specialist billed private insurers and Medicare $225 million, with insurers paying out $91 million. He also forged patient medical records to show false cancer diagnoses and justify unneeded chemo. Fata pleaded guilty, and faces a maximum of 175 years in federal prison.
- **Cop rocks with fake arm injury.** Moonlighting as the lead singer for a punk rock band, police officer Christopher Inserra gyrated and fist-pumped on stage while stealing disability money for a supposedly enfeebled right arm. He blithely posted a video of his performance on YouTube for the world to see. Bad move; he handed law enforcement and prosecutors incontrovertible

(*Continued*)

INSIGHT 2.1 *(Continued)*

evidence that went viral and soon convicted him. Inserra pleaded guilty instead of facing a possibly lengthy jail term and ended up with 5 years of probation. However, he was still punished: He was forced to resign from the police force, his career was ruined, and a criminal conviction will be on his record for years to come. He also must repay the stolen disability money.

- **Ortho steals fortune with bogus joint surgeries.** Faking and botching thousands of surgeries made orthopedic surgeon Dr. Spyros Panos a multimillionaire. But instead of a luxury mansion, Panos will call a jail cell his home for years to come. The Poughkeepsie, New York, man made $35 million worth of false insurance claims and was a star at the medical facility where he worked. Panos bounced from operating room to operating room, performing negligent or phantom procedures for large insurance claims. Panos performed arthroscopic procedures yet billed them as more-expensive open-heart surgeries. One surgery lasted only 7 minutes. He also billed insurers for surgeries he never performed. Panos received $4\frac{1}{2}$ years in federal prison, although jail time could be the least of his ordeals. He also faces at least 260 lawsuits from patients who allege they were needlessly and often carelessly cut up for insurance money.
- **Cancer con bad medicine for insurance cheater.** Bone cancer chewed through Sara Ylen, leaving her only 6 months to live. It all started when a stranger raped her in a store parking lot and gave her a sexually transmitted disease that caused her cancer. Or so Ylen claimed. In fact, her story was completely false. She bilked her health insurer out of nearly $100,000 in unneeded hospice care and sent an innocent man to jail for nearly 10 years for the alleged assault. Ylen pleaded no contest to health-insurance fraud and other charges.

SOURCE: Adaptation of cases from Coalition against Insurance Fraud, *2014 Insurance Fraud Hall of Shame* at insurancefraud.org. Adapted with permission.

Inflated Claims

Another cost of insurance relates to the submission of inflated or "padded" claims. Although the loss is not intentionally caused by the insured, the dollar amount of the claim may exceed the actual financial loss. Examples of inflated claims include the following:

- Attorneys for plaintiffs sue for high-liability judgments that exceed the true economic loss of the victim.
- Insureds inflate the amount of damage in auto collision claims so that the insurance payment will cover the collision deductible.
- Disabled persons often malinger to collect disability-income benefits for a longer duration.
- Insureds exaggerate the amount and value of property stolen from a home or business.

Inflated claims must be recognized as an important social cost of insurance. Premiums must be increased to pay the additional losses. As a result, disposable income and the consumption of other goods and services are reduced.

Cost to Society of Fraudulent and Inflated Claims

Fraudulent and inflated claims are another important social cost of insurance in the economy. The amount of fraudulent claims is difficult to measure and varies by line of insurance, economic conditions, attitude of the public toward insurers, and other factors as well. However, estimates of fraudulent claims indicate that the problem is serious. According to the Insurance Information Institute, industry estimates of fraud are about 10 percent of the property and casualty incurred losses and loss-adjustment expenses each year. Based on this estimate, property and casualty insurance fraud exceeded $33 billion annually over the 5-year period from 2008 to 2012. In addition, according to the Federal Bureau of Investigation (FBI), healthcare fraud is an estimated 3 to 10 percent of total healthcare spending. This includes both private and public fraud.

Some people commit insurance fraud because they are greedy, need large amounts of cash for various purposes, and view insurers as easy targets. Others want to reduce their out-of-pocket costs when a loss occurs, such as covering their deductible, or want