# RISK MANAGEMENT AND INSURANCE

SIXTH EDITION

C. ARTHUR WILLIAMS, JR. · RICHARD M. HEINS

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To Roberta and Ruth

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# PREFACE

When the first edition of this text appeared in 1964, we noted our intent that the book represent a substantial departure from existing texts on insurance principles. We described several ways in which we thought the book would be different, including four that described the outline and orientation of the first edition and those that followed, including this sixth edition.

1 All chapters in the text are written from the viewpoint of business and family risk managers.

2 Business risk management and family risk management receive separate treatment. Major emphasis is placed on business risk management.

3 Although a discussion of insurance principles remains an important part of the book, considerable attention is devoted to other aspects of risk management, and the use of risk management tools other than insurance.

4 The text explains the application of some modern methods of quantitative analysis to the measurement of the risks facing a firm or family and the selection of the proper tools for measuring these losses.

Like the first five editions of *Risk Management and Insurance,* this sixth edition is designed primarily for introductory one-semester or one-quarter courses in risk management and insurance. The contents and structure of this text are based on the twin beliefs that (1) the study of insurance, a major tool of risk management, should be preceded by an understanding of the procedures and concepts of risk management itself; and (2) that most students will take only one course in this area. Therefore, this course should cover both risk management and insurance. For students interested in risk management or insurance as a career, this balanced treatment of both subjects also provides a comprehensive introduction to the field, which can be followed by more intensive studies of particular parts and case courses. The authors are

pleased to count among the readers of earlier editions many persons already either professionally engaged as risk managers or holding a wide variety of positions in the insurance industry.

The text is divided into four parts. Part 1 acquaints the student with risk—its nature and its effects—and discusses the purposes and scope of risk management. Part 2, which deals with business (defined broadly to include nonprofit and public organizations) and related family risk management, describes the risk management function in business, how a business can identify and measure its loss exposures, the loss exposures of a typical firm, the major tools of risk management, how to select among these tools, how to analyze insurance contracts, some leading policies, and insurers and their operations. Part 3 covers the unique aspects of family risk management. Part 4 deals with government regulation of insurers.

**Significant changes from the fifth edition include the following:**

**1** In Chapter 1 we discuss in more detail the possible objectives of risk management and how these objectives might vary depending upon whether they are being established for a public corporation whose stockholders have widely diversified investment portfolios; a small business whose owners have most of their assets invested in that business, a nonprofit corporation, a public agency, or a family.

**2** In Chapter 5 we have rewritten the section on how property is valued for risk management purposes to emphasize the methods most often used in practice and to recognize that sometimes a firm may plan to abandon property if it is destroyed or seriously damaged.

**3** We have added a new section to Chapter 7 describing the tort reform legislation recently passed in many states to reduce the frequency and severity of liability losses.

**4** Because retention has become an increasingly important practice, especially in the handling of liability and medical expense exposures, we now treat this subject in considerably more detail in Chapter 11 and elsewhere. For example, we have added to Chapter 11 a new section on risk retention and insurance purchasing groups.

**5** In Chapter 13, the first of two chapters dealing with the selection of the proper tools, we have replaced the two examples used to explain the worry method with one example that we believe is much easier to understand. This chapter and Chapter 4 on probability distributions also now contain a real life example of how probability distributions and the worry value method were used in one case to decide between insuring and retaining a liability loss exposure.

**6** The relationship of traditional risk management objectives and methodology to the value maximization objective that is part of modern finance theory is now the subject of a new Chapter 14 written by Professor Michael L. Smith of Ohio State University. This relationship is also discussed in more detail than before in other sections of the text, particularly in Chapters 1, 5, and 13.

**7** All of Chapter 18 and part of Chapter 19 have been completely rewritten to reflect the recent introduction by the Insurance Services office of a new commercial lines program that made dramatic changes in the property and liability insurance contracts a business may buy.

**8** We have substantially revised Chapters 21 and 22 to reflect the effect of (a) the Tax Reform Act of 1986 and other recent legislation affecting employee benefit plans, (b) the introduction of cash balance pension plans as an alternative to other defined benefit plans and to defined contribution plans, and (3) the dramatic changes that have occurred during the past few years in medical expense plans.

**9** In Chapter 23 we now emphasize a fourfold classification of basic individual life insurance and annuity products: (a) term insurance, (b) whole life insurance, (c) universal life insurance, and (d) annuities.

**10** In Chapter 32 we have incorporated recent changes in the homeowner's program. Form 5, for example, no longer exists.

**11** In Chapter 34 we have expanded the section on competition as a regulator of the insurance industry to include both its short-run and long-run effects on insurance prices.

**12** In addition to the specific illustrations already mentioned, throughout the text we have updated the discussion to reflect the major developments in risk management and insurance through mid-1988. As was true in the fifth edition, to clarify the presentation we also have shortened or rewritten many sentences and sections.

Because this text covers the entire field of risk management and insurance in depth, some teachers may prefer to omit certain chapters to emphasize others or to meet time constraints. They may also wish to rearrange the chapters. For example, a teacher who wishes to emphasize business risk management could omit Part 3 on family risk management and assign only selected pages in Chapters 15 through 29, which deal primarily with insurance. A teacher who wishes to emphasize insurance could assign only selected pages in Chapters 1 through 14, which provide a background in risk management. Some teachers may prefer to omit Chapter 14 on risk management and the value of the firm, but we believe it provides some highly useful insights. Teachers who prefer to cover family risk management before business risk management can rearrange chapters to accomplish this purpose. Another possibility is to defer Chapter 9 on personnel loss exposures until after Chapter 19. An *Instructor's Guide,* containing sample text assignments, is available from the publisher.

Although Professor Heins's contributions to the first two editions were substantial, Professor Williams has been solely responsible for this sixth revision and the three previous editions.

The authors are indebted to many persons who contributed directly or indirectly to the completion of this edition and the five previous editions. We again express our appreciation to the persons named in the prefaces to the

first five editions. For this sixth edition, we owe a special debt to Professor Michael L. Smith of The Ohio State University who, in addition to writing the new Chapter 14, prepared or commented on sections of Chapters 1 and 5. Specific mention should also be made to the following persons who reviewed the fifth and sixth editions and made some highly constructive comments: John Beal, Tulane University; Jerry Jorgensen, University of Utah; Nino Lama, Lama Financial Center; Robert A. Marshall, Florida State University; H. Wayne Snider, Temple University; and Frank Wright, Royal Insurance. Although we have not accepted all their comments, we did find each of their reviews extremely helpful. Professor Bob Hedges of Temple University has sent us, over the years, numerous insightful critiques on various sections of the text. Helpful comments have also been received from Professors Andrew Whitman and Dongsae Cho and from several graduate assistants, especially Peter Young and David Christopherson, at the University of Minnesota. These individuals have shared with Professor Williams the pleasant task of teaching an introductory course in which earlier editions of this text have been used. Most of the manuscript has been typed by Ruth Anderson, who somehow managed to convert illegible handwriting into clean copy. The dedication reflects our continuing thanks for the support we have received from our wives. Any errors, of course, are the responsibility of the authors.

With each prior edition of this text we tried to produce a revision that was better than its predecessors. Only the reader can judge whether with this sixth edition we have achieved this goal.

*C. Arthur Williams, Jr.*

*Richard M. Heins*

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## PART 4 RISK MANAGEMENT, INSURANCE, AND PUBLIC POLICY

PART ONE

# INTRODUCTION TO RISK AND RISK MANAGEMENT

Risk exists whenever the future is unknown. Risk is defined later in this text as the variation in possible future outcomes. Consequently, if at least two outcomes are possible, risk exists. The greater the risk, the less predictable the future outcome becomes. Because the adverse effects of risk have plagued humans since the beginning of time, individuals, groups, and societies have developed various methods for managing risk. Since no one knows the future exactly, everyone is a risk manager, not by choice but by sheer necessity.

The purpose of this text is to examine carefully one important class of risks, called *pure risks*. Restricting the detailed analysis to this limited class permits the discussion to focus sharply on certain concepts, many of which will also be applicable to other types of risks. Once certain fundamental ideas have been presented, the text will explain in some detail the need for, and the application of, various tools of risk management, first by a business firm (defined broadly to include public and nonprofit organizations) and second by a family (defined to include one or more individuals).

Part 1 of the text introduces the reader to the general subject of risk and risk management. After defining risk and analyzing its adverse effects, this part introduces the reader to the risk management process and the objectives of risk management.

CHAPTER 1

# RISK AND RISK MANAGEMENT

## LEARNING OBJECTIVES

After you have completed this chapter, you should be able to:

1 Summarize why the study of risk management is important.
2 Explain why risk is not the same concept as the chance of loss or uncertainty.
3 Distinguish between pure risks and speculative risks.
4 Explain the economic costs of pure risks.
5 Describe briefly the six basic steps in risk management.
6 Explain the possible risk management objectives and the need for tradeoffs among these objectives.

## INTRODUCTION

People have always sought ways to deal with the uncertainties of life. This book will examine how businesses (and other organizations—public and private) and families (including single persons) might effectively manage a major class of exposures to loss through a process called risk management.

This introductory chapter first explains briefly why the study of risk management is important. It then defines and analyzes the concepts of probability, risk, uncertainty, and reaction to risk; describes various ways in which risks can be classified; shows how risk imposes significant economic losses upon organizations, individuals, and societies; outlines the six steps in the

risk management process; and explains the possible objectives of risk management and the need for tradeoffs among these objectives.

## WHY THE STUDY OF RISK MANAGEMENT IS IMPORTANT

*Risk management,* as the term is used in this text, is the identification, measurement, and treatment of exposures to potential accidental losses, almost always in situations where the only possible outcomes are losses or no change in the status quo. Examples of some recent dramatic accidental losses are fires that caused almost total losses to two major hotels, the collapse of a skywalk in another large hotel, a nuclear incident at an electric power plant, an explosion at a chemical plant that released deadly gases, a chemical spill into a famous river that passes through several countries, and the crash of a large jet following takeoff from a metropolitan airport. An example of a catastrophic "accidental" loss that is less sudden is the liability and workers' compensation claims currently being made for asbestosis against asbestos manufacturers, insulation installers, and others arising out of exposure to this substance over a period of many years. Most accidental losses are not this dramatic, but many lesser incidents each day threaten the survival of some businesses, cause their earnings to dip below acceptable levels, interrupt their operations, or slow their growth. For example, a tornado destroys several buildings owned by a small business, plus many dwellings. A burglar steals cash and valuable inventory from a small department store. An employee hits a pedestrian, causing serious injuries that result in a sizable liability suit. All businesses face the threat of losses that may never occur. Worry about these possibilities does more than make life less pleasant; it may stop a business from engaging in certain activities and otherwise alter how it conducts its operations. Proper risk management enables a business to handle its exposures to accidental losses in the most economic, effective way.

Risk management also enables a business to handle better its ordinary business risks. Freed of concern about the accidental losses noted above, a business can pursue more aggressively and effectively its regular activities. In addition, the quality of its decisions on such matters as new construction, introducing a new product, or extending its operations into a foreign country is improved by considering how this construction or activity would affect its exposures to accidental losses if it decided to move ahead.

These contributions of risk management to the survival and profitability of a business will be explored in more detail later in this chapter. Although the discussion to this point has been limited to a business, risk management can be practiced successfully by other organizations such as nonprofit hospitals, educational institutions, and local governments, and by families, including single persons.

In a sense risk management is not an option. We need merely to exist to face some of the exposures that will be discussed in this text. If we simply ignore these exposures, we will have selected a risk management approach

by default that only by chance will be the best approach. By managing these exposures properly we should be able to achieve more acceptable results at minimum cost.

Organizations of all sorts have recognized the increasing importance of sound risk management. As life has become more complicated, more interrelated, and more uncertain, new loss exposures have been created and the severity of many old exposures increased. In most large firms and many smaller ones top management has assigned primary responsibility for risk management to a specialized department. Employee benefit plan management, even though it may be administered solely or partly by the personnel department, is a risk management function to the extent it deals with Social Security benefits, pensions, medical expense benefits, death benefits, disability benefits, and similar payments.

Risk managers handle loss exposures by controlling them (for example, through the installation of automatic sprinklers and the rehabilitation of injured workers) and by financing the losses that still occur despite their control efforts. Losses can be financed by transferring them to someone else such as an insurer or by retaining them within the organization or family unit.

Insurance is a major transfer tool of risk management. Both private and public insurance play vital roles in risk management and in the economic, social, and political life of our nation. In 1986 the private insurance business generated premiums in excess of $471 billion, controlled assets valued at close to $1.3 trillion, and employed about 2 million persons. The Social Security system collected taxes that exceeded all the corporate income taxes combined and for many persons exceeded their personal income tax.

Why is the study of risk management and insurance important? Up to this point we have discussed briefly the importance of this management function to organizations, families, and society. How would you personally benefit from studying risk management? First, more persons become risk managers at some stage in their professional careers than ever expected to do so. Second, even if you do not become a professional risk manager, your activities will affect your organization's risk manager. You will in turn be affected by his or her activities. Third, many of you will become risk management consultants, insurance agents or brokers, insurance company underwriters, loss control or loss adjustment specialists, investment advisers, or one of the many other professionals who service risk managers or the firms who do not have risk managers on their staff. Fourth, risk management and insurance professionals touch our lives in other highly significant ways through the organizations and families they save or stabilize through loss indemnification, the accidents they either prevent or reduce in severity, the long-term projects in which they invest, and the security they provide by reducing the uncertainty in our lives. Fifth, we must all manage the exposures we face in our personal lives. Finally, the importance of the insurance business to all of us is demonstrated by the fact that the United States Supreme Court over 75 years

ago labeled the private insurance business "a business affected with a public interest," thus subjecting it to much closer government regulation than most businesses. As a citizen, you should share that greater concern.

## PROBABILITY AND PROBABILITY DISTRIBUTIONS DEFINED

The discussion now turns to some concepts that are important in risk management—probability and probability distributions. The probability associated with a certain outcome is the relative likelihood that that outcome will occur. Probability varies between 0 and 1. If the probability is 0, that outcome *will not* occur. If the probability is 1, that outcome *will* occur. The closer the probability is to 1, the more likely it will occur. For example, according to the Commissioner's 1980 Standard Ordinary Mortality Table, based on 1970–1975 experience, the probability that a male, aged 30, will die during the next year is 1.9 per 1,000. At age 50 the probability is 6.7 per 1,000. For females at these two ages the probabilities are respectively 1.1 and 5.0 per 1,000.

A probability distribution shows for each possible outcome its probability of occurrence. Illustrations are the two probability distributions shown in Figure 1.1. Each of these two distributions shows the possible total dollar losses from fires that a business might experience during the coming year together with the probability that each of these total dollar losses will occur. These totals reflect both the number of accidents that might occur during the year and the dollar losses per accident.

The possible outcomes and probabilities plotted in Figure 1.1. are as follows:

| Distribution A | |
|---|---|
| **Total losses per year** | **Probability** |
| $ 0 | .10 |
| 20,000 | .15 |
| 40,000 | .20 |
| 60,000 | .20 |
| 80,000 | .20 |
| 100,000 | .10 |
| 120,000 | .05 |
| **Distribution B** | |
| **Total losses per year** | **Probability** |
| $ 50,000 | .05 |
| 60,000 | .90 |
| 70,000 | .05 |

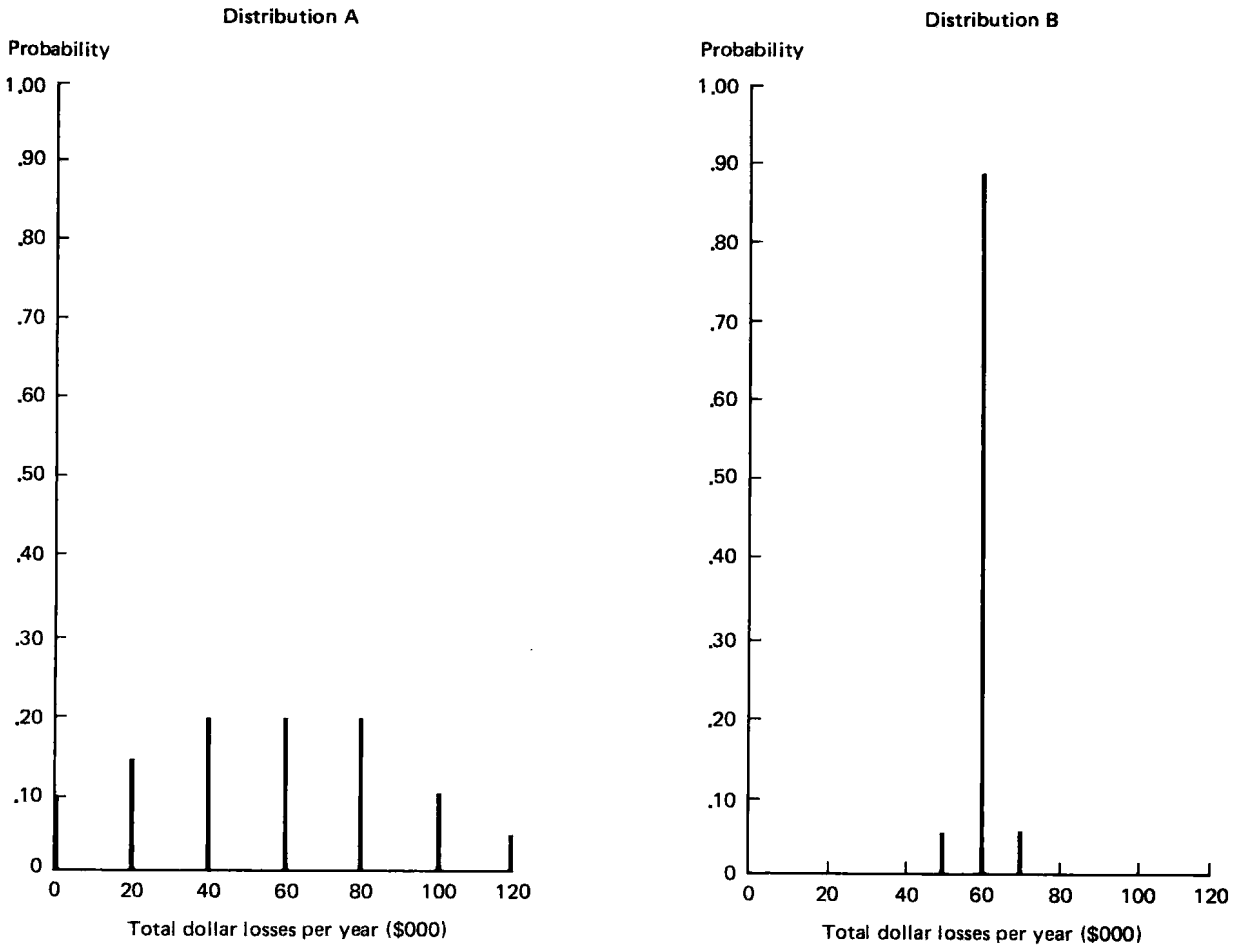


**FIGURE 1.1**
Two hypothetical probability distributions of total dollar losses per year.