FUNDAMENTALS OF RISK AND INSURANCE

VAUGHAN

3RD EDITION

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EMMETT J. VAUGHAN
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PREFACE

If it ain't broke, don't fix it.

WILL ROGERS

Although this edition of *Fundamentals of Risk and Insurance* incorporates a number of changes, its purpose, organization, and approach remain essentially the same as that of the first two editions. The original goal was to create a consumer-oriented text, and I have continued this orientation throughout the third edition. The changes that have been made are primarily to update the material and reflect the changes in the field of insurance since the completion of the second edition in 1978. I have also reorganized some of the material at the suggestion of users.

Let me briefly note the major changes that have been made from the previous edition. The first relates to the discussion of risk in the first chapter. Although some users suggested that the discussion of the various definitions of risk be deleted, other users argued for its retention. The solution I have chosen is the standard one in the face of such conflicts: a compromise. The treatment of the alternatives to the definition of risk used in the text has been moved to an appendix to Chapter 1; those who prefer to skip this material may do so, while those who prefer to include it are also accommodated.

The second major change relates to the treatment of the Homeowners policies. The discussion of Homeowners policies has been expanded somewhat and divided into two chapters. These two chapters are more suitably placed before the discussion of the separate dwelling forms. This permits study of the Homeowners policies without prior study of the dwelling forms. The treatment of the dwelling forms has been condensed and combined with other miscellaneous forms of property insurance for the individual or family.

Finally, the treatment of automobile insurance now focuses on the Personal Auto Policy rather than the Family Automobile Policy as in the previous editions. The discussion of the Family Auto Policy has been reduced, reflecting the changing importance of these two policies.

The main emphasis in the book remains on the insurance product and its use within a risk management framework. The traditional fields of life insurance, health insurance, property and liability insurance, and social insurance are all treated according to their relationship to the wide range of insurable risks to which the individual or organization are exposed. In several chapters specific contracts are examined in some detail, since I continue to believe that we can best emphasize the principles of insurance by studying their application in specific insurance contracts.

The book is divided into three major sections. In the first section, we examine the concept of risk, the nature of the insurance device, and the principles of risk management. This section also provides an overview of the insurance industry and the manner in which it operates.

The second section deals with the traditional fields of life and health insurance as solutions to the risks connected with the loss of income. The social security system, workers compensation, and other social insurance coverages are discussed in this section to permit the student to integrate the coverage under these programs in income protection planning.

The final section of the book deals with the risks associated with the ownership of property and legal liability. The coverages applicable to the individual or family are treated in chapters that are separate from those designed for the business firm, permitting those instructors who prefer to do so to concentrate on coverages for the individual and give only slight treatment to commercial coverages.

The book is designed to fit a one-semester or two-quarter course, but it may be adapted to longer and shorter sequences. We have attempted to compose what we consider to be a logical sequence of subject matter, but the book can be used flexibly. Parts II and III in particular may be taken in different order.

A two-quarter sequence can cover the entire text. Although the whole text could also conceivably be covered in a single semester, the result would be a whirlwind tour of the field of insurance, and I believe that itwill be necessary for most instructors to omit certain chapters and some of the detailed discussion. I suggest that Chapters 7, 8, 27, 33, 34, and 35 be deleted in a single semester course. In the case of a single quarter course meeting for ten weeks, Chapters 6, 9, 13, 20, 23, and 32 may also be deleted. Obviously, a given instructor may feel differently about the relative importance of the various chapters, and may choose to delete chapters other than those I have suggested. Alternate course schedules are suggested in the instructor's manual. As in the case of the second edition, a *Student Study Guide*, prepared by Professor Richard C. Corbett of Florida State University, is available for the third edition.

I have been supported and encouraged in this revision by many people. First and foremost are my family, all of whom sacrificed much to help me. I thank them all for their help, but more importantly, for their understanding. In addition, I owe much to my teacher and former coauthor, the late Curtis M. Elliott. His influence left an indelible mark on me and on this book.

As a book progresses through successive editions, the number of people to whom an author is indebted increases geometrically, since the efforts of so many people become a part of the work. As a result, there are many people to whom special thanks are due. They include my colleagues at The University of Iowa, Michael L. Murray and Jack Nicholson, who offered valuable suggestions and helped to clarify many of the concepts herein. The reviewers of the first and second editions, whose contributions to those editions helped to shape this one as well were Richard C. Allgood, CPCU, Garth H. Allen, W. Oscar Cooper, Robert W. Cooper, Kenneth J. Krepas, John W. Haney, E. J. Leverett, Joseph R. Morrin, Gary K. Stone, and S. Travis Pritchett. The reviewers of this edition also deserve special thanks. Each made valuable suggestions and comments and without question had a positive influence on the book. These reviewers were Albert L. Auxier of the University of Tennessee, Bill Feldhaus of Georgia State University, Roger A. Formisano of the University of Wisconsin at Madison, E. J. Leverett of the University of Georgia, Robert J. Myers of Temple University, John J. O'Connell of Arizona State University, and Robert C. Witt of the University of Texas. Donald Duffy, Richard N. Edwards, and Scott Fleming, all of the Kaiser Permanente Medical Care Program, provided valuable assistance in connection with Chapter 18.

I also offer thanks to all of my former students. Their many comments and intelligent questions contributed to the design of the book and the examples and illustrations used. The past and present graduate teaching assistants at the University of Iowa, who shared with the author the pleasant task of teaching the basic insurance course at The University of Iowa, each contributed significantly to the earlier editions and to this one. They are Lois Anderson, Phillip Brooks, Robb Fick, Tim Hamann, Terry Leap, Lacy McNeill, Joseph Panici, Mark Power, Ellen Steele, Mike Steele, and Patrick Steele. I also thank the users of the first two editions who took time to write to me with their suggestions and comments. Professors Bob Hedges and Robert J. Myers, both of Temple University, in particular took the time to share their insights with me in this way. Finally, I thank Kathryn A. Kurth, who assisted in the preparation of the manuscript and prepared the index.

To the teachers who will use this book as a text, I will be grateful to receive advice concerning any errors that should be corrected and any material that should be added or omitted when it is again revised. To the students who will be compelled to read it, I hope that the material presented will seem as exciting and interesting as it has seemed to me.

Emmett J. Vaughan

Iowa City, Iowa
December 1981

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CONTENTS

SECTION ONE
RISK AND INSURANCE

1. The Conceptual Framework 3
The Concept of Risk 3
Current Definitions of Risk 4
Risk Distinguished from Peril and Hazard 6
Classifications of Risk 6
Classifications of Pure Risk 8
The Burden of Risk 9
Methods of Handling Risk 9
Current Definitions of Risk 13

2. The Insurance Device 21
The Nature and Functions of Insurance 21
Elements of an Insurable Risk 28

3. Risk Management 35
The Nature of Risk Management 35
Development of Risk Management 36
The Risk-Management Process 36
Considerations in Selecting from among the Tools of Risk Management 40
The Nonprofessional Risk Manager 43
Buying Insurance 44

4. The Fields of Insurance 51
Social Insurance 51
Private (Voluntary) Insurance 55
Public Guarantee Insurance Programs 58
Similarities in the Various Fields of Insurance 59

5. The Private Insurance Industry 63
The History of Insurance 63
Classification of Private Insurers 67
The Agent 72
Marketing Systems 73

6. The Structure of the Insurance Industry 79
Number of Insurers and Market Shares 79
Corporate Combinations in the Insurance Industry 80
Competition in the Insurance Industry 82
Cooperation in the Insurance Industry 83

7. Functions of Insurers 91
Functions of Insurers 91
Ratemaking 91
Production 95
Underwriting 96
Loss Adjustment 98
The Investment Function 101
Miscellaneous Functions 101

8. Financial Aspects of Insurer Operations 105
Statutory Accounting Requirements 105
Property and Liability Insurers 107
Life Insurance Companies 111
Reinsurance 114
Taxation of Insurance Companies 116

9. The Government as an Insurer 121
Government Insurance Defined 121
Reasons for Government Insurance 121
Federal Social Insurance Programs 122
State Social Insurance Programs 123
Federal Public Guarantee Insurance Programs 125
State Public Guarantee Programs 125
Federal Private (Voluntary) Insurance Programs 125
State Private (Voluntary) Insurance Programs 132
Evaluating the Role of the Government as an Insurer 133

10. Regulation of the Insurance Industry 137
The Why of Government Regulation 137
A Brief History of Insurance Regulation 141
Regulation Today 143

Areas Regulated 144
State Versus Federal Regulation 152

11. The Legal Framework **159**
Insurance and the Law of Contracts 159
Special Legal Characteristics of Insurance Contracts 162

SECTION TWO
LIFE AND HEALTH INSURANCE

12. Introduction to Life Insurance **179**
Unique Function of Life Insurance 179
Some Unique Characteristics of Life Insurance 180
Types of Life Insurance Policies 182
Participating and Nonparticipating Life Insurance 185
General Classifications of Life Insurance 186
Annuities 190

13. The Actuarial Basis of Life Insurance **195**
Life Insurance Premium Computation 195
Reserves on Life Insurance Policies 204
Benefit-Certain and Benefit Uncertain Contracts 207

14. The Life Insurance Contract—Part I **211**
General Provisions of Life Insurance Contracts 211
Settlement Options 216

15. The Life Insurance Contract—Part II **223**
Nonforfeiture Values 223
Dividend Provisions 227
Important Optional Provisions 228

16. Special Life Insurance Policy Forms **237**
Specialized Life Contracts 237
Special Annuity Forms 244
The Variable Annuity 246
Innovations in Life Insurance 249
Advantages and Disadvantages of Special Forms 252

17. Health Insurance—Disability Income Insurance **255**
The General Nature of Disability Income Insurance 255
The Need for Disability Income Insurance 256
Disability Income Contracts 257
Individual Health Insurance Policy Provisions 260
The Cost of Disability Income Insurance 264

18. Health Insurance—Coverage for Medical Expenses **267**
Medical Expenses—Coverage and Insurers 267
Traditional Forms of Medical Expense Insurance 268
Health Maintenance Organizations 273
Buying Health Insurance 277
The Prospect of a National Health Insurance Plan 278

19. The Old Age, Survivors, Disability and Health Insurance Program **285**
Old Age, Survivors, Disability and Health Insurance 285
The Soundness of the Program 298

20. Other Compulsory Compensation Programs **305**
Workers' Compensation 305
Unemployment Insurance 315
Compulsory Temporary Disability Insurance Laws 318

21. Programming Income Coverages **323**
Programming Life Insurance 323
Programming Health Insurance 330
Illustrations of Life and Health Insurance Programming 331

22. Buying Life Insurance and Estate Planning **341**
Buying Life Insurance 341
Estate Planning 349

23. Retirement Programs and Business Uses of Life and Health Insurance **357**
Group Life and Health Insurance as an Employee Benefit 357

SECTION THREE PROPERTY AND LIABILITY INSURANCE

24. The Standard Fire Policy **373**
Historical Development 373
The Standard Fire Policy 373
Forms and Endorsements 381

25. The Homeowners Policy—Part I **387**
Historical Development 387
General Nature of the Homeowners Program 388
Homeowners Section I Coverages 390
Other Provisions 396

26. The Homeowners Policy—Part II **401**
Perils Insured Under Homeowners Forms 401
Optional Coverages Under the Homeowners Policy 409
Summary 410

27. Other Personal Forms of Property Insurance **413**
Monoline Fire Dwelling Forms 413
The Mobilehome Policy Program 418
Flood Insurance 420
Inland Marine Coverages for the Individual 422
Buying Property Insurance for the Individual 425
Title Insurance

28. Negligence and Legal Liability **431**
Criminal and Tortious Behavior 431
Negligence and Legal Liability 432
Obligations of Property Owners to Others 437
Defenses to Negligence 439

29. General Liability Insurance for the Individual **445**
Liability Insurance in General 445
Comprehensive Personal Liability Coverage 446
Optional Endorsements to Homeowners Liability Coverage 456
Professional Liability Insurance 457
The Umbrella Liability Policy 458

30. The Automobile and Its Legal Environment **463**
Legal Liability and the Automobile 464
Insurance for High-Risk Drivers 467
The Automobile Insurance Problems and Changes in the Tort System 469

31. The Personal Auto Policy **479**
General Nature of the Personal Auto Policy 479
Personal Auto Policy Liability Coverage 481
Medical Payments Coverage 487
Uninsured Motorist Coverage 488
Physical Damage Coverage 490
Policy Conditions 492

32. Other Automobile Policy Forms and Automobile Insurance Rates **497**
Other Automobile Policy Forms 497
The Cost of Automobile Insurance 502
Buying Automobile Insurance 508

33. Commercial Property Coverages **513**
Fire Insurance against Direct Loss 513
Fire Insurance against Consequential Loss 518
Boiler and Machinery Insurance 520
Allied Lines and Miscellaneous Property Coverages 521
Transportation Coverages 523
Insurance against Dishonesty 526
Package Policies for Business Firms 530
Summary 531

34. Commercial Liability Coverages **535**
Employers' Liability and Workers' Compensation 535
General Liability Insurance 537
Commercial Automobile Insurance 542
Aviation Insurance 545
Liability Insurance for Common Carriers 545
Insurance for Bailees 547
The Blanket Catastrophe Excess (Umbrella) Liability Policy 548
Summary 549

35. Surety Bonds and Credit Insurance **553**
Surety Bonds 553
Credit Insurance 557

36. Insurance in the Future 563
The Government as Insurer 563
Changes in the Legal Environment 564
Possible Changes in the Pattern of Regulation 566
Changes in the Insurance Industry 567
Some Persistent Problems 569
Career Opportunities in Insurance 572

Appendix A Glossary 577

Appendix B Whole Life Policy 595

Appendix C Disability Income Policy 613

Appendix D Standard Fire Policy 625

Appendix E Extended Coverage Endorsement 629

Appendix F Homeowner's '76 633

Appendix G Personal Auto Policy 649

Index 659

SECTION ONE

RISK AND INSURANCE

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CHAPTER 1

THE CONCEPTUAL FRAMEWORK

> ***"When I use a word," Humpty Dumpty said, in a rather scornful tone, "it means just what I choose it to mean—neither more nor less." "The question is," said Alice, "whether you can make words mean so many different things." 'The question is," said Humpty Dumpty, "which is to be master, that's all."***
>
> **LEWIS CARROLL**
> ***Through the Looking Glass***

Every field of knowledge has its own specialized terminology, and terms which have very simple meanings in everyday usage often take on different and complicated connotations when applied in a specialized field. In this chapter we will examine a number of basic concepts used in the study of insurance. In particular, we will concern ourselves with the concept of risk, for risk is the basic problem with which insurance deals.

THE CONCEPT OF RISK

It would seem on the surface that the term *risk* is a simple enough notion. When someone states that there is risk in a given situation, the listener understands what is meant: that in the given situation there is uncertainty about the outcome, and that the possibility exists that the outcome will be unfavorable. This loose intuitive notion of risk, which implies a lack of knowledge about the future and the possibility of some adverse consequence, is satisfactory for conversational usage, but for our purpose a somewhat more rigid definition is desirable.

Economists, statisticians, decision theorists, and insurance theorists have long discussed the concepts of "risk" and "uncertainty" in an attempt to arrive at a definition of risk that might be useful for analysis in each field of investigation. Up to the present time, they have not been able to agree on a definition that can be used in each field with the same facility; nor does it appear likely that they will do so in the near future. A definition of risk that is suitable for the economist or statistician may very well be worthless as an analytic tool for the insurance theorist. The fact that each group treats a different body of subject matter requires the use of different concepts, and although the statistician, the decision theorist, and the insurance theorist all use the term *risk*, they may each mean something entirely different.

Insurance is still in its infancy as a body of theory. As a result, we find many contradictory definitions of risk throughout the literature dealing with this phenomenon from an insurance point of view. One reason for these contradictions is that insurance theorists have attempted to borrow the definitions of risk used in other fields. Surprising as it may seem, insurance text writers have not been able to agree on a definition of this basic concept.

To compound the problem, the term risk is used by people in the insurance business to mean either a peril insured against (e.g., fire is a risk to which most property is exposed), or a person or property protected by insurance (e.g., many insurance companies feel that young drivers are not good risks). From time to time in this text, we may use the term *risk* in one of the two ways insurance practitioners use it, but for the most part we will use it in the abstract to indicate a situation where an exposure to loss exists.

CURRENT DEFINITIONS OF RISK

If we were to survey the best-known insurance textbooks used in colleges and universities today, we would find a general lack of agreement concerning the definition of risk. In general, we would find the term defined in one of the following ways:

1. Risk is the chance of loss.
2. Risk is the possibility of loss.
3. Risk is uncertainty.
4. Risk is the dispersion of actual from expected results.
5. Risk is the probability of any outcome different from the one expected.

While each of these definitions differs from the others, all fall into one of two major categories: those that view risk as a condition of the real world, and those that view it as a subjective phenomenon that results from the imperfections of human knowledge.

There is no sign at this point that insurance theorists will be able to agree on any of the above definitions in the near future. Each has found numerous adherents, and each has certain qualities that make it preferable for some purposes.[1] Although the insurance theorists have not agreed on a universal definition, there are common elements in each of the definitions: indeterminacy and loss.

- ► The notion of an indeterminate outcome is inherent in each of the definitions: the outcome must be in question. When risk is said to exist, there must always be at least two possible outcomes. If we know in advance what the result will be, there is no risk, regardless of whether or not there is loss. For example, investment in a capital asset generally involves a realization that the asset is subject to physical depreciation and that its value will decline. Here the outcome is certain and so there is no risk.
- ► At least one of the possible outcomes is undesirable. This may be a loss in the generally accepted sense in which something the individual possesses is lost, or it may be a gain smaller than the gain that was possible. For example, the investor who fails to take advantage of an opportunity "loses" the gain that might have been made. The investor faced with the choice between two stocks may be said to "lose" if he or she chooses the one that increases in value less than the alternative.

Our Definition of Risk

For our purposes, two of the definitions noted above will be used, but in a slightly modified form, providing, we hope, a precise, yet intuitively acceptable notion of risk. We define risk as follows:

> Risk is a condition in which there is a possiblility of an adverse deviation from a desired outcome that is expected or hoped for.

Because an "adverse deviation from a desired outcome" may be viewed as a loss, this definition is quite similar to the definition of risk as "the possibility of loss." It is also similar to the definition of risk as "the probability of any outcome different from that which is expected." The major differences are the substitution of "possibility" for "probability" and the introduction of the notion of an *adverse* deviation from a *desired* outcome that is expected or *hoped for*. If you own a house, you hope that it will not catch fire. When you make a wager, you hope that the outcome will be favorable. The fact that the outcome in either event may be something other than what you hope constitutes the possibility of loss or risk.

Note that in this definition risk is a condition of the real world; it is not subjective, but rather a combination of circumstances in the external environment. The possibility of loss must exist, even though the person exposed to that possibility may not be aware of it. If the individual believes that there is a possibility of loss where none is present, there is only imagined risk, and not risk in the sense of a state of the real world.

Note also that there is no requirement that the possibility be measurable; only that it must exist. When we say that an event is possible, we mean that it has a probability between zero and 1; it is neither impossible nor definite. We may or may not be able to measure the degree of risk.

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[1] For a discussion of the various definitions of risk that are listed, see the Appendix to this chapter.

In its broadest context, this definition includes any situation in which there is a possibility of an unfavorable outcome. For example, the student who does not study faces the possibility of receiving an *F* for the course. Few would deny that there are some risks that do not involve money. Since our purpose here is to relate risk to insurance, however, we will focus on a special type of risk—that which entails the possibility of financial loss. We define *financial loss* as a decline in or disappearance of value due to a contingency. This means that if the loss of value is intended or if it is certain, it is not a loss within the context of our definition.

The Degree of Risk

As if the problem of agreeing upon a definition of "risk" were not enough, we are faced with the equally perplexing one of agreeing on what we mean by the "degree of risk." Precisely what is meant when we say that one alternative involves "more risk" or "less risk" than another?

For those who define risk as uncertainty, the answer is relatively simple. The greater the uncertainty, the greater the risk. Those who define risk as uncertainty maintain that risk is greatest when there are two possible outcomes, each of which is equally likely to occur. In other words, they maintain that uncertainty (risk) is at its highest point in the individual case when the probability of loss is 0.5.

Suppose we take the dangerous game of Russian roulette to examine this position. If I hand you a revolver in which I have placed three cartridges, leaving three of the chambers in the cylinder empty, the chance of loss is 3/6 or 1/2. To those who define risk as uncertainty, this represents the point of greatest risk. Accordingly, if I place one more bullet in the cylinder, the degree of risk declines. Thus, there would be less risk when there are four bullets in the cylinder than when there are three, less when there are five than when there are four. This position seems to run contrary to the logical notion of the degree of risk.

It would seem that the most commonly accepted meaning of "degree of risk" is related to the likelihood of occurrence. We intuitively consider those events with a high probability of loss to be "riskier" than those with a low probability. In our example, it seems more accurate (or at least less confusing) to state that adding the fourth bullet increases rather than decreases the risk. Adding the fifth bullet increases the risk even more. This intuitive notion of the degree of risk is consistent with our definition of risk. If risk is defined as the possibility of an adverse deviation from a desired outcome that is expected or hoped for, the degree of risk is measured by the probability of such an adverse deviation.

For the individual, the higher the probability of loss, the greater the risk, for the greater the probability of loss, the greater the probability of a deviation from what is hoped for. In the case of the individual, the hope is that no loss will occur, so the probability of a deviation from what is hoped for (which is the measure of risk) varies directly with the probability that a loss will occur. Adding the fourth and fifth bullets increases the probability of a deviation from the hoped-for outcome. If a sixth bullet is added, the player can no longer expect or even hope that the outcome will be favorable. The sixth bullet makes the outcome certain, eliminating risk. If the probability of loss is 1, there is no chance of an outcome other than that which is expected and therefore no hope of a favorable result. When the probability of loss is zero, there is no possibility of loss and therefore no risk.

In the case of the individual, we ignore what is "expected" and measure risk in terms of the probability of an adverse deviation from what is hoped for. Actuarial tables tell us, for example, that the probability of death at age 52 is approximately 1%, and that at age 79 it is about 10%. At age 97, the probability of death increases to nearly 50%. Using the probability of an adverse deviation from the outcome that is hoped for, we view the risk of death at age 79 as greater than that at age 52, but less than that at age 97.

In the case of aggregate exposures, estimates can be made about the likelihood that a given number of losses will occur, and predictions may be made on the basis of these estimates. Here the expectation is that the predicted number of losses will occur. In the case of aggregate exposures, where large numbers are involved, the degree of risk is not the probability of a single occurrence or loss, but the probability of some outcome different from that predicted or expected. This concept will be treated in greater detail in Chapter 2.

At times we use the terms *more risk* and *less risk* to indicate a measure of the possible size of the loss. Many people would say that there is more risk involved in a possible loss of $1,000 than in that of $1, even though the probability of loss is the same in both cases. It would seem that we should make some allowance in the measurement of risk for the financial impact of the loss. Certainly both the probability and the amount of the potential loss contribute to the risk's impact. Given two situations one involving a $1,000 exposure and the other a $1 exposure, and assuming the same probability in each case, it seems appropriate to state that there is a greater risk in the case of the possible loss of $1,000. This is consistent with our definition of risk, since the loss of $1,000 is a greater deviation from what is hoped for (that is, no loss) than is the loss of $1. On the other hand, given two situations where the amount exposed is the same (e.g., $1,000), there is more risk in the situation with the greater probability of loss.

While it may be difficult to relate the size of the potential loss and the probability of that loss in the measurement of risk, the concept of "expected value" may be used to relate these two facets of a given risk situation. The expected value of a loss in a given situation is the probability of that loss multiplied by the amount of the potential loss. If the amount at risk is $10 and the probability of loss is 0.10, the expected value of the loss is $1. If the amount at risk is $100 and the probability is 0.01, the expected value is also $1. This is a very useful concept, as we shall see later.

RISK DISTINGUISHED FROM PERIL AND HAZARD

It is not uncommon for the terms *peril* and *hazard* to be used interchangeably with each other and with "risk." However, to be precise, it is important to distinguish these terms. A *peril* is a cause of a loss. We speak of the peril of "fire" or "windstorm," or "hail" or "theft." Each of these is the cause of the loss that occurs. A *hazard*, on the other hand, is a condition that may create or increase the chance of a loss arising from a given peril. It is possible for something to be both a peril and a hazard. For instance, sickness is a peril causing economic loss, but it is also a hazard that increases the chance of loss from the peril of premature death. Hazards are normally classified into three categories:

- *Physical hazards* consist of those physical properties that increase the chance of loss from the various perils. Examples of physical hazards that increase the possibility of loss from the peril of fire are the type of construction, the location of the property, and the occupancy of the building.
- *Moral hazard* refers to the increase in the probability of loss which results from evil tendencies in the character of the insured person. More simply, it is the dishonest tendencies on the part of an insured that may induce that person to attempt to defraud the insurance company. A dishonest person, in the hope of collecting from the insurance company, may intentionally cause a loss, or may exaggerate the amount of a loss in an attempt to collect more than the amount to which he or she is entitled.
- *Morale hazard*, not to be confused with moral hazard, results from a careless attitude on the part of insured persons toward the occurrence of losses. The purchase of insurance may create a morale hazard, since the realization that the insurance company will bear the loss may lead the insured to exercise less care than if forced to bear the loss alone.

CLASSIFICATIONS OF RISK

Risks may be classified in many ways; however, there are certain distinctions that are particularly important for our purposes. They are discussed below.

Financial and Nonfinancial Risks

In its broadest context, the term *risk* includes all situations in which there is an exposure to adversity. In some cases this adversity involves financial loss, while in others it does not. There is some element of risk in every aspect of human endeavor, and many of these risks have no (or only incidental) financial consequences. Even a blind date carries an element of risk. In this text we are concerned with those risks which involve a financial loss.

Static and Dynamic Risks

A second important distinction is between static and dynamic risks.[2] Dynamic risks are those resulting from changes in the economy. Changes in the price level, consumer tastes, income and output, and technology may cause financial loss to members of the economy. These dynamic risks normally benefit society over the long run, since they are the result of adjustments to misallocation of resources. Although these dynamic risks may affect a large number of individuals, they are generally considered less predictable than static risks, since they do not occur with any precise degree of regularity.

Static risks involve those losses which would occur even if there were no changes in the economy. If we could hold consumer tastes, output and income, and the level of technology constant, some individuals would still suffer financial loss. These losses arise from causes other than the changes in the economy, such as the perils of nature and the dishonesty of other individuals. Static risks, unlike dynamic risks, are not a source of gain to society. Static losses involve either the destruction of the asset or a change in its possession as a result of dishonesty or human failure. Static losses tend to appear with a degree of regularity over time and, as a result, are generally predictable.

Fundamental and Particular Risks

The distinction between fundamental and particular risks is based on the difference in the origin and consequences of the losses.[3] Fundamental risks involve losses that are impersonal in origin and consequence. They are group risks, caused for the most part by economic, social, and political phenomena, although they may also result from physical occurrences. They affect large segments or even all of the population. Particular risks involve losses that arise out of individual events and that are felt by individuals rather than by the entire group. Unemployment, war, inflation, earthquakes, and floods are all fundamental risks. The burning of a house and the robbery of a bank are particular risks.

Since fundamental risks are caused by conditions more or less beyond the control of the individuals who suffer the losses and since they are not the fault of anyone in particular, it is held that society rather than the individual has a responsibility to deal with them. Although some fundamental risks are dealt with through private insurance,[4] it is an inappropriate tool for dealing with most fundamental risks, and some form of social insurance or other transfer program may be necessary. Unemployment and occupational disabilities are fundamental risks treated through social insurance. Flood damage or earthquakes make a district a disaster area eligible for federal funds.

Particular risks are considered to be the individual's own responsibility, inappropriate subjects for action by society as a whole. They are dealt with by the individual through the use of insurance, loss prevention, or some other technique.

Pure and Speculative Risks

One of the most useful distinctions is that between pure risk and speculative risk.[5] The term

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[2] The dynamic-static distinction was made by Willett. See Alan H. Willett, *The Economic Theory of Risk and Insurance* (Philadelphia: University of Pennsylvania Press, 1951), pp. 14-19.

[3] The distinction between fundamental and particular risks is based on C. A. Kulp's discussion of risk (which he referred to as "hazard"). See C. A. Kulp, *Casualty Insurance*, 3rd ed. (New York: Ronald Press, 1956), pp. 3, 4.

[4] For example, earthquake insurance is available from private insurers in most parts of the country, and flood insurance is frequently included in all risk contracts covering movable personal property. Flood insurance on real property is available through private insurers only on a limited basis.

[5] Although the distinction between pure and speculative risk had been introduced earlier, Albert H. Mowbray formalized the distinction. See Albert H. Mowbray and Ralph H. Blanchard, *Insurance, Its Theory and Practice in the United States*, 5th ed. (New York: McGraw-Hill, 1961), pp. 6, 7.

pure risk is used to designate those situations which involve only the chance of loss or no loss. *Speculative risk*, in contrast, describes a situation where there is a possibility of loss, but also a possibility of gain. One of the best examples of pure risk is the possibility of loss surrounding the ownership of property. The person who buys an automobile, for example, immediately faces the possibility that something may happen to damage or destroy the automobile. The possible outcomes are loss or no loss. Gambling is a good example of a speculative risk. In a gambling situation, risk is deliberately created in the hope of gain. The student wagering $10 on the outcome of Saturday's game faces the possibility of loss, but this is accompanied by the possibility of gain. The entrepreneur or capitalist faces speculative risk in the quest for profit. The investment made may be lost if the product is not accepted by the market at a price sufficient to cover costs, but this risk is borne in return for the possibility of profit.

The distinction between pure and speculative risks is an important one, because normally only pure risks are insurable. Insurance is not concerned with the protection of individuals against those losses arising out of speculative risks. Speculative risk is voluntarily accepted because of its two-dimensional nature, which includes the possibility of gain. Not all pure risks are insurable, and a further distinction between insurable and uninsurable pure risks may also be made. A discussion of this difference will be delayed until Chapter 2.

CLASSIFICATIONS OF PURE RISK

While it would be impossible in this book to list all the risks confronting an individual or business, we can briefly outline the nature of the various pure risks that we face. For the most part, these are also static risks. Pure risks that exist for individuals and business firms can be classified under one of the following:

1. *Personal Risks.* These consist of the possibility of loss of income or assets as a result of the loss of the ability to earn income. In general, earning power is subject to four basic perils: (a) premature death, (b) dependent old age, (c) sickness or disability, and (d) unemployment.
2. *Property Risks.* Anyone who owns property faces property risks simply because such possessions can be destroyed or stolen. Property risks embrace two distinct types of loss: direct loss and indirect or "consequential" loss. Direct loss is the simplest to understand: if a house is destroyed by fire, the property owner loses the value of the house. This is a direct loss. However, in addition to losing the value of the building itself, the property owner no longer has a place to live; and during the time required to rebuild the house, it is likely that the owner will incur additional expenses living somewhere else. This loss of use of the destroyed asset is an "indirect," or "consequential," loss. An even better example is the case of a business firm. When a firm's facilities are destroyed, it loses not only the value of those facilities but also the income that would have been earned through their use. Property risks, then, can involve three types of losses: (a) the loss of the property (b) loss of use of the property or its income, and (c) additional expenses occasioned by the loss of the property.
3. *Liability Risks.* The basic peril in the liability risk is the unintentional injury of other persons or damage to their property through negligence or carelessness; however, liability may also result from intentional injuries or damage. Under our legal system, the laws provide that one who has injured another, or damaged another's property through negligence or otherwise, can be held responsible for the harm caused. Liability risks therefore, involve the possibility of loss of present assets or future income as a result of damages assessed or legal liability arising out of either intentional or unintentional torts, or invasion of the rights of others.
4. *Risks Arising from Failure of Others.* When another person agrees to perform a service for you, he or she undertakes an obligation which you hope will be met. When the person's failure to meet this obligation would result in your financial loss, risk exists. Examples of risks in this category would include failure of a contractor to complete a construction project as scheduled, or failure of debtors to make payments as expected.

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