6.3 Ideal Requisites for Insurability

LEARNING OBJECTIVES

In this section you will learn the following:

- Why so many risks cannot be insured by private insurance companies
- The definition of insurable risks by private insurers
- Why catastrophes such as floods are not insurable risks by private insurers

Soon after the devastation of Hurricane Katrina became known, the Mississippi attorney general filed a lawsuit against insurers claiming that the flood should be covered by homeowner's insurance policies. The controversy over coverage was explored in the September 8, 2005, *New York Times* article, "Liability Issue: Wind or Water?" Is this question so open-ended?

Are all pure risks insurable by private (nongovernmental) insurers? No. The private insurance device is not suitable for all risks. Many risks are uninsurable. This section is devoted to a discussion of the requirements that must generally be met if a risk is to be insurable in the private market. As a practical matter, many risks that are insured privately meet these requirements only partially or, with reference to a particular requirement, not at all. Thus, in a sense, the requirements listed describe those that would be met by the ideal risk. Nevertheless, the bulk of the risks insured fulfill—at least approximately—most of the requirements. No private insurer can safely disregard them completely. [1] A risk that was perfectly suited for insurance would meet the following requirements:

1. The number of similar exposure units is large.
2. The losses that occur are accidental.
3. A catastrophe cannot occur.
4. Losses are definite.
5. The probability distribution of losses can be determined.
6. The cost of coverage is economically feasible.

The sixth requirement in the list above influences the consumer demand for insurance and looks at what is economically feasible from the perspective of potential insureds. The other requirements influence the willingness of insurers to supply insurance.

Many Similar Exposure Units

As noted, an insurance organization prefers to have a large number of similar units when insuring a possible loss exposure. The concepts of mass and similarity are thus considered before an insurer accepts a loss exposure. Some insurance is sold on exposures that do not possess the requirements of mass and similarity, but such coverage is the exception, not the rule. An example is insurance on the fingers of a concert pianist or on prize-winning racehorses. When there are no masses of exposures, the coverage is usually provided by specialty insurers. Lloyd's of London, for example, is known for insuring nonmass exposures such as Bruce Springsteen's voice. The types of insurers will be discussed in Chapter 7 "Insurance Operations".

Mass

A major requirement for insurability is mass; that is, there must be large numbers of exposure units involved. For automobile insurance, there must be a large number of automobiles to insure. For life insurance, there must be a large number of persons. An automobile insurance company cannot insure a dozen automobiles, and a life insurance company cannot insure the lives of a dozen persons. How large is a "large group"? For insurance purposes, the number of exposure units needed in a group depends on the extent to which the insurer is willing to bear the risk of deviation from its expectations. Suppose the probability of damage to houses is 1/1,000. An insurer might assume this risk for 1,000 houses, with the expectation that one claim would be made during the year. If no houses were damaged, there would be a 100 percent deviation from expectations, but such a deviation would create no burden for the insurer. On the other hand, if two houses were damaged, the claims to be paid would be twice the expected number. This could be a severe burden for the insurer, assuming average or higher loss severities. By increasing the number of similar houses insured to 10,000, the expected number of losses increases to ten, but the stability of experience is increased. That is, there is a proportionately smaller deviation from expected losses than would exist with a group of 1,000 houses. Similarly, if the group is increased to 100,000

houses, the variation between actual and expected losses would be likely to increase in absolute terms, but it would decline proportionately. One additional loss from 100,000 houses is proportionally less than one additional loss from 10,000 houses and even less than one additional loss from 1,000 houses.

Similarity

The loss exposures to be insured and those observed for calculating the probability distributions must have similarities. The exposures assumed by insurers are not identical, no matter how carefully they may be selected. No two houses are identical, even though physically they may appear to be. They cannot have an identical location and, perhaps more important, they are occupied by different families. Nevertheless, the units in a group must be reasonably similar in characteristics if predictions concerning them are to be accurate. For example, homes with brick sidings are similar for insurance purposes.

Moreover, probability distributions calculated on the basis of observed experience must also involve units similar to one another. Observing the occupational injuries and illnesses of a group of people whose ages, health conditions, and occupations were all different would not provide a basis for calculating workers' compensation insurance rates. For example, clerical work typically involves much lower probabilities of work-related loss than do occupations such as logging timber or climbing utility poles. Estimates based on experience require that the exposure units observed be similar to one another. Moreover, such estimates are useful only in predicting losses for comparable exposures.

Accidental Losses

The risks assumed by an insurer must involve only the possibility, not the certainty, of loss to the insured. Insurable losses must be accidental or **fortuitous**; that is, they must be a matter of chance. Ideally, the insured should have no control or influence over the event to be insured. In fact, this situation prevails only with respect to limited situations. As mentioned in Chapter 1 "The Nature of Risk: Losses and Opportunities", intangible and physical hazards influence the probability of loss. Prediction of potential losses is based on a probability distribution that has been estimated by observing past experience. Presumably, the events observed were, for the most part, fortuitous occurrences. The use of such

estimates for predicting future losses is based on the assumption that future losses will also be a matter of chance. If this is not the case, predictions cannot be accurate.

Small Possibility of Catastrophe

The possibility of catastrophic loss may make a loss exposure uninsurable. A **catastrophic loss** to an insurer is one that could imperil the insurer's solvency. When an insurer assumes a group of risks, it expects the group as a whole to experience some losses—but only a small percentage of the group members to suffer loss at any one time. Given this assumption, a relatively small contribution by each member of the group will be sufficient to pay for all losses. It is possible for a large percentage of all insureds to suffer a loss simultaneously; however, the relatively small contributions would not provide sufficient funds. Similarly, a single very large loss would also require large contributions. Thus, a requisite for insurability is that there must be no excessive possibility of catastrophe for the group as a whole. Insurers must be reasonably sure that their losses will not exceed certain limits. Insurers build up surpluses (net worth) and contingency reserves (funds for future claims) to take care of deviations of experience from the average, but such deviations must have practical limits. If losses cannot be predicted with reasonable accuracy and confidence, it is impossible to determine insurance premium rates, the size of surpluses, or the net worth required.

Catastrophic losses may occur in two circumstances. In the first, all or many units of the group are exposed to the same loss-causing event, such as war, flood, tornado, mudslide, forest fire, hurricane, earthquake, tsunami, terrorist attack, or unemployment. For example, if one insurer had assumed the risk of damage by wind (hurricane) for all houses in the Miami, Florida, area, it would have suffered a catastrophic loss in 1992 when many structures were damaged simultaneously by Hurricane Andrew (and in fact several insurers were unable to withstand the losses). The 2005 hurricanes, which caused the largest-ever insured losses, are an example of a megacatastrophe that affected many units. These are examples of exposure units that suffer from the same cause of loss because of geographic proximity. Exposure units are susceptible to **dependent loss** when loss to one exposure unit affects the probability of loss to another. Thus, fire at one location increases the probability of fire at other homes in the area: their experience is dependent. In the early days of insurance in the United States, many fire insurance

companies concentrated their business in small areas near their headquarters. This worked in New York City, for example, until a major fire devastated large sections of the city in 1835. Because of their concentrated exposures, several insurers suffered losses to a large percentage of their business. The insurers were unable to pay all claims, and several went bankrupt.

A recent example of catastrophe exposure is the case of the risk of mold. Mold created a major availability and affordability issue in the homeowner's and commercial property insurance markets in the early 2000s. The *Wall Street Journal* article, "Hit With Big Losses, Insurers Put Squeeze on Homeowner Policies," reported massive exclusions of mold coverage because of the "avalanche of claims." [2]

A second type of catastrophe exposure arises when a single large value may be exposed to loss. September 11, 2001, represents such catastrophic loss. Tremendous value was concentrated in the towers of the World Trade Center. The possibility of a human-made catastrophe of such magnitude was not anticipated. Private insurers stopped short of calling the terrorist attacks "acts of war"—which would have been excluded from coverage—and honored the policies covering the World Trade Center and the lives of the victims. However, one consequence was the industry's action to immediately exclude terrorism coverage from new policies until the Terrorism Risk Insurance Act (TRIA) of 2002 provided stop-gap coverage from the federal government. When insurers and reinsurers (the insurers of the insurance companies) see the peril as having a far higher probability than previously perceived, they know that they can no longer accurately predict future losses, and their immediate reaction is to exclude the peril. Because of regulation and oversight (see Chapter 8 "Insurance Markets and Regulation"), however, the industry cannot make policy changes instantaneously. [3]When private insurers can no longer provide coverage, a solution may be to create pools such as those described in the box below, "Who Should Insure Against Megacatastrophes?" More on this topic and on reinsurance will be explained in Chapter 7 "Insurance Operations".

Definite Losses

Losses must be definite in time, place, and amount because, in many cases, insurers promise to pay in dollar amounts for losses if they occur during a particular time and in a particular geographical area. For

example, the contract may cover loss by fire at a specified location. For this contract to be effective, it must be possible to determine when, where, and how much loss occurred. If this cannot be established, it is impossible to determine whether the loss is covered under the terms of the contract. The fact that pain and suffering is hard to measure in dollar terms increases the insurer's risk when calculating rates for liability insurance. One other reason the requirement of definiteness is essential is that it is necessary to accumulate data for future predictions. Unless such data can be accurate, they cannot provide the basis for useful predictions.

Determinable Probability Distribution

For an exposure to loss to be insurable, the expected loss must be calculable. Ideally, this means that there is a determinable probability distribution for losses within a reasonable degree of accuracy. Insurance premium rates are based on predictions of the future, which are expressed quantitatively as expected losses. Calculation of expected losses requires the use of estimated probability distributions (discussed in detail in Chapter 2 "Risk Measurement and Metrics").

Probability distributions based on experience are useful for prediction; however, only when it is safe to assume that factors shaping events in the future will be similar to those of the past. For this reason, mortality (death) rates during times of peace are inappropriate for estimating the number of insured deaths during times of war. Similarly, the introduction of new technologies such as foam blanketing makes past experience of fire damage a poor indicator of future experience. Yet, because the technology is new and no theory exists as to what the losses ought to be, actuaries have little information on which to base lower rates. The actuary must use subjective estimates as well as engineering information to develop proper rates.

When the probability distribution of losses for the exposure to be insured against cannot be calculated with reasonable accuracy, the risk is uninsurable. An example of purported uninsurability due to inability to predict losses is the nuclear power industry. Insurance experts convinced government officials in 1957 that the risk of loss caused by an incident at a nuclear power site was too uncertain (because of lack of experience and unknown maximum severity) for commercial insurers to accept without some government

intervention. As a result, the government limited the liability of owners of nuclear power plants for losses that could arise from such incidents.

Who Should Insure against Megacatastrophes?

The incredible losses from hurricanes Wilma, Rita, and Katrina, including the breached levees in low-lying New Orleans and the subsequent bungled inaction by local, state, and federal authorities, opened a major public debate in the United States. On one level (which is not the focus of this text), the dialogue focused on who should have been first responder and what processes can be put in place to ensure that history does not repeat itself. The second topic of the debate (which we will focus on) was who should pay for such disasters in the future. The economic loss of Katrina and its aftermath was estimated to surpass $100 to $150 billion, large portions of which were not insured. As you will learn in Chapter 1 "The Nature of Risk: Losses and Opportunities", flood is insured only by the federal government through the National Federal Insurance Program, and the coverage limits are low, at $250,000. Many flooded homes and businesses in Louisiana and Mississippi did not carry this insurance. Even if they carried the coverage, the limits prevented recovery of their true property values. Residents had to resort to other assistance programs, some from the Federal Emergency Management Agency (FEMA).

The unprecedented economic loss is at the heart of the debate. Who should insure against such megacatastrophes in the future? The Insurance Information Institute (III) provided a summary of the proposals that were put forward during the public dialogue about how large-scale natural catastrophes should be managed in the post-9/11 era. The following are two main viewpoints:

1. Because the private industry cannot insure mega losses that are fundamentally uninsurable, the federal government should be the ultimate insurer. The federal government is already the national flood insurer and has been providing the terrorism stopgap coverage under the Terrorism Risk Insurance Act (TRIA). It makes sense that uninsurable risks be mitigated by the government. The insurance commissioners of Florida, California, and New York proposed a national catastrophe fund. Others suggested amendment to the federal tax code for insurers' reserves. The idea is that coverage would still be provided by insurers, but states would create

pools, and above them, a third layer would be provided for national megacatastrophes by the federal government. Involvement by the federal government in case of large-scale losses has elements of the Terrorism Risk Insurance Act that was extended until the end of 2014.

2. Because we are living in a free market economy, the private sector is best suited to handle any disaster, large or small. The idea is to have less government, with relaxed regulation and taxation. The creativity of the private sector should prevail. The government should not compete with private insurance and reinsurance markets. In this scenario, insurers have more capacity and thus more actuarially sound predictions to set appropriate rates. To prove the point, the industry was able to sustain both 9/11 and Katrina (except that the industry has not been responsible for the flood damages). If the private industry takes over all potential mega losses, there does need to be great improvement, however, in catastrophe modeling. The industry will have to diversify and utilize the capital markets (seeChapter 3 "Risk Attitudes: Expected Utility Theory and Demand for Hedging" about CAT bonds). It is predicted that the industry will ensure high-quality loss control in areas with potential disasters through building codes, strengthening of levees, and utilization of all possible disaster management techniques.

Questions for Discussion

1. Because large-scale human-made and natural disasters are not controllable by insurers, should the government pay for damages?
2. Because insurance is the business of insurers, should they handle their problems without being subsidized by taxpayers? What would be the outcome in terms of safety and loss controls?

Sources: This box relied on information from articles from the*National Underwriter*, Business Insurance, and the Insurance Information Institute (III) at http://www.iii.org.

Economic Feasibility

For insurance to be **economically feasible** for an insured, the size of the possible loss must be significant to the insured, and the cost of insurance must be small compared to the potential loss.

Otherwise, the purchase of insurance is not practical. If the possible loss is not significant to those exposed, insurance is inappropriate. Cost-benefit analysis is needed for the insurers to determine if the rates can be feasible to insureds. Also, the analysis in Chapter 3 "Risk Attitudes: Expected Utility Theory and Demand for Hedging" regarding the actuarially fair premiums a risk-averse individual would be willing to pay is important here. For catastrophic coverage, the insurer may determine through capital budgeting methods and cash flow analysis that it cannot provide low enough costs to make the coverage feasible for insureds.

Retention (bearing the financial loss by oneself) of many risks is almost automatic because the loss would not be a burden. If all the people who own automobiles were wealthy, it is doubtful that much automobile collision insurance would be written because such losses would not be significant to the wealthy owners. Insurance is feasible only when the possible loss is large enough to be of concern to the person who may bear the burden.

The possible loss must also be relatively large compared to the size of the premium. If the losses the insurer pays plus the cost of insurer operations are such that the premium must be very large in relation to the potential loss, insurance is not economically feasible. From the viewpoint of the insured, when the expected loss premium is high relative to the maximum possible loss, internal budgeting for the risk is preferable to insurance. The use of deductibles (a form of retention) to eliminate insurance reimbursement for frequent small losses helps make automobile collision premiums economically feasible. The deductible eliminates claims for small losses. Small automobile collision losses have such high probability and the cost of settling them is so great that the premium for covering them would be very large compared to the size of actual losses. For example, if a policy with a $200 deductible costs $85 more than one with a $500 deductible, you may consider $85 too large a premium for $300 of lower deductible. Insurance is best suited for risks involving large potential losses with low probabilities (described in Chapter 3 "Risk Attitudes: Expected Utility Theory and Demand for Hedging"). Large losses are key because insureds cannot pay them, and low probabilities for large losses make premiums relatively small compared with the possible losses. In other situations, insurance may not be economically feasible for the person or business facing risk.

Summary of Insurable Risks

Table 6.1 "Examples of Insurable and Uninsurable Risks" provides an analysis of the insurability characteristics of a few common perils and risks. The first column lists the requirements for insurability that we have just discussed. Note that the risk of flooding is not considered insurable because of its potential for catastrophe: many exposures can suffer losses in the same location. Thus, flooding is covered by the federal government, not by private insurers. Hurricanes, though similar to floods, are covered by private insurers, who obtain reinsurance to limit their exposure. After a catastrophe like Hurricane Andrew, however, many reinsurers became financially strapped or insolvent.

Table 6.1 Examples of Insurable and Uninsurable Risks

Flood	Fire	Disability	Terrorism	
Large number of similar exposure units	Yes	Yes	Yes	No
Accidental, uncontrollable	Yes	Yes	Yes	No (man-made, though not by the insured)
Potentially catastrophic	Yes	No	No	Yes
Definite losses	Yes	Yes	No	Yes
Determinable probability distribution of losses	Yes	Yes	Yes	No
Economically feasible	Depends	Depends	Depends	No
Insurable?	No	Yes	Yes	No

The second example in Table 6.1 "Examples of Insurable and Uninsurable Risks" is the peril/risk of fire. Fire is an insurable risk because it meets all the required elements. Even this peril can be catastrophic, however, if fires cannot be controlled and a large geographical area is damaged, such as the large fires in Colorado and Arizona in 2002. Disability is another type of peril that is considered insurable in most cases. The last example is the risk of terrorism. As noted above, it is no longer considered an insurable risk due to the catastrophic element associated with this peril since the September 11, 2001, attack.

Insurance companies use cost-benefit analysis to determine whether they should bring a new product to the market. In Chapter 4 "Evolving Risk Management: Fundamental Tools", you learned about the time value of money and computation for such decisions.

KEY TAKEAWAYS

In this section you studied that a risk perfectly suited for insurance meets the following requirements:

- The number of similar exposure units is large.
- The losses that occur are accidental.
- A catastrophe cannot occur.
- Losses are definite.
- The probability distribution of losses can be determined.
- The cost of coverage is economically feasible.

DISCUSSION QUESTION

Explain whether the following risks and perils are insurable by private insurers:

a. A hailstorm that destroys your roof
b. The life of an eighty-year-old man
c. A flood
d. Mold
e. Biological warfare
f. Dirty bombs

[1] Governmental insurance programs make greater deviations from the ideal requisites for insurability. They are able to accept greater risks because they often make their insurance compulsory and have it subsidized from tax revenues, while private insurers operate only when a profit potential exists. The nature of government insurance programs will be outlined later in this chapter.

[2] Jeff D. Opdyke and Christopher Oster, “Hit With Big Losses, Insurers Put Squeeze on Homeowner Policies,” *Wall Street Journal*, May 14, 2002.

[3] Insurance is regulated by the states, a topic that will be covered in more detail in Chapter 7 "Insurance Operations".