Social Insurance: The New Function of Government

In the preamble to the United States Constitution, the framers wrote that they were uniting the states in order to "establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity." For most of the country's history, one of those goals, "common defense," was the federal government's clear spending priority. In 1953, for example, 69 cents of each dollar of federal government spending went to fund national defense (Figure 12-1). Another 4 cents went to pay for Social Security, a 17-year-old program that provided only 18% of the income of the typical elderly household. Only 0.4 cents out of each dollar of federal government spending was devoted to providing health care to U.S. citizens.

Since then, the government's spending priorities shifted dramatically, away from "common defense" and toward promoting "the general welfare." By 2003, only 19 cents of each dollar of federal government spending went to fund national defense (second panel of Figure 12-1 on page 302). Twenty-two cents were paid for Social Security, which now represents 64% of the income of the typical elderly household. Another twenty-two cents were devoted to health care spending, primarily on two programs that did not exist in 1953: the Medicare program, which provides universal health insurance coverage to the elderly, and the Medicaid program, which provides free health insurance to many poor and disabled people. The dramatic shift in spending led economist Paul Krugman to observe that "loosely speaking, the post-cold-war federal government is a big pension fund that also happens to have an army."

This radical change in the nature and scope of government spending is one of the most fundamental changes in public policy in the United States over the past fifty years. The programs that have grown are labeled collectively as **social insurance programs**, government interventions to provide insurance

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against adverse events. In this chapter, we discuss social insurance programs in the United States in general terms. The following chapters focus on specific social insurance programs, such as:

- **Social Security**, which provides insurance against earnings loss due to death or retirement
- **Unemployment Insurance**, which provides insurance against job loss
- **Disability Insurance**, which provides insurance against career-ending disability
- **Workers’ Compensation**, which provides insurance against on-the-job accidents
- **Medicare**, which provides insurance against medical expenditures in old age

Social insurance programs have several common features. Workers participate by “buying” insurance through payroll taxes or mandatory contributions by themselves or their employers. These contributions make them eligible to receive benefits if some measurable event occurs, such as disability or on-the-job injury. Program eligibility is conditioned only on making contributions and on the occurrence of the adverse event. Eligibility is typically not **means-tested**; that is, eligibility does not depend on one’s current means, the level of one’s current income or assets.

Throughout the next several chapters, we will discuss particular social insurance programs, but before we get into the details of these programs, we need to understand the general economics of insurance markets. This chapter begins by explaining the nature of insurance and why it is a product that is
valued by consumers. We then discuss the potential failures in the private insurance market that might warrant government intervention. Foremost among these is the problem of adverse selection: the fact that the insured individual knows more about her risk level than does the insurer might cause insurance markets to fail. As we have discussed throughout this book, market failures potentially warrant government intervention.

The value of government intervention is mitigated, however, by the availability to individuals of self-insurance: to the extent that individuals can insure themselves against risks (for example, by savings or borrowing), then government intervention may not have large benefits and may serve only to crowd out that self-insurance. Moreover, social (or any type of) insurance carries with it the important problem of moral hazard: when you insure individuals against adverse events, you can encourage adverse behavior. If individuals are insured against on-the-job accidents, they might be somewhat less careful on the job; if individuals are insured against long unemployment spells, they might not work very hard to find new jobs; if individuals are insured for their medical costs, they might overuse their doctors.

Moral hazard problems will occur naturally whenever individuals are insured against adverse events. Thus, in this chapter we lay out the central trade-off with social insurance programs: governments can improve efficiency by intervening when insurance markets fail (due, for example, to adverse selection) and individuals are not self-insured against such risks, but those interventions themselves have offsetting efficiency costs (moral hazard) that undercut their goals.

### 12.1

What Is Insurance and Why Do Individuals Value It?

Any discussion of government insurance provision must start with an understanding of what insurance is and why it is so valuable to consumers.

#### What Is Insurance?

Insurance is provided for a wide variety of different circumstances, but it has a common structure. Individuals, or those acting on their behalf (their employers or their parents, for example) pay money to an insurer, which can be a private firm or the government. These payments are called insurance premiums. The insurer, in return, promises to make some payment to the insured party, or to others providing services to the insured party (such as physicians or auto repair shops). These payments are conditioned on a particular event or series of events (for example, an accident or a doctor's visit).

This broad definition covers the wide variety of private insurance products that exist in the United States. A sampling includes:

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- **Health Insurance**: Individuals and employers pay $500 billion of premiums each year to insure against health problems and the medical bills associated with them.
- **Auto Insurance**: Drivers pay $150 billion in premiums each year to insure against the cost and physical damage of auto accidents and theft.
- **Life Insurance**: Individuals and employers pay $140 billion in premiums each year to provide income to the heirs of those who die.
- **Casualty and Property Insurance**: Individuals and businesses pay $420 billion in premiums each year to insure their homes and other properties and possessions against fire, natural disasters, and theft.

### Why Do Individuals Value Insurance?
Insurance is valuable to individuals because of the principle of *diminishing marginal utility* discussed in Chapter 2. Recall that we typically assume that the marginal utility derived from consumption falls as the level of consumption rises: the first pizza means a lot more to you than the fifth. This intuitive assumption means that, if given the choice between (a) two years of average consumption and (b) one year of excessive consumption and one year of starvation, individuals would prefer the former. Individuals prefer two years of average consumption because the excessive consumption doesn’t raise their utility as much as the starvation lowers it.

For example, given the utility functions we typically use in economics, having consumption of $30,000 in both year one and year two delivers a higher utility level than having consumption of $50,000 in year one and $10,000 in year two. The gain in utility from raising consumption from $30,000 to $50,000 in year one is much smaller than the loss in utility from lowering consumption from $30,000 to $10,000 in year two. Thus, individuals desire **consumption smoothing**: they want to translate consumption from periods when it is high (so that it has a low marginal utility) to periods when it is low (so that it has a high marginal utility).

When outcomes are uncertain, individuals wish to smooth their consumption over possible outcomes, or **states of the world**, just as they desire to smooth their consumption over time. And, just as utility is maximized by having the same consumption in year one and year two in the previous example, utility is maximized by having the same consumption regardless of the outcome of some uncertain event.

Imagine that, over the next year, there is some chance that you will get hit by a car, and as a result you will have high medical expenses. There are two possibilities, or states of the world, for the next year: you get hit by a car or you don’t get hit by a car. Your goal is to make a choice today that determines your consumption tomorrow in each of these states of the world, so that your utility across the two states of the world (accident, no accident) is maximized.

Individuals choose across consumption in states of the world by using some of their income today to buy insurance against an adverse outcome tomorrow. By buying insurance, individuals commit to make a payment regardless of the
state of the world, in return for getting a benefit if the uncertain outcome is negative (an accident). The larger the payment to the insurer (the insurance premium), the larger the benefit in the negative outcome case (the insurance payout). Thus, by varying the amount of insurance they buy, individuals can shift their consumption from one state of the world to another. For example, by buying a lot of insurance, an individual shifts consumption from the positive outcome state of the world (when he only pays premiums) to the negative outcome state of the world (when he also gets benefits).

The fundamental result of basic insurance theory is that individuals will demand full insurance in order to fully smooth their consumption across states of the world. That is, in a perfectly functioning insurance market, individuals will desire to buy insurance so that they have the same level of consumption regardless of whether the adverse event (such as getting hit by a car) happens or not. Given diminishing marginal utility, this course of action gives individuals a higher level of utility than does allowing the accident to lower their consumption. The intuition is the same as the example over time at the start of this section: it is better to have constant consumption in all states of the world than to have consumption that is high in one state and low in another.

Formalizing This Intuition: Expected Utility Model

To better understand this difficult intuitive point, it is useful to turn to the standard mechanism that economists use for modeling choices under uncertainty: the expected utility model. This model is similar to the consumer choice model we introduced in Chapter 2, but it allows individuals to maximize utility across states of the world rather than across bundles of goods. In particular, suppose that there is an uncertain outcome, with some probability \( p \) of an adverse event. Then expected utility is written as:

\[
EU = (1 - p) \times U(\text{consumption with no adverse event}) + \\
p \times U(\text{consumption with adverse event})
\]

We can use this model to examine an individual's decision over how much insurance coverage to buy. For example, suppose there is a 1% chance (\( p = 0.01 \)) that Sam will get hit by a car next year and that his injuries will result in $30,000 in medical expenses. Sam has a choice of insuring some, none, or all of these potential medical expenses, but this will cost him \( m \) cents in insurance premiums per dollar of expenditures covered. Thus, if Sam buys an insurance policy that pays \( b \) if he is hit, his premium is \( mb \) (for example, if he fully insures the risk, then he pays \( m \times 30,000 \)). If Sam buys insurance, in the state of the world where he doesn't get hit by the car he will be \( mb \) poorer than if he doesn't buy the insurance. In the rare state of the world where he does get hit by the car he will be \( b - mb \) richer than if he hadn't bought the insurance (since he paid the \( mb \) premium, and the insurance covered \( b \) of expenses). Thus, purchasing insurance is the way Sam can effectively translate consumption from periods when consumption is high, and therefore has low marginal utility (don't get hit), to periods when consumption is low, and therefore has high marginal utility (do get hit).
Sam's interest in translating consumption from the no-accident state to the accident state will depend on the price that is charged for insurance. A starting point is to assume that insurance companies charge an actuarially fair premium; that is, they charge a price equal to the insurer's expected payout. This assumption implies that insurers have no administrative costs and make no profits; they simply recycle their premium payments into insurance claims. If, for example, there is a 1% chance that the insurer must pay out $30,000, then its expected payout is $0.01 \times 30,000 = $300. So the premium that the insurer charges will be $300. At that premium, given the 1% chance of an accident, the insurer breaks even, collecting $300 from each person and paying out $30,000 to 1 in 100 people ($300 each on average). More generally, for any amount of coverage $b$ and an odds of payout of $p$ the insurance companies will charge premiums equal to $p \times b$.

**Full Insurance Is Optimal** The central result of expected utility theory is that with actuarially fair pricing, individuals will want to fully insure themselves to equalize consumption in all states of the world. This point is illustrated in Table 12-1. Suppose that Sam's income, which he fully consumes, is $30,000 per year. That first row shows the case where Sam doesn't buy any insurance to pay his medical bills if he is in a car accident. There is a 99% chance that Sam will have consumption of $30,000 next period, and a 1% chance that he will have consumption of zero, since he will have to pay $30,000 in medical bills if he has an accident. Suppose also that his utility function is of the form $U = \sqrt{C}$, where $C$ denotes his consumption, which is equal to his income. (There are no savings.) With no insurance, Sam's expected utility is therefore

$$(0.99 \times \sqrt{30,000}) + (0.01 \times \sqrt{0}) = (0.99 \times 173.2) + (0.01 \times 0) = 171.5.$$

Suppose instead that Sam buys insurance that pays all his medical bills if he is hit by a car. This insurance costs Sam $300, which he pays regardless of

<table>
<thead>
<tr>
<th>Table 12-1</th>
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**The Expected Utility Model**

<table>
<thead>
<tr>
<th>If Sam...</th>
<th>And Sam is...</th>
<th>Consumption (C)</th>
<th>Utility $\sqrt{C}$</th>
<th>Expected Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doesn't buy insurance</td>
<td>Not hit by a car (p = 99%)</td>
<td>$30,000</td>
<td>173.2</td>
<td>0.99 $\times$ 173.2 + 0.01 $\times$ 0 = 171.5</td>
</tr>
<tr>
<td></td>
<td>Hit by a car (p = 1%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Buy full insurance (for $300)</td>
<td>Not hit by a car (p = 99%)</td>
<td>$29,700</td>
<td>172.3</td>
<td>0.99 $\times$ 172.3 + 0.01 $\times$ 172.3 = 172.3</td>
</tr>
<tr>
<td></td>
<td>Hit by a car (p = 1%)</td>
<td>$29,700</td>
<td>172.3</td>
<td>0.99 $\times$ 172.3 + 0.01 $\times$ 172.3 = 172.3</td>
</tr>
<tr>
<td>Buy partial insurance (for $150)</td>
<td>Not hit by a car (p = 99%)</td>
<td>$29,850</td>
<td>172.8</td>
<td>0.99 $\times$ 172.8 + 0.01 $\times$ 121.8 = 172.2</td>
</tr>
<tr>
<td></td>
<td>Hit by a car (p = 1%)</td>
<td>$14,850</td>
<td>121.8</td>
<td>0.99 $\times$ 172.8 + 0.01 $\times$ 121.8 = 172.2</td>
</tr>
</tbody>
</table>

Sam has a choice over how much insurance to buy against the risk of getting hit by a car. This table shows the consumption, and associated utility, for the states of the world where Sam is and is not hit by a car. Expected utility, the weighted average of utility in the two states of the world (weighted by the odds of each state of the world), is higher with the purchase of insurance.
whether he gets hit. If he is hit, however, he doesn’t have to spend his $30,000 of income on medical bills. With insurance, Sam’s expected utility becomes

\[
(0.99 \times \sqrt{30,000 - 300}) + (0.01 \times \sqrt{30,000 - 0}) = (0.99 \times 172.3) + (0.01 \times 172.3) = 172.3.
\]

Sam’s utility is higher if he buys the insurance, even though he will almost certainly end up paying the premium for nothing. This is because Sam wants to use insurance to smooth his consumption across both states of the world, due to the principle of diminishing marginal utility. Moreover, Sam will prefer this full insurance for $30,000 to any other level of benefits. For example, suppose Sam were to choose only $15,000 of coverage, half of the costs if there is an accident. In that case, Sam would pay premiums only half as large, $15 per year. But his utility would fall to 172.2, below the level of utility he gets from purchasing full insurance.

Thus, even if insurance is expensive, so long as its price (premium) is actuarially fair, individuals will want to fully insure themselves against adverse events. This intuition is formalized mathematically in the appendix to this chapter. The key lesson here is that with actuarially fair premiums, the efficient market outcome in the insurance market is full insurance and thus full consumption smoothing.\(^4\)

**The Role of Risk Aversion** One important difference across individuals is the extent to which they are willing to bear risk, or their level of risk aversion. Individuals who are very risk averse are individuals with a very rapidly diminishing marginal utility of consumption; they are very afraid of consumption falling, and are happy to sacrifice some consumption in the good state to insure themselves from large reductions in consumption in the bad state.\(^5\) Individuals who are less risk averse are individuals with slowly diminishing marginal utility of consumption; they aren’t willing to sacrifice very much in the good state to insure themselves against the bad state. Individuals with any degree of risk aversion will want to buy insurance when it is priced actuarially fairly; so long as marginal utility is diminishing, consumption smoothing is valued. When insurance premiums are not actuarially fair, as in some cases we describe next, those who are very risk averse may be willing to buy insurance even if those who are not very risk averse are unwilling to buy, since the latter group is willing to sacrifice more in the good state to insure the bad state.

\(^4\)It is possible, of course, that when there is an adverse event your taste for consumption might change. For example, if you are disabled, you may need to spend less on consumption (other than medical expenditures, which are covered by health insurance), since you do not pay work expenses, don’t partake in as much entertainment, and so on. In this circumstance, you wouldn’t desire full consumption smoothing; maximizing utility would mean allowing your consumption to fall when disabled. This is called a state-dependent utility function. We ignore that case here and assume individuals have the same taste for consumption in all states (regardless of whether the adverse event occurs). As a result of this assumption, all an adverse event does is change the budget constraint, not the utility function.

\(^5\)More generally, the degree of risk aversion bears a more complicated relationship to the shape of the utility function, but the intuition that more rapidly diminishing marginal utility equates to more risk aversion is a fairly general (and helpful) one.
12.2

Why Have Social Insurance? Asymmetric Information and Adverse Selection

If the world functioned as described in section 12.1, there would be no need for government intervention in insurance markets: individuals would fully insure themselves in the private market at actuarially fair prices. Yet such government intervention is enormous and growing. In this section, we review the most common motivation suggested by economists for government intervention in insurance markets: asymmetric information between insured and insurer, which leads to the problem of adverse selection.

Asymmetric Information

Insurance markets may be marked by information asymmetry, the difference in information that is available to sellers and to purchasers in a market. Information asymmetry can arise in insurance markets when individuals know more about their underlying level of risk than do insurers. This asymmetry can cause the failure of competitive markets.

The intuition of the market failure caused by information asymmetry is best illustrated using the market for used cars, the example used by Nobel Prize–winning economist George Akerlof in 1970. Sellers of used cars know their vehicles’ problems, while potential buyers may not. Individuals selling a car may be doing so because they have a “lemon,” a car that has major, serious defects. Buyers of cars don’t know whether they are getting a lemon, and they can’t necessarily trust the information provided by sellers, since sellers will want to dump their lemons on unsuspecting buyers. Therefore, buyers might avoid the used car market altogether. As a result, overall demand in the used car market is low, and sellers of used cars on average receive less for their cars than they are worth. Even if you have a car in excellent condition, and even if you are willing to attest to that fact, buyers will not pay enough for it because they can’t be sure that you are being honest. You may be unwilling to sell your high-quality used car for a low price, so the used car sale may not be completed.

This outcome is a market failure because some trades that are valued by both parties may not be made due to the asymmetry of information. Buyers might be perfectly happy to pay a high price for a high-quality used car, and sellers might be perfectly happy to sell at that high price. The fact that buyers are wary of getting a lemon, however, stops that trade from happening.

In the used car market, the imperfection arises from the fact that sellers know more than buyers, making buyers wary of the market. In insurance markets, the information asymmetry is reversed: the purchasers of insurance may know more about their insurable risks than the seller (insurer) does. In this case, the insurer will be reluctant to sell insurance, since he will be wor-

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6 For the original paper, see Akerlof (1970).
ried that only those with the insured-against problems will demand insurance; the insurer will worry that only the sick demand health insurance, for example, or only those about to lose their job will demand unemployment insurance. As a result, insurers will charge higher than actuarially fair premiums, or they may not sell insurance at all if they are particularly suspicious about someone's risk status. The next sections use a health insurance market example to formalize this intuition.

Example with Full Information
Imagine that there are two groups, each with 100 persons. One group is careless and absentminded and doesn't pay attention when crossing the street. As a result, individuals in this group have a 5% chance of being hit by a car each year. The other group is careful and always looks both ways before crossing the street. Members of this group have only a 0.5% chance of being hit by a car each year. What effect would the existence of these two different types of pedestrians have on the insurance market? The effect depends on what we assume about the relative information available to the individuals and to the insurance company.

For example, suppose that the insurance company and the street crossers have full information about who is careful and who is not. In this case, the insurance company would charge different actuarially fair prices to the careless and careful groups. The people in the careless group would each pay 5¢ per dollar of insurance coverage, while those in the careful group would each pay only 0.5¢ per dollar of insurance coverage. At these actuarially fair prices, individuals in both groups would choose to be fully insured (as proved in Section 12.1), with the careless paying $30,000 \times 0.05 = $1500 per year in premiums and the careful paying $30,000 \times 0.005 = $150 per year in premiums. The insurance company would earn zero profit, and society would achieve the optimal outcome (each group is fully insured).

The first row of Table 12-2 illustrates the full information example, with separate prices for the two groups of consumers. At these premiums, the 100 careless people pay a total of $15,000 in premiums, and the 100 careful people pay a total of $150,000. Total premiums paid are $165,000. The insurer expects to have 0.5 accidents among the 100 careful consumers, for a payout of $15,000 (0.5 \times $30,000 cost per accident), and 5 accidents among the careful consumers, for a payout of $150,000 (5 \times $30,000). So the total expected insurance payout is $165,000, and the insurance company will break even.

Example with Asymmetric Information
Now suppose that the insurance company knows that there are 100 careless consumers and 100 careful consumers, but it doesn't know which category any given individual belongs in. In this case, the insurance company could do one of two things.

First, the insurance company could ask individuals if they are careful or careless, and then offer insurance at separate premiums, as in the second row of
If the insurer has full information about whether insurance purchasers are careful or careless (first row), then he will charge $1,500 to the careless and $150 to the careful, making a net profit of zero. If the insured know whether they are careless or careful, and the insurer does not, then the insurer may try setting separate premiums for the groups (second row) or one common premium for all individuals (third row). In either case, the insurer loses money due to adverse selection, so the insurer will not offer insurance, leading to market failure.

Table 12-2: the premium would be only $150 if you say you are careful when you cross the street, and $1,500 if you say you are careless. In this case, however, all consumers will say that they are careful so that they can buy insurance for $150 per year: why voluntarily pay ten times as much for insurance? From the consumers' perspective this is a fine outcome, because everyone is fully insured and paying a low premium. But what about the insurer? The company is collecting $30,000 in total premium payments (200 persons × $150 per person). It is, however, expecting to pay out 5 claims to the careless and 0.5 claims to the careful, for a total cost of 5.5 × 30,000, or $165,000. So the insurance company, in this example, loses $135,000 per year. Companies will clearly not offer any insurance under these conditions. Thus, the market will fail: individuals will not be able to obtain the optimal amount of insurance because the insurance will not be offered for sale. This outcome is summarized in the second row of Table 12-2.

Alternatively, the insurance company could admit that it has no idea who is careful and who is not, and then offer insurance at a pooled, or average, cost. That is, on average, the insurer knows that there are 100 careless and 100 careful consumers, so that on average in any year the insurer will pay out $165,000 in claims. If it charges each of those 200 persons $825 per year, then, in theory, the insurance company will break even.

Or will it? Consider the careful consumers, who are faced with the decision to buy insurance at a cost of $825 or to not buy insurance at all. Careful consumers would view this as a bad deal, given that they have only a 0.5% chance of being hit. So they would not buy insurance. Meanwhile, however, all of the careless
consumers view this as a great deal, and they would all buy insurance. The insurance company ends up collecting $82,500 in premium payments (from the 100 careless customers), but paying out $30,000 \times 5 = $150,000 in benefits to those careless customers. So the insurance company again loses money. Moreover, half the consumers (the careful ones), who would ideally choose to fully insure themselves against getting hit by a car, end up with no insurance. Once again, the market has failed to provide the optimal amount of insurance to both types of consumers. This outcome is shown in the third row of Table 12-2.

The Problem of Adverse Selection

The careful/careless pedestrian example in the previous section is an example of an asymmetric information problem that plagues insurance markets, the problem of adverse selection: the fact that insured individuals know more about their risk level than does the insurer might cause those most likely to have the adverse outcome to select insurance, leading insurers to lose money if they offer insurance. The general operation of the adverse selection problem is illustrated by our example. Only those for whom the insurance is a fair deal will buy that insurance. With one price that averages the high- and low-expense groups, only those in the high-expense group will find the insurance to be a fair deal. (For them it's actually better than a fair deal.) If only the high-expense (highest risk of adverse outcome) group buys (selects) the insurance, the insurance company loses money because it charges the average price but has to pay out the high expected expenses of careless individuals. If the insurance company knows that it will lose money when it offers insurance, then it won't offer that insurance. As a result, in this case no insurance will be available to consumers of any type.

Adverse selection can therefore lead to failure in the insurance market, and perhaps the eventual collapse of the market. This might occur because it may not be in the interest of any individual company to offer insurance at a single, pooled price, so that no companies offer the insurance. For example, in the 1980s, the California health insurer HealthAmerica Corporation was rejecting all applicants to its individual health insurance enrollment program who lived in San Francisco, on the belief that AIDS was too prevalent there. According to the San Francisco district attorney, HealthAmerica would pretend to review San Franciscans' applications, but would actually place these in a drawer for several weeks before sending them rejection letters. This is a market failure because, with full information, individuals from San Francisco were likely to buy insurance at the actuarily fair premium, even if that premium was higher due to the risk of AIDS.

Does Asymmetric Information Necessarily Lead to Market Failure?

Are insurance companies destined to fail whenever there is asymmetric information? Not necessarily. First of all, most individuals are fairly risk averse. Risk-averse individuals so value being insured against bad outcomes that they are willing to

adverse selection The fact that insured individuals know more about their risk level than does the insurer might cause those most likely to have the adverse outcome to select insurance, leading insurers to lose money if they offer insurance.
**risk premium** The amount that risk-averse individuals will pay for insurance above and beyond the actuarially fair price.

**pooling equilibrium** A market equilibrium in which all types buy full insurance even though it is not fairly priced to all individuals.

**separating equilibrium** A market equilibrium in which different types buy different kinds of insurance products designed to reveal their true types.

pay more than the actuarially fair premium to buy insurance: they are willing to pay a risk premium above and beyond the actuarially fair premium. In our example, it is possible that the careful individuals are so risk averse, and therefore so afraid of being uninsured, that they are willing to buy insurance even at the average price. That is, even if the actuarially fair price for the careful is $150, and the market is charging $825, if their risk premium is $675 ($825 – $150) or more, they will still buy insurance. This situation is technically called a pooling equilibrium, a market equilibrium in which all types buy full insurance even though it is not fairly priced to all individuals. The pooling equilibrium is an efficient outcome: both types are fully insured and the insurer is willing to provide insurance.

Even if there is no pooling equilibrium, the insurance company can address adverse selection by offering separate products at separate prices. Think about the source of the adverse selection problem in our example: careless individuals are pretending to be careful in order to get cheap insurance. The insurance company would like to get individuals to reveal their true types (careless or careful), but the company faces the type of preference revelation problem we saw with public goods. Even if individuals aren’t willing to voluntarily reveal their types, however, they might make choices that involuntarily reveal their types.

Suppose that the insurance company offered two polices: full coverage for the $30,000 of medical costs associated with accidents, at $1,500 (the actuarially fair price for the careless); and coverage of up to $10,000 of medical expenses, at a price of $50 (the actuarially fair price for that level of coverage for the careful). If these two products were offered, it is possible the careless would purchase the more expensive coverage and the careful would purchase the less expensive coverage. This outcome occurs because the careless don’t want to bear the risk of having only $10,000 of coverage, given their relatively high odds of having an accident; they would rather pay a high price to make sure they have full coverage. The careful can take that risk, however, because of their very low odds of having an accident. By offering different products at different prices, the insurance company has caused consumers to reveal their true types. This market equilibrium is called a separating equilibrium.

Sound far-fetched? Consider what happened in health insurance markets 25 years ago. At that time, insurance companies were offering very generous insurance to all consumers at one high price. As health insurance costs began to escalate, however, companies could no longer make profits with this strategy. In response to the higher costs they faced, the insurance companies began to offer two products: a traditional insurance plan, and a new product called the health maintenance organization (HMO). HMOs offered care that was much more tightly monitored, typically featuring much less access to medical specialists, for example. But HMOs also had a much lower premium. The result, as we will discuss at length in Chapter 15, was a major shift by largely healthy consumers to this new, relatively low-cost/low-benefit option: a classic separating equilibrium.

Unlike the pooling equilibrium, however, the separating equilibrium still represents a market failure. The careless are getting what they would get in a model of full information: full coverage at a high price, which they are willing to pay. The careful are not getting their first choice, however, which would be full coverage at a lower, actuarially fair price. To address this market failure,
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Inspectors have forced the careful to choose between full coverage at a very high price and partial coverage at a lower price. Since many of the careful will choose the partial coverage, this is not the optimal solution: the optimum is full coverage for both groups, at different prices that reflect each group's relative risks of injury. Thus, even with separate products, adverse selection can still impede markets from achieving the efficient outcome.

**APPLICATION**

**Adverse Selection and Health Insurance “Death Spirals”**

A particularly compelling example of the damage done by adverse selection in health insurance markets comes from a study of Harvard University by Cutler and Reber (1998). Harvard offered its employees a wide variety of health insurance plans, some much more generous than others (e.g., covering more expensive procedures). The prices charged to the university by the insurance companies for these plans were a function of how much each plan's enrollees made use of the medical care paid for by the plan. If a plan had many sick enrollees, for example, then its costs were higher, and the insurance companies would charge the university higher premiums. Such a pricing system is called **experience rating**: charging a price for insurance that is a function of realized outcomes. This is the “ex post” equivalent of actuarial adjustments: while actuarial adjustment charges a price based on expected experience, experience rating charges a price based on actual or realized experience.

Health insurance plan costs were shared by Harvard University and its employees. Traditionally, the university shielded its employees from the fact that some plans were more expensive than others by paying a larger share of the more generous, more expensive health insurance plans and leaving employees with similar costs whichever plan they chose. Thus, from the employees' perspective, there was relatively little penalty for choosing a more expensive, more generous insurance plan. In 1995, however, Harvard moved to a system in which the university paid the same amount for each plan, regardless of the plan’s cost, so that employees had to pay more for the more generous and expensive health plans.

Cutler and Reber found that this new system greatly increased the extent of adverse selection across Harvard health insurance plans. Before 1995, many healthy individuals would choose the generous and expensive plan because prices were so similar—there was a pooling equilibrium, with both sick and healthy choosing generous (full) insurance. When employees had to pay more for the generous plan, however, some healthy enrollees chose cheaper plans, and the less healthy employees continued to choose the more generous plans; that is, the insurance group moved to a separating equilibrium, with the healthy getting less—generous insurance at cheaper prices, and the less-healthy getting more generous insurance at high prices.

Because these less-healthy employees used much more medical care, however, the experience-rated premiums (which reflect the average medical utilization of enrollees) of the more generous plans increased substantially. Given Harvard's new system (the university picked up a flat amount of costs, regardless of the
total cost of the plan), the rising costs of these generous plans were borne completely by plan enrollees, which caused even more healthy employees to leave the generous plans for ones that were more affordable. This led to a spiral of higher premiums causing the healthy to give up the generous plan, leading to even higher costs for that plan (since the remaining enrollees were sicker on average), which led to even more of the healthy leaving the plan. This spiral continued until, by 1998, the most generous plan had gotten so expensive that it was no longer offered. Adverse selection had led to a "death spiral" for this plan.

This was clearly an inefficient outcome, because individuals who wanted very generous insurance could no longer buy it at any price. The insurance market had failed for Harvard employees; a product that was demanded at (or above) its cost of production was no longer available. This case study illustrates how adverse selection can produce market failure.

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**How Does the Government Address Adverse Selection?**

There are many potential government interventions that can address this problem of adverse selection. Suppose that, in the careful/careless pedestrian example, the government mandated that everyone buy full insurance at the average price of $825 per year. This plan would lead to the efficient outcome, with both types of pedestrians having full insurance. This would not be a very attractive plan to careful consumers, however, who could view themselves as essentially being taxed in order to support this market, by paying higher premiums than they should based on their risk. That is, at a premium of $825, many careful consumers would prefer to be uninsured rather than being mandated to buy full insurance, so the government is making them worse off.

Another option is public provision: the government could just provide full insurance to both types of consumers, so that all consumers have the optimal full insurance level. Alternatively, the government could offer everyone subsidies toward the private purchase of full insurance to try to induce (optimal) full coverage. These government interventions would have to be financed, however. If the interventions were financed by charging all consumers equally, then the situation would be the same as that with the mandate: careful consumers would be paying more than they would voluntarily choose to pay for the full insurance (now in the form of tax bills rather than insurance premiums). Thus, the government can address adverse selection, and improve market efficiency, in a number of ways, but they involve redistribution from the healthy to the sick, which may be quite unpopular.

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**12.3 Other Reasons for Government Intervention in Insurance Markets**

Adverse selection is the most common but far from the only reason offered for government intervention in insurance markets. Other rationales include the following.
Externalities

A classic case for government intervention in insurance markets is the negative externalities imposed on others through underinsurance. As discussed in Chapter 1, your lack of insurance can be a cause of illness for me, thereby exerting a negative physical externality. Alternatively, if you don’t have auto insurance, and you injure me in an auto crash, then I and my insurer bear the cost of my injury, a negative financial externality. Just as the government intervened to solve externalities in Chapters 5 and 6, it can do so in insurance markets as well by either subsidizing, providing, or mandating insurance coverage.

Administrative Costs

The administrative costs for Medicare, the government-run national insurance program for the elderly, are less than 2% of claims paid. Administrative costs for private insurance, on the other hand, average about 12% of claims paid. Why does this matter? Return to the case of perfect information, where the insurance company can appropriately price insurance for the careless and careful consumers. As we noted, the insurance company in this case would charge $150 to the careful consumer, $1,500 to the careless consumer, and at those prices all consumers would fully insure themselves against injury. If the insurance company has administrative expenses of 15% of premiums, however, they have to charge $172.50 to the careful consumer ($150 \times 1.15 = $172.50), and $1,725 to the careless consumer ($1,500 \times 1.15 = $1,725) in order to break even. At those higher (actuarially unfair) prices, some not-very-risk-averse consumers may decide against buying insurance. In this way, administrative inefficiencies can lead to market failure because not all people will be fully insured, as is optimal.

Redistribution

With full information, the optimal outcome is for the careless consumer to pay ten times as much for his insurance as the careful consumer. This outcome may not be very satisfactory to many societies from a distributional point of view. Governments may want to intervene in insurance markets, perhaps by taxing the low-risk individuals and using the revenues to subsidize the premiums paid by high-risk individuals, thereby achieving a more even distribution of insurance costs.

Interestingly, technologies that make private insurance markets work better are also the ones that worsen the redistribution problem. Genetic testing, for example, may ultimately allow insurers to remove many problems of asymmetric information via the testing of individuals to accurately predict their health costs. Such testing has the implication, however, that those who are genetically ill-fated will pay much higher prices for insurance than those who are genetically healthy. Will modern societies tolerate an insurance market that charges many times more for insurance to individuals who happen to have been born with the wrong genes?

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8 Woolhandler et al. (2003).
Paternalism

Paternalism is another major motivation for all social insurance programs. Governments may simply feel that individuals will not appropriately insure themselves against risks if the government does not force them to do so. This motivation for intervention has nothing to do with market failures. Instead, it has to do with the failure of individuals to maximize their own utility. Thus, governments may insist on providing social insurance for individuals’ own good, even if the individuals would choose not to do so themselves in a well-functioning private insurance market.

12.4

Social Insurance Versus Self-Insurance:
How Much Consumption Smoothing?

The arguments just presented suggest a number of reasons why private insurance markets may not make it possible for a risk-averse individual to satisfy his desire for consumption smoothing. Yet they do not suggest that consumption smoothing is completely unavailable, because individuals may have other private means to smooth consumption: their own savings, the labor supply of family members, borrowing from friends, and so on. The justification for social insurance depends on the extent to which social insurance is necessary, given consumers’ use of private forms of consumption smoothing. For ease of exposition, we will call these other forms of consumption smoothing self-insurance, although most of these forms are not actually insurance. If individuals have extensive self-insurance against adverse risk, the benefits of social insurance will be reduced.

Example: Unemployment Insurance

To better understand how self-insurance might work, let’s consider the case of unemployment insurance (UI), which provides income to workers who have lost their jobs. Individuals do not generally have a private form of unemployment insurance on which they can draw, but they do have other potential means to smooth their consumption (self-insurance) across unemployment spells:

- They can draw on their own savings.
- They can borrow, either in collateralized forms (such as borrowing against the equity they have in their homes) or in uncollateralized forms (on their credit card, for example).
- Other family members can increase their labor earnings.
- They can receive transfers from their extended family, friends, or local organizations, such as churches.

The importance of social insurance programs as a source of consumption smoothing depends on the availability of self-insurance. If there is no self-
insurance, then social insurance will provide an important source of consumption smoothing. Once we allow for private forms of consumption smoothing through self-insurance, we have a problem similar to that raised in Chapter 7 in the context of public goods: public intervention (social insurance) can crowd out private provision (self-insurance). If social insurance simply crowds out self-insurance, then there may be no net consumption-smoothing gain to social insurance. Given that there is an efficiency cost to raising government revenues (see Chapter 20), government insurance market interventions that do not provide consumption-smoothing gains (that simply crowd out private sources of support) are harder to justify.

Illustration We can illustrate this point using the unemployment example. UI benefits replace some share of the worker's lost wage income; that share is called the UI replacement rate. The benefits of UI to a worker are determined by the extent to which raising the replacement rate improves the worker's ability to smooth her consumption over a period of unemployment. The effect of the replacement rate on consumption smoothing is determined, in turn, by the availability of other forms of private consumption smoothing (self-insurance) during unemployment spells.

Figure 12-2 on page 318 shows some examples of the possible relationship between the UI replacement rate (the horizontal axis) and the percentage drop in consumption when Ava becomes unemployed (the vertical axis). A larger fall in consumption means less consumption smoothing. Ideally, Ava does not want her consumption to fall at all when she becomes unemployed—she wants her consumption to be the same in states of employment and unemployment. Ava's optimum, then, is a 0% reduction in consumption at unemployment; this outcome represents full consumption smoothing.

Panels (a) to (c) show how the drop in consumption at unemployment depends on the UI replacement rate. Each of these three top panels represents different levels of self-insurance. That is, within each figure we consider the relationship between UI and consumption smoothing, and across figures we consider how that relationship changes with the level of self-insurance.

Panel (a) shows the scenario in which Ava has no self-insurance—for example, no savings, credit cards, or friends who can loan money to her. With no UI (a zero replacement rate), consumption falls by 100% (point A) when Ava becomes unemployed because her earnings are gone and there is no self-insurance or UI to replace them. Thus, her consumption drops to zero. In this example of no self-insurance, each percent of wages replaced by UI benefits reduces the fall in consumption by 1%, as shown by the upward-sloping relationship between the replacement rate and the consumption drop (which has a slope of one). When UI replaces the full previous income (a UI replacement rate of 100%), consumption doesn't fall at all. (There is a 0% change in consumption at point B.) In this case, UI plays a full consumption-smoothing role: there is no crowding-out of self-insurance (because there is no self-insurance); each dollar of UI goes directly to reducing the decline in consumption from unemployment.

Skipping to panel (c), we see the other extreme, full self-insurance, as would be the case if a private unemployment insurance product existed and were...
FIGURE 12-2

(a) No self-insurance; full consumption smoothing by UI

(b) Partial self-insurance; partial consumption smoothing and partial crowd out by UI

(c) Full self-insurance; full crowding out by UI

(d) UI consumption smoothing and crowding-out effects depend on the availability of self-insurance

Consumption-Smoothing Benefits of UI • Panels (a) to (c) show the relationship between the UI replacement rate (horizontal axis) and the drop in consumption upon unemployment (vertical axis) for three situations: no self-insurance (panel (a)), partial self-insurance (panel (b)), and full self-insurance (panel (c)). If there is no self-insurance (panel (a)), then each dollar of UI benefits leads to one dollar more of consumption smoothing; with partial self-insurance (panel (b)), each dollar of UI benefits leads to 50 cents more of consumption smoothing; and with full self-insurance (panel (c)), each dollar of UI benefits simply crowds out a dollar of self-insurance and has no effect on consumption smoothing. Panel (d) shows the extent to which UI smooths consumption and crowds out self-insurance as a function of the amount of self-insurance available.

sold at an actuarially fair price, or if Ava had rich parents who would happily lend her as much money as she needed. We know from the insurance theory explained earlier in the chapter that individuals, in the absence of government intervention, will choose full insurance if it is available. This implies that Ava will choose to fully smooth her consumption when she becomes unem-
ployed, either from private sources if there is no public insurance, or from public insurance if it is available.

In this case, even with a zero replacement rate (no UI), Ava's consumption does not fall at all when she becomes unemployed (point D); self-insurance allows her to fully maintain her desired consumption. As the replacement rate increases, there is no change in consumption smoothing, since it is already at its desired level. (At any replacement rate, the change in consumption is always zero.) Rather, the only effect of increases in UI benefits is a reduction in the extent to which Ava purchases private insurance or borrows from her parents. In this situation, UI plays no consumption-smoothing role, and plays only a crowding-out role: each dollar of UI simply means that there is one less dollar of self-insurance.

This example, while hypothetical, is not implausible. My wife's aunt worked for a large Midwestern manufacturing company that closed its operations every summer, but essentially promised to hire its workers back the following fall. During the year she saved for this event out of her earnings, and was pleased to spend her summers as a state champion softball pitcher! As UI generosity increased over time in her state, she simply saved less, maintaining her desired level of consumption smoothing. UI did nothing to help her smooth her consumption; it only reduced (crowded out) the amount of saving she needed to do during the year to ensure constant consumption throughout the year.

Finally, panel (b) presents the middle-ground case where partial, but not complete, self-insurance is available. Suppose, for example, that in the absence of UI (replacement rate of 0%), Ava has sufficient self-insurance so that her consumption falls by only 50% (point C). As UI's replacement rate becomes more generous, Ava has less need for her self-insurance, so she reduces that self-insurance by 50 cents for each dollar provided by UI; that is, if UI replaced all lost earnings (UI replacement rate of 100%), Ava would not use self-insurance at all (at point B). Relative to the outcome shown in panel (a), UI plays a partial consumption-smoothing role: it is both smoothing consumption and crowding out the use of self-insurance. Each dollar of UI leads to 50 cents more consumption smoothing and 50 cents crowd-out of individual savings.

**Summary** The bottom panel (d) of Figure 12-2 summarizes the lessons from the first three panels. The first line of this panel shows the availability of self-insurance, running from 0 (no self-insurance) on the left to 100% (full self-insurance) on the right. The next two lines show how the effect of UI on both consumption smoothing and crowd-out depends on the extent of self-insurance. If there is no self-insurance, then UI plays a 100% consumption-smoothing role: each dollar of UI is translated directly into a dollar of consumption. Likewise, with no self-insurance, UI does no crowding out, since there is nothing to be crowded out by the government program. As self-insurance grows, the amount of consumption smoothing provided by UI falls, because individuals have self-insurance they can rely on instead. Likewise, as self-insurance grows, the amount of crowding out done by UI increases, since the government program is increasingly simply replacing private sources of consumption smoothing. When there is full self-insurance, UI plays a 100% crowding-out role: each dollar of UI crowds out a dollar of self-insurance. In this case, UI has no consumption-smoothing effect.
Thus, the availability of self-insurance determines the value of social insurance to individuals suffering adverse events. If self-insurance is very incomplete, then social insurance is as valuable, providing extensive consumption smoothing. If self-insurance is nearly complete, then social insurance is not very valuable, as it simply serves to crowd-out that self-insurance.

Social insurance may still be of value, however, even if there is crowd-out, for the reason noted earlier: social insurance may be more efficient than self-insurance. This discussion assumes that self-insurance is efficient, such as buying private insurance, or borrowing from very rich parents. In practice, self-insurance may be inefficient relative to social insurance. My wife’s going to work may be a very inefficient means for me to insure against the consumption loss from unemployment, since we have to arrange child care, buy new clothes for her job, etc. Likewise, my saving to smooth consumption over adverse events is inefficient because I will likely save too much (if the adverse event doesn’t occur) or too little (if it does). Insurance, by pooling risk across many individuals, allows me to smooth consumption efficiently. Thus, even if social insurance is largely crowding out self-insurance, it may be still of some value, since it is a more efficient means of insuring against adverse events. The main point of this section is that social insurance will be less efficient if there is self-insurance than if there is not.

Lessons for Consumption-Smoothing Role of Social Insurance

While the example we used was specific to unemployment insurance, the lessons are general for all of the social insurance programs we look at in the next few chapters. For example, as we discuss in Chapter 13, an important source of self-insurance for retirement is one’s own savings. To what extent does the Social Security program, which provides retirement income, simply crowd out savings that individuals would do on their own for retirement, and to what extent does it provide consumption smoothing across the years between working and retirement? We deal with these specific issues in the next chapter.

In general, the importance of social insurance for consumption smoothing will depend on two factors:

- Predictability of the event: social insurance plays a smaller consumption-smoothing role for predictable events, because individuals can prepare themselves for predictable events through other channels (such as savings). Thus, the benefits of social insurance are highest when events are not predictable.

- Cost of the event: savings or borrowing are possible channels of consumption smoothing for a few weeks of unemployment, but may be much less feasible for years out of work due to a long-term or permanent disability. Thus, the benefits of social insurance are highest when events are most costly.

Understanding the extent of consumption smoothing provided by any social insurance program is important for evaluating the central trade-off mentioned in the introduction to this chapter. The benefits of social insurance are measured by the amount of consumption-smoothing provided by the program. Next, we turn to measuring the costs.
12.5

The Problem with Insurance: Moral Hazard

When we discussed externalities in Chapter 5, the analysis was straightforward: there was a failure in the market and, in principle, the government could achieve efficiency by forcing the relevant actors to internalize the external costs (or benefits) they were imposing. When governments intervene in insurance markets, however, the analysis is one step more complicated because of another asymmetric information problem called moral hazard, the adverse behavior that is encouraged by insuring against an adverse event. Moral hazard is a central feature of insurance markets: if families buy fire insurance for their homes, they may be less likely to keep fire extinguishers handy; if individuals have health insurance, they may be less likely to take precautions against getting ill; if workers have unemployment insurance, they may be less likely to search hard for a new job. The existence of moral hazard means that it may not be optimal for the government to provide full insurance that is demanded by risk-averse consumers.

Consider the example of workers' compensation insurance, a $50 billion program that insures workers against injury on the job (discussed in detail in Chapter 14). Clearly, getting injured on the job is a bad thing, and individuals would like to insure against it. There is a big problem with workers' compensation insurance, however: it is difficult to determine whether individuals are really injured, and whether that injury occurred on the job. Many injuries are impossible to precisely diagnose, particularly chronic problems like back pain or mental impairment, and it is hard to tell whether injuries, particularly chronic injuries, have occurred on the job or during a weekend softball game.

The difficulty of assessing injuries is a problem because it can be quite attractive to qualify for the workers' compensation program. Workers' compensation benefits include payment of the medical costs of treating an injury, and cash compensation for lost wages, which can amount to two-thirds or more of a worker's pre-injury wages. Recall that in standard economic models we assume that leisure is a normal good and that, all else equal, individuals would rather be home than at work. If you can claim that you have an on-the-job injury, even if you really don't, then you can stay home from work and continue to take home two-thirds of what you earned when working. Thus, the existence of this program may actually encourage individuals to fake injury.

By trying to insure against an adverse event (true injury), the insurer may encourage individuals to pretend that the adverse event has happened to them when it actually hasn't. This scenario is a primary example of moral hazard. Imagine how bad this problem would be if, as in the Social Security systems of some European countries we study in the next chapter, you actually receive as much (or more) money from staying home than you do from working!
The Problems with Assessing Workers’ Compensation Injuries

Excellent examples of the difficulties in assessing whether a worker is truly injured come from stories of workers who are collecting workers’ compensation when they are clearly not injured:

- 35-year old Ricci DeGaetano had been a guard in a Massachusetts prison until he slipped and fell on the job in 1997. He returned to work the next year, but soon after claimed he was injured while fighting with an inmate. He collected $82,500 in workers’ compensation claims for the next three years. The problem? DeGaetano, a certified black belt, was operating a karate school the entire time, teaching there almost daily. Pictures of him with his students from this period were even available on the Internet. He was fired by the Department of Correction and charged with two counts of fraud and larceny.

- New Orleans police officer David Dotson started getting workers’ compensation after an April 2001 claim that he received a shoulder injury while on patrol. His story began to unravel, however, when his supervisors saw him give an emotional television interview upon his return from the 9/11 World Trade Center attacks. They wondered how Dotson’s shoulder injury allowed him to work with a bucket brigade at Ground Zero. Further investigation found that Dotson spent his nights moonlighting as a supermarket security guard. He was eventually convicted of collecting $16,532 in fraudulent claims and sentenced to 21 months in prison.

- Los Angeles police detective Rocky Sherwood managed a Little League baseball team for 7-to-8-year-olds so successfully that they won the California World Series in June 2001. Two on-the-job traffic accidents in 1998 had given Sherwood what he described as constant pain in his spine and right knee, rendering him unable to work and thus eligible for workers’ compensation. Unfortunately for him, the LAPD suspected deception and made a videotape of him coaching his Little League team. According to the investigating officer, the tape showed Sherwood engaged in “strenuous activity,” including hitting, pitching, fielding, and demonstrating for the kids how to slide into a base. He was charged with felony workers’ compensation fraud.

Moral hazard is an inevitable cost of insurance, private or social. Because of optimizing behavior by individuals and firms, we increase the incidence of adverse events simply by insuring against them. The existence of moral hazard problems therefore creates the central trade-off of social insurance: by fixing failures in private insurance markets, government can worsen the underlying problem that is being insured against.

What Determines Moral Hazard?
The extent of moral hazard varies with two factors. The first factor is how easy it is to observe whether the adverse event has happened. If an employer truly

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knows whether a worker has been injured on the job, then the moral hazard problem with workers' compensation is greatly diminished. The second factor is how easy it is to change behavior in order to establish the adverse event. When it is neither easy nor attractive to change behavior in order to qualify for insurance, such as the case for insurance against death, moral hazard is unlikely to be a problem. When the insurance is for an adverse event that is easily and costlessly attained (or faked), however, moral hazard may be a larger problem.

Moral Hazard Is Multidimensional
Moral hazard can arise along many dimensions. In examining the effects of social insurance, four types of moral hazard play a particularly important role:

- **Reduced precaution against entering the adverse state.** Examples: because you have medical insurance that covers illness, you reduce preventive activities to protect your health, or because you have workers' compensation insurance, you aren't as careful at work.

- **Increased odds of entering the adverse state.** Examples: because you have workers' compensation, you are more likely to claim that you were injured on the job, or because you have unemployment insurance, you are more likely to become unemployed.

- **Increased expenditures when in the adverse state.** Examples: because you have medical insurance, you use more medical care than you otherwise would, or because you have workers' compensation, you don't work hard to rehabilitate your injury.

- **Supplier responses to insurance against the adverse state.** Examples: because you have medical insurance, physicians provide too much care to you, or because you have workers' compensation, firms aren't as careful about protecting you against workplace accidents.

In the next few chapters, we often will not draw a strong distinction between these different types of moral hazard, but it is important to recognize the alternative dimensions along which it can exist.

The Consequences of Moral Hazard
Why is moral hazard a problem? Even if social insurance encourages individuals to, for example, spend more time at home pretending to be injured than being at work, why is that an important cost of social insurance?

Moral hazard is costly for two reasons. First, the adverse behavior encouraged by insurance lowers social efficiency, for example, because it reduces the provisions of socially efficient labor supply. In a perfectly competitive labor market, a workers' wage equals his marginal product, the value of the goods he is producing for society. With no workers' compensation, workers will supply labor until their wage (their marginal product) equals their marginal valuation of the next hour of leisure time (such as their value of watching TV). If the wage is above the value of leisure time, then it is socially efficient for individuals to work, since the benefit of work (the marginal product of that labor) exceeds the cost (the value of the foregone TV).
When workers’ compensation is introduced, the value of leisure rises: each hour of leisure not only provides one hour of TV, but also a workers’ compensation payment. Thus, individuals will supply labor only until the wage equals their marginal value of leisure plus the workers’ compensation income they can receive by pretending to be injured. This will lead individuals to work less than is socially efficient: even if the wage (and therefore the marginal product) is above the value of watching TV, individuals may still choose not to work because of the promise of workers’ compensation benefits.

This moral hazard cost arises in any insurance context, such as health insurance. In that case, individuals should use medical care only until the point where the marginal benefit to them (in terms of improved health) equals the marginal cost of the service. If individuals are completely insured, however, and don’t pay any costs for their medical care, then they will use that medical care until the marginal benefit to them is zero (their marginal cost, which is zero with full insurance). This will lead to an inefficiently high level of medical care if the true marginal cost is greater than zero.

The second cost for social insurance due to moral hazard is revenue raising. Whenever the government increases its expenditures, it must raise taxes to compensate (at least in the long run). As we discuss at length in the tax chapters, there are efficiency costs associated with government taxation through the negative impacts it has on work effort, savings, and other behaviors. Thus, when social insurance encourages adverse events, which raise the cost of the social insurance program, it increases taxes and lowers social efficiency further.

\section*{12.6 Putting It All Together: Optimal Social Insurance}

There are four basic lessons from the discussion in this chapter. \textit{First}, individuals value insurance because they would ideally like to smooth their consumption across states of the world. That is, they would like to have the same consumption whether or not an adverse event such as unemployment or injury befalls them. \textit{Second}, there are a number of reasons why the market may fail to provide such insurance, most notably adverse selection. \textit{Third}, even if the market fails to provide such insurance, the justification for social insurance depends on whether other private consumption-smoothing mechanisms are available. The key question is the extent to which the social insurance provides new consumption smoothing versus just crowding out existing self-insurance. \textit{Fourth}, expanding insurance coverage has a moral hazard cost in terms of encouraging adverse behavior.

These lessons have a clear policy implication: \textit{optimal social insurance systems should partially, but not completely, insure individuals against adverse events}. As with all government policies in this book, the appropriate role for the government in providing social insurance reflects the tradeoff between the benefits and costs of such intervention. The \textit{benefits of social insurance are the amounts of consumption smoothing provided by social insurance programs}. If individuals become injured on the job and the government smooths their consumption by insuring that injury, social effi-

12.7 Conclusion

Asymmetric information in insurance markets has two important implications. First, it can cause adverse selection, which makes it difficult for insurance markets to provide actuarially fair insurance to those who would demand it if it were available to them. Second, it can cause moral hazard, whereby the provision of insurance encourages adverse behavior in those purchasing the insurance. The ironic feature of asymmetric information is therefore that it simultaneously motivates and undercuts the rationale for government intervention through social insurance.

In the remainder of this section of the book, we will investigate the role of the government in insuring several major life events: unemployment, on-the-job injury, career-ending disability, retirement, and illness. In each case, we see that there is a trade-off between the benefits of completing imperfect insurance markets and the costs of encouraging adverse behavior. The extent of this trade-off will vary with the nature of the adverse events being insured. The purpose of these chapters will be to assess how the extensive literature on these social programs can inform policy makers of appropriate reforms to the programs.

**HIGHLIGHTS**

- The largest and fastest-growing function of the government is the provision of social insurance against adverse events such as retirement, unemployment, injury, or illness. Social insurance programs are mandatory, contribution-based systems that tie the payout of benefits to the occurrence of a measurable event.

- Insurance is demanded because it allows individuals to smooth their consumption across various states of the world; with actuarially fair premiums, the optimal outcome is for individuals to fully insure themselves against adverse events.
The major motivation for government-provided social insurance is the failure in private insurance markets caused by adverse selection. Adverse selection causes insurance markets to fail because imperfect information leads insurers to be unable to offer full insurance to different types of consumers.

Other motivations for social insurance include externalities, administrative inefficiencies in the private insurance market, the desire for redistribution, and paternalism.

**QUESTIONS AND PROBLEMS**

1. Why might one person buy insurance while another person with identical preferences and income would not?

2. What is consumption smoothing? How does insurance help people smooth consumption?

3. Suppose that you have a job paying $50,000 per year. With a 5% probability, next year your wage will be reduced to $20,000 for the year.
   a. What is your expected income next year?
   b. Suppose that you could insure yourself against the risk of reduced consumption next year. What would the actuarially fair insurance premium be?

4. In the past, some lenders refused to loan money to people who lived in certain neighborhoods, regardless of their other attributes. Why might lenders do this? What market failure is at work here?

5. The problem of adverse selection in insurance markets means that it is generally a bad deal for companies to offer insurance at the same price for all potential customers. Why then do we observe some insurance companies (such as those selling “trip insurance” that refunds money to people who purchase trips that they are unable to take) do exactly this?

6. Why might government provision of insurance lead to a larger number of insurance claims than private provision of insurance would?

7. Why does the government mandate individuals to purchase their own insurance in some cases—such as automobile liability insurance—but directly provide insurance to people in other situations—such as health insurance?

8. Your professor is paid only nine months out of the year (really!?). Suppose that she were fired each spring and rehired each fall, and thereby eligible for unemployment insurance benefits. (After all, all those students going away for the summer creates economic hardship for your university!) Do you think that would affect her consumption smoothing over the year, relative to what she does right now, when she is not fired annually? Explain your answer.

9. Currently, in order to receive workers’ compensation, a claimant’s injury claims must be verified by a physician of the claimant’s choosing. Suppose that the workers’ compensation policy changed so that only government-assigned physicians could verify injury claims. What is likely to happen to the rate of reported on-the-job injury? Explain.

10. Describe the dimensions along which moral hazard can exist. Can you think of ways in which the government can reduce the prevalence of moral hazard along each dimension?

**ADVANCED QUESTIONS**

11. Suppose you think that poorly educated families are less able to smooth consumption in the absence of unemployment insurance than are well-educated families. How would you empirically test this supposition? What types of data would you want to use?
12. There are two types of drivers on the road today. Speed Racers have a 5% chance of causing an accident per year, while Low Riders have a 1% chance of causing an accident per year. There are the same number of Speed Racers as there are Low Riders. The cost of an accident is $12,000.

a. Suppose an insurance company knows with certainty each driver’s type. What premium would the insurance company charge each type of driver?

b. Now suppose that there is asymmetric information so that the insurance company does not know with certainty each driver’s type. Would insurance be sold if:
   i. individuals self-reported their types to the insurance company?
   ii. no information at all is known about individual driver’s types?

If you are uncertain whether insurance would be sold, explain why.

13. Your utility function is \( U = \log(2C) \) where \( C \) is the amount of consumption you have in any given period. Your income is $40,000 per year and there is a 2% chance that you will be involved in a catastrophic accident that will cost you $30,000 next year.

a. What is your expected utility?

b. Calculate an actuarially fair insurance premium. What would your expected utility be were you to purchase the actuarially fair insurance premium?

c. What is the most that you would be willing to pay for insurance, given your utility function?

14. Billy Joe has utility of \( U = \log(C) \), while Bobby Sue has utility of \( U = \sqrt{C} \). Which person is more risk averse? Which person would pay the higher insurance premium to smooth consumption?

15. The world is divided into two groups of people, smokers and nonsmokers. Both types of individuals have utility \( U = \log(C) \), where \( C \) is the amount of consumption that people have in any given period. Smokers have a 12% chance of requiring medical attention, while nonsmokers have a 2% chance of requiring medical attention. Assume, for simplicity, that the medical attention required costs $10,000.

a. Suppose that an insurance company could offer two policies—one that paid the full cost of medical care above and beyond a $3,000 deductible, and a second that paid only up to $2,000 of coverage. What premiums should the insurance company charge for each insurance plan? Which group(s) would purchase each insurance plan?

b. Will the insurance company be willing to sell the two plans that you describe in a?

c. Is the two-plan system you describe in part a the efficient outcome? Explain.

16. Consider a small island with two goods (ice cream and umbrellas), each of which is produced by a separate person. The sales of each producer depends on the weather tomorrow—whether it rains or is sunny. The probability of rainy weather is .5. Sales of the two firms are as follows:

<table>
<thead>
<tr>
<th>State</th>
<th>Weather</th>
<th>Seller 1</th>
<th>Seller 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Sun</td>
<td>$64</td>
<td>$0</td>
</tr>
<tr>
<td>B</td>
<td>Rain</td>
<td>$0</td>
<td>$64</td>
</tr>
</tbody>
</table>

Both sellers maximize expected utility. Total welfare is the sum of the two sellers’ expected utilities, and each person’s utility function is \( U = \sqrt{X} \)

a. What is the initial expected utility of each seller?

b. Suppose that the two individuals are considering entering into an arrangement today that insures their income against this uncertain weather outcome tomorrow. That is, depending on the weather outcome (state A or B), each person will either receive some of the other person’s income or give some of their income to the other person. Can such an insurance arrangement be struck that makes both parties better off? What arrangement will maximize social welfare? How does social welfare compare to the level in a? Is this arrangement acceptable to both parties?

c. Suppose that it is announced that it will be sunny tomorrow. How much insurance will be bought and sold today? What expected utility will each person now have? Has this increased or decreased social welfare, relative to b? Why?
Appendix to Chapter 12

Mathematical Models of Expected Utility

This appendix presents the mathematical model of expected utility that underlies the discussion in Chapter 12. This model illustrates the consequences of adverse selection in insurance markets.

**Expected Utility Model**

The model is described by the following parameters:
- You are hit by the car with some probability $p$.
- Your income is $W$, regardless of whether you get hit or not.
- But, if you get hit, you incur medical costs $\delta$.
- You can buy insurance, with premium $m$ per dollar of insurance.
- That insurance will pay you $b$ if you are hit by the car.

In this case, we can write your expected utility ($EU$) as

$$EU = (1 - p) \times U(W - mb) + p \times U(W - \delta - mb + b)$$

The problem with this expression is that we have one equation, with two unknowns ($m$ and $b$). To solve this equation, we need to add one more condition: that insurance is priced in an actuarially fair manner, so that insurance companies make zero expected profits (we assume, for now, zero administrative costs). In that case, the zero expected profit ($E\pi$) condition for the insurer is:

$$E\pi = m \times b - p \times b = 0$$

The expected profit of the insurer, which equals premiums received minus expected benefits paid out, equals zero. This, in turn, implies that the premium equals:

$$m = p$$

That is, if he risk is 10%, then $m = 10$ cents per dollar of insurance. We can now go back and maximize expected utility, by plugging in $b$ from this equation. As in the example in the text, we assume that utility is of the form $U = \sqrt{C}$. So:

Maximize $EU = (1 - p) \times \sqrt{(W - b \times p)} + p \times \sqrt{(W - \delta - b \times p + b)}$
Maximizing this equation with respect to \( b \) we obtain:

\[-(1 - p) \times p / \sqrt{(W - b\delta)} + p \times (1 - p) / \sqrt{(W - \delta - b\delta + \delta)} \]

Setting this equal to zero and solving for the optimal level of insurance benefits \((b^*)\), we get: \( b^* = \delta \). That is, individuals should buy enough insurance so that if they have the adverse outcome, their benefits exactly offset their costs: individuals should buy full insurance to smooth their consumption across states. Another way to see this is to plug the optimal benefit level \((b = \infty)\) back into the utility function:

\[
EU = \sqrt{(W - p\delta)} + \sqrt{(W - \delta - p\delta + \delta)} = \sqrt{(W - p\delta)} + \sqrt{(W - p\delta)}
\]

That is, we obtain the result that consumption is equalized (at \( W - p\delta \)) in both states of the world. This result motivates the key conclusion of Chapter 12: facing actuarially fair insurance markets, individuals will want to fully insure themselves against risk.

**Adverse Selection**

To understand more formally the implications of adverse selection, we now consider two groups, the careful and the careless, where the probability of accident for the careful is \( p_c \) and the probability of accident for the careless is \( p_a \).

As discussed in this chapter, if there is full information, then the insurance company charges prices such that \( m_a = b \times p_a \) for the careless, and \( m_c = b \times p_c \) for the careful. The former premium is higher, since \( p_a > p_c \); those who are more likely to have an accident have to pay more for insurance.

But, if there isn't full information, so that insurance companies know only the proportions of types in the population, then there are two possible pricing strategies. One is to assume that individuals are honest and charge them according to their reported types. As discussed in the chapter, however, this strategy will lead all individuals to claim that they are careful. In this world, the profits earned on the careful are: \( E\pi = m_c - b \times p_c = b \times p_c - b \times p_a = 0 \); that is, the insurance company breaks even on the share of the population that is careful. However, the profits earned on the careless are \( E\pi = m_a - b \times p_a = b \times p_a - b \times p_a < 0 \), since \( p_a > p_c \); profits are negative overall and insurance is not offered.

The other strategy considered in this chapter was to offer insurance at an average price, \( m_v \), that is based on the average of the accident probabilities \( p_a > p_v > p_c \). At this price, insurance is a good deal for the careless but a bad deal for the careful, and may only be bought by the careless. In that case, the expected profits of the insurer are again negative:

\[
E\pi = m_a - b \times p_a = b \times p_v - b \times p_a < 0, \text{ since } p_a > p_v.
\]

It is possible, however, that the careful would still buy full insurance (the pooling equilibrium). They would, for example, buy insurance if expected utility
with insurance (at the unfair price) is still higher than expected utility without insurance, that is, if

\[ EU \text{ (with insurance)} = (1 - p_e) \times U(W - p_e\delta) + p_e \times U(W - p_e\delta) > \]

\[ EU \text{ (no insurance)} = (1 - p_i) \times U(W) + p_i \times U(W - \delta) \]

Whether this inequality holds or not will depend on two things: the extent of risk aversion of the careful individuals and the relationship between \( p_e \) and \( p_i \).

If the careful individuals are more risk averse, they will be more willing to buy insurance (even at an unfair premium), to guard against the odds of being left with low consumption. And, the closer the average risk is to the risk faced by the careful, the closer the premium is to being actuarially fair, and the more likely it is that the careful individuals will buy the insurance.