CHAPTER 4

INSURANCE

QUESTIONS

1. Who takes care of people when they need medical care they cannot afford?
2. Who pays for losses: insurance companies or the people who buy insurance?
3. How does pooling of funds reduce exposure to risks?
4. Is a favor from a friend similar to a loan from a bank?
5. Do insurance companies take risks, or do they just put a price on risks?
6. What is an "actuarially fair" premium?
7. Are people who think they will become sick more likely to obtain insurance?
8. Are people with insurance more likely to sustain a financial loss?
9. Does insurance increase or decrease the demand for medical care?

Breaking an arm, catching pneumonia, having a heart attack—there are a dizzying array of risks that could disrupt your life. We hope none of these bad things will happen, but if they do, most of us can rely on insurance to cover some of our financial losses. From an individual perspective, insurance generates net benefits by allowing trade between two possible states of the world: a little money in the usual state (when a person is healthy) is given up to get a lot of money in the unusual and more difficult state (when a person is sick). From society's point of view, insurance is a method of pooling risk so that one person's loss is shared across many people rather than being borne by that person alone. If all people contribute, the pool of collected funds will be sufficient to compensate the unlucky few. All participants gain peace of mind, knowing that they can obtain necessary medical care with limited financial risk. The next two chapters examine the operations, history, and theory of health insurance. To grasp how insurance works , it is necessary to understand that it is a means for both individual maximization of utility and for social promotion of group values such as respect for life, care of people with disabilities, equal opportunity, and political unity.

4.1 METHODS FOR COVERING RISKS

What would you do if you broke your arm? Who would take care of you? How would you eat and pay your rent while you were out of work? Who would pay for the doctor and hospital care? There are several ways this loss could be covered.

Savings

The first economic consequence of a loss is to use savings to pay for current expenses. *Savings* can be thought of as a trade between time periods. People do not save to pile up money. They save so that they can consume more in the future, either because they plan to do so (e.g., for retirement or a vacation) or to protect themselves against the unexpected (e.g., accident, illness). Savings provide a buffer against random losses, smoothing out consumption over time so that you can still eat if you are not working, still pay the rent if you incur a $600 doctor bill immediately after your vacation, and still pay tuition bills if you need expensive prescription drugs to get you through your final exams. The ability to smooth out the amount of consumption over time improves utility. The difference between a planned variation (a vacation trip) and a risk (a broken leg) is the element of uncertainty. Saving is limited as a risk management tool because it allows individuals only to trade with themselves at different time periods; it does not spread a catastrophic loss over a large group of people so that it can be borne more easily. Although people can plan a vacation or retirement within their budgets, they may face an extraordinary loss (e.g., spinal injury, cranial fracture) that is far too expensive to be handled by their own resources.

Family and Friends

Young people who have not had a chance to accumulate their own savings must depend on their families' financial resources to carry them during an illness. Although family assistance may be freely and generously given, it creates an obligation to pay your family back when you are well, to be grateful, and to help other family members in the future when they need it. Thus, the family engages in a form of exchange among people as well as among time periods.[1] Your current loss is covered by someone else's current savings, which gives you an obligation to cover someone else's loss in the future. Whereas individual savings allow one person to trade among his or her own time periods to optimize consumption, families trade over time and people; therefore, they can absorb the shock of a loss without a disastrous decline in living standards more effectively than an individual alone.

Favors that friends do for each other occur so frequently and unconsciously that it seems strange to look at them as trades. When I carry books for someone whose leg is in a cast or take notes for a classmate who has the flu, I am simply being nice and not looking to receive anything in return. Yet ultimately, families and friendship are based on a sense of mutual obligation and reciprocity.[2] If someone consistently fails to help me, eventually I will stop being helpful to him or her. Furthermore, I might let others know how inconsiderate and selfish that person is so that they won't waste their time assisting him or her. It is by such means that the informal rules of exchange among friends and families are enforced. Helping out might not be legally binding, but it is socially binding.

Charity

The obligation to help extends beyond friends and family to people we have never, and may never, meet and who can do nothing for us in return. We still care about people even if we don't know them. Mutual caring makes people a society rather than just a random collection of individuals.[3] The first hospitals were caring institutions, substitute homes for people who did not have a home, and for people who were ill or had a disability but whose families were too poor to take care of them.[4] Charity as a means of social exchange predates formal insurance contracts by thousands of years and has been far more important

as a way to pay medical bills for most of that time. Yet charity is limited in scope and the extent to which most people feel responsible for someone else's misfortune has declined as formal market institutions have arisen to provide coverage for risks.

Private Market Insurance Contracts

Bad things happen. We cannot always do anything about them. When we can do something, it often costs a great deal of money. Suppose that I am one of one hundred middle-aged executives sent by XXumma Corp. to Eastern Europe for a year. We can assume that several of us will get sick during the year. Suppose we knew that one of us was going to have a heart attack. An operation could help, a coronary artery bypass graft (usually known by its initials CABG and pronounced like "cabbage"), but this operation, with all its attendant aftercare, costs about $50,000. The person who has the heart attack will suffer financially as well as physically. A way of making a bad situation a little better is for us to form a club. Each person puts in $500 and the unlucky one who has a heart attack gets the operation paid for. This is known as "risk pooling," which is an essential feature of all insurance.

Although no one can predict who will be the unlucky one, for large numbers of people, the **risk**—the expected value of all losses averaged over all people—is quite predictable. From the individual perspective, insurance is a trade between two possible states of the universe: one in which the person has a heart attack and one in which he or she does not. Money is shifted from the state in which individuals have more (when they are healthy) to the state in which they have less (when they are sick), similar to the way saving shifts money from good periods to pay for the bad periods. From a societal point of view, insurance is a collection of trades between people. Money is shifted from people who have plenty of money (those who are healthy) to people who suffer losses (those who are sick).

Insurance pools losses; it does not get rid of the losses or even reduce them. The group members must pay for all losses (plus some administrative fees) with the **premiums** they pay. Insurance companies do not like to take risks. They like to sell insurance to large groups of people with predictable (average) losses. This way the insurer's revenues and expenses, and therefore its profits, are very stable and predictable from year to year. Insurance companies specialize in pricing risks, not in taking risks. They try to predict exactly how large premiums need to be to cover all the predicted losses. This specialty, known as actuarial science, uses information on previous losses to make accurate predictions of the amount of money required to pay for future benefits. For this example, the probability (one in one hundred) and size ($50,000) of the loss is well known, so it is simple to determine the **actuarially fair premium,** $1/100 \times \$50{,}000 = \$500$. An actuarially fair premium is the same as the *expected value of a loss* discussed in Chapter 3 with regard to cost-benefit analysis.

Insurance must be priced above the actuarially fair premium to cover the expenses of administering the insurance plan and to provide profit to the owners who put up their expertise and capital. The difference between the actual premium and the actuarially fair premium is known as the ***loading factor.*** It may be as small as 5 percent or 10 percent for group policies covering large businesses and may exceed 100 percent for individual policies.

Traditional insurance plans simply paid for all (or a defined part) of the medical bills a person incurred. Such **indemnity** plans have become rare. People want insurance companies to bargain for lower prices with hospitals and physicians, to evaluate whether new variations on an old drug are really worth twice as much, and to process all paperwork. **Managed care** plans provide a package of services at a cost lower than people could obtain if they tried to do it all on their own (see Chapters 5 and 10).

Social Insurance

Market contracts are mutually beneficial to people who purchase insurance and to the companies that act as financial intermediaries. However, they do nothing for people who cannot afford to buy insurance or for people excluded from purchasing insurance (e.g., people with disabilities). Market contracts do not pay for medical research or education programs to promote healthy lifestyles, nor do they provide outreach to teenage mothers or people with mental illness. In short, they do nothing to strengthen the social contract that binds the people of a nation together in support of each other. The informal obligations of citizens to society expressed in charitable giving are extended and formalized in social insurance programs such as Medicare and Social Security in the United States, the National Health Service in the United Kingdom and Canada, and the health care systems of most countries.[5] Contributions to social insurance are not voluntary, but mandatory through the tax system. Who will pay and who will receive are determined by concerns common to all and the political process rather than through individual choices made in the marketplace.

As explained in Chapter 1, the U.S. health care system is a blend of private and public financing. Medicare, a social insurance program that covers medical bills for most elderly people in the United States, is larger than the many private for-profit companies combined. Even when insurance is privately paid and managed by profit-making firms, government regulations mandate who is covered, what services are offered, and how prices are set. Therefore, even private insurance is forced into some conformity with social insurance principles.

Strengths and Weaknesses of Different Forms of Risk Spreading

Individual savings are quite limited as a form of risk management since the resources of only one person are used. There is no way that a person born with a genetic defect can save money to cover that risk. Most young people cannot save the $20,000 or so required to treat a broken leg, and a serious illness would exceed the financial capabilities of all but the wealthiest individuals. Trades involving more than one person are needed for coverage. Taking money from family and friends spreads the risk more widely, but this larger group may have difficulty telling whether you really need assistance. In addition, if family and friends do contribute toward your medical bills, they may also want to give you lots of unwelcome advice and intrude in your personal affairs. Charity brings in an even broader group, but the sick individual has less incentive to minimize waste, since he or she is spending other people's money. Charity also tends to be unreliable and even more meddlesome.

WHY DO POLICE OFFICERS AND FIREFIGHTERS HAVE SUCH COMPREHENSIVE INSURANCE?

Medical coverage for those who put their lives on the line for the good of the community remains comprehensive even though many employers and government agencies are cutting back on benefits. There is a symbolic importance to this insurance that goes beyond financial considerations. If the community is not willing to do everything possible to protect the health of these public servants, why should these servants continue to risk it all to save lives? Similar considerations lie behind the willingness of an Army troop to go to great lengths to recover a wounded or dead comrade when such efforts don't seem to be worthwhile from a cost-benefit perspective and have led to the creation of a $20 billion system to care for disabled veterans.

The extent of resources available is limited by how much people care, and charity alone could never fund a modern medical system.

Markets create impersonal contracts to pay for services. They can draw on financial resources from around the world. Your insurance may be handled by a company in the Netherlands that neither knows nor cares about you as a person, but fully meets your needs as long as the doctor bills get paid on time. Yet markets are driven by profits, not love, and each participant must pay his or her own way. Nothing will be done for a child with a genetic defect unless a parent has a policy that includes dependents. A lawyer's interpretation of a contract replaces family concerns as the factor determining which kind of medical care will be provided. The movement from individual to group to market financing reveals a trade-off: the individual is most sensitive to his or her own needs, but has the smallest span for risk pooling (savings, trade over time periods). The market is global in reach, but impersonal and willing to help only when there is a profit to be made (see Table 4.1).

Social insurance combines the humanitarian thrust of charity with the financial strengths of the market, but it provides only a compromise, not a reconciliation. Social insurance can be comprehensive only if contributions are made compulsory through taxes. As the base of funding is broadened to include more people, social insurance grows ever more divorced from personal empathy and becomes just one more government service provided through the political process. As taxpayers, we are willing to provide some medical care for everyone, but not necessarily the best quality in the best rooms of the most modern hospitals. In addition, some taxpayers may be downright hostile about spending millions of dollars on patients who, for example, spent their money on entertainment rather than medical care or who have worsened their own illnesses through substance abuse or unhealthy lifestyles. Social insurance requires that society reach a consensus on who deserves what and how medical care should be delivered. Such a consensus currently exists in the United States only for the elderly under Medicare, and even that can fall apart, as it did in 1989 when revisions to cover pharmaceuticals and catastrophic expenses were passed, implemented, and then repealed by Congress after a revolt by older taxpayers.[6]

4.2 WHY THIRD-PARTY PAYMENT?

As medical care became more expensive, the potential cost of illness went from burdensome to overwhelming. In 1929, $200 was an unusually large medical bill. In today's high-tech intensive care units (ICUs), hospital costs of $100,000 or more are common, with extra payments needed to cover surgery, anesthesia, laboratory tests, and drugs. Few individuals can afford to pay the high cost of advanced modern treatment for serious illness, but few are willing to forgo treatment if they become seriously ill. Insurance makes it possible for most people to obtain care when they need it without going bankrupt. Regular

TABLE 4.1 Types of Risk Protection

Method	Reduces Effects of Loss By:	Depends On:
Savings	Shifting consumption between periods	How much I personally have now
Family, Friends, Charity	Sharing between people	How much people care about me
Insurance Contract	Trading between possible states of the world through financial markets	Ability to price risk

withholding of premiums and taxes spreads the financial risk across many people and makes catastrophic expenses bearable.

Insurance would not be necessary if everyone's medical expenses were near the average of $5,427 per person per year. Instead, there is a great deal of variation—much more than that for food, housing, clothing, transportation, and other major expenses. Most people are healthy during any given year, with 15 percent having minimal costs (less than $500) for medical care (see Table 4.2 and Figure 4.1).[7] However, each individual from the 9 percent of the population that needed hospitalization in 2002 averaged more than $20,000 in medical expenses. Only 1 percent of patients had expenses that exceeded $100,000, but this 1 percent accounted for 30 percent of total health care dollars spent. Indeed, it took just 10 percent of all patients to account for 70 percent of the costs.[8] For this group of 28 million people, average medical expenditure exceeded $35,000 for the year.

Although each of us would prefer to pay nothing, most of us can afford to pay for at least some of the cost of the care we expect to receive if we get sick. Even if we are healthy, it is reasonable to be asked to contribute something toward the expenses of those who are not. But how much? A $150,000 bill could be staggeringly difficult to pay. We might not even think that we can afford $5,427, the average annual cost of medical care per person. But whether we wish to pay that much or not, an average of $5,427 per person must be extracted through taxes, bills paid by individuals, insurance premiums paid by employers (who must therefore reduce wages), or some other means, such as charitable giving, to keep the system running. These funds are needed to keep hospitals open; pay doctors, nurses, custodians, and clerks; keep research laboratories investigating new cures; and so forth.

Most of us are not aware of the financial burden we bear for health care provided to ourselves and others. For most workers, employers pay about $2 an hour (11 percent of compensation) for health benefits, reducing the amount that can be paid out as wages.[9] Even if an employer does not provide health insurance, something is deducted each week as taxes, which is often labeled "H.I." or "FICA:M." This is hospital insurance, not for the employee, but for the elderly and people with disabilities on Medicare. Every time we buy a candy bar or a gallon of gasoline, we pay state taxes that fund Medicaid for indigent people. On the other hand, senior citizens might complain bitterly about the cost of drugs and hospitals and nursing homes, with little awareness of how much subsidy they are receiving. Even if senior citizens pay thousands of dollars out of pocket, more than 90 percent of hospital bills, half of nursing home bills, and almost one-third of the costs of their drugs are being borne by other people, mostly younger working people.

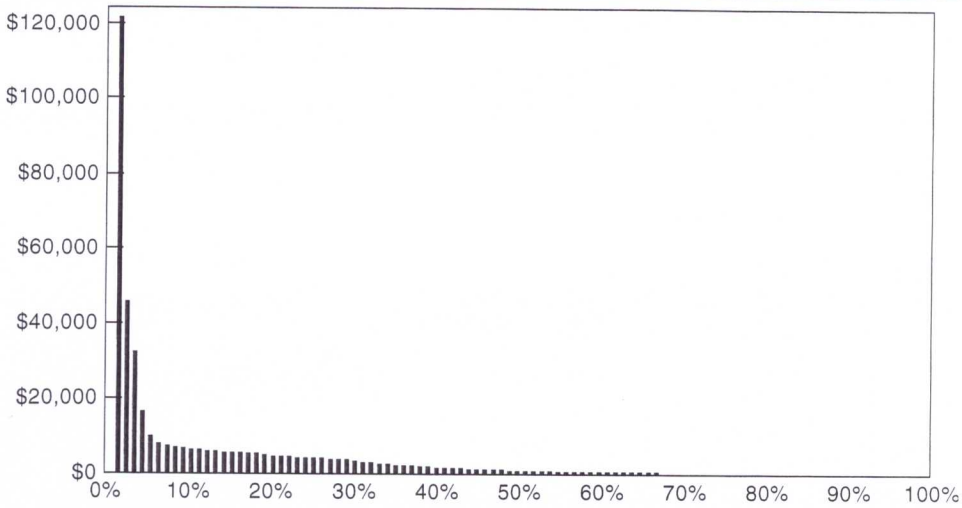
Variability

The chance that an insured group will have extraordinarily high or low losses declines sharply as the number of people in the group increases. Figure 4.2 shows how risk declines with the size of the risk-bearing pool. It assumes that each person in the group has a one in one hundred chance of sustaining a $50,000 loss. The expected loss ($500 per person) is the same regardless of the number of people insured. With just 10 people insured, it is

TABLE 4.2 The Concentration of Personal Health Expenditures

		Top		Middle	Bottom
	All	1%	Next 9%	75%	15%
Persons (000s)	285,000	2,850	24,650	213,750	42,750
Health $ (millions)	$1,545,900	$436,400	$646,000	$455,770	$7,730
Per person	$ 5,427	$153,126	$ 26,210	$ 2,135	$ 184

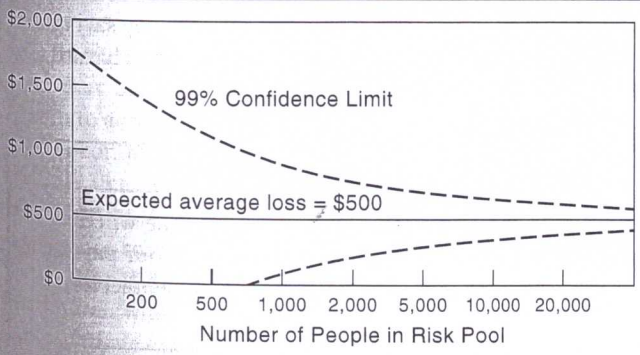
FIGURE 4.1 Distribution of Individual Medical Care Expenditures



Note: The 1 percent of individuals with highest cost consume approximately 30 percent of total services, and the top 5 percent consume about 50 percent.

impossible for the loss to be equal to the expected loss of $500. With 100 people in the risk pool, it is possible (37 percent of the time) that one of them will get sick, thereby making the loss equal to the expected value of $500. Just as often (37% of the time), however, no one will get sick and losses will be 0. About 18 percent of the time two people in the group will get sick, making the average loss $1,000, and 8 percent of the time three or more people in the group will become ill. With 1,000 people in the group, it is unlikely (0.005 percent) that no one will have an illness. Most (99 percent) of the time the average loss will be between $1,000 and $100 per person. These are known as 99 percent confidence intervals, which are represented in Figure 4.2 by the dotted lines that start far from the mean and gradually move closer as the number of people in the group increases. With 10,000 people in the risk-pooling group, the chances of no one getting sick are vanishingly small, as are the chances that the average loss will exceed $1,000. The group will experience losses between $370 and $630 per person 99 percent of the time. An insurance company is quite confident doing business with a group this large. On the other hand, a company with fewer than twenty-five insureds has a sizable chance of losses that are more than double the expected value (about 22 percent of the time).

FIGURE 4.2 Variability Declines as the Size of the Risk Sharing Pool Increases



4.3 RISK AVERSION

Would people be willing to pay even a 10 percent load (mark-up) just to get their premium money back as benefit payments? To the extent that people can easily fund routine losses through personal savings, they won't be willing to pay the mark-up, which is why most routine losses are not insured. Only large and potentially catastrophic losses are worth paying extra to insure against.

Suppose the premiums required in the earlier heart attack example were not the actuarially fair $500, but $750, or $1,000, or even $1,500? This is still better than having to sell your house, being in debt for twenty years, or—perhaps worse—not being able to have an operation that could save your life if catastrophe strikes. To an economist, the fact that people are willing to pay more than the expected value of the loss for insurance is evidence that they think they are better off with insurance than without it. The desire to replace an uncertain loss with a steady and certain premium payment is known as **risk aversion.** Some people feel very strongly about risk and will go to great lengths to avoid it. Most people choose not to take financial chances unless they have to or are well paid for doing so (e.g., risky investments provide a higher rate of interest than safe government bonds). Others are willing to take some chances. To some extent this is a matter of taste, similar to how spicy you like your food. Your aversion to risk also depends to some extent on how much income you have—going from $2 million a year to $50,000 is not nearly as scary as going from $200,000 to $5,000, which would provide you with less than $100 a week to spend on food, rent (forget it—you're living at your parent's place again or homeless), and travel (mostly by bus).

With insurance, people can obtain medical care they otherwise could not afford. What if a $350,000 liver transplant could extend your life expectancy by 10 years? If you value your life at $100,000 per year (see Chapter 3, section 5), the benefit-to-cost ratio of treatment is 3 to1 and clearly worthwhile. Yet you, like most people, do not have $350,000 in cash to spend and cannot get a bank loan for that amount, without collateral, just to possibly extend life. Insurance expands the choice set of patients facing serious illness and gives us all peace of mind. Economist John Nyman estimates that this **access to treatment** (affordability) gain is more valuable than pure risk sharing in ordinary financial insurance by an order of magnitude.[10] When it comes to life and death, being able to get help is extremely important.

Given that most people are risk averse, why aren't all risks insured? Life is full of risk. I buy an airplane ticket for a spring vacation even though I could die before I ever get to use it. My bicycle might be stolen. Some people study for a profession, such as accounting or computer science, only to find that job market conditions have changed by the time they graduate. As you take the exam for this course, at least some of the result (I hope not all) will be random (e.g., which questions were asked during class, when television commercial breaks occurred during your study time). Only a few risks in life are insured. Why? For one reason, it is costly to write up and specify insurance contracts, pay claims, and so on. Most small losses will, on average, balance out over time and thus can be handled by savings. In addition, several structural incentive problems occur with insurance (e.g., moral hazard and adverse selection, which are discussed later in this chapter) that reduce its value.

ARE YOU RISK AVERSE?

Here's an easy test. Imagine your boss offering to flip a coin to determine whether to double your monthly paycheck or take it away. If the prospect of losing your paycheck is much more unpleasant than the chance of doubling it, you, like most people, are risk averse and a good candidate for insurance.

In most property and casualty insurance, the losses that are insured are large, infrequent, and random (unpredictable). Many medical expenses meet these criteria, but not all do. For example, most doctor visits for colds and the flu are small, frequent, and fairly predictable. Although the magnitude of the financial losses incurred might explain why some medical expenses are insured, it does not explain why insurance coverage is so extensive in health care, covering many minor and routine services as well as catastrophic events. Three special factors must be recognized in considering the market for health insurance. One is the belief that everyone has a right to medical care. Another is the effectiveness of medical providers in promoting insurance because it provides benefits to them, not the least of which is removing the doctor-patient relationship from the world of commercial trade and haggling over price. Third, and perhaps most important, is the near impossibility of patients acting as informed consumers and smart shoppers. Trying to determine what medical care to get, whether treatment A is really worth $1,500 more than treatment B, or whether having an operation now will save money in the long run, is too difficult. We turn to intermediaries, to doctors and insurance plans, to make many of these decisions for us.

The fact that we are not insured against all risks raises an interesting question: If people are so risk averse, why do they gamble (by playing the lottery or at casinos)? It is clear why people may gamble on an investment in stock or land. They are compensated by getting (on average) higher returns than they can obtain with less risky investments. But in the casino form of gambling, you don't get paid for taking risks; you have to pay for the privilege of taking on risk. The truth is, people gamble this way mostly for fun. It is something exciting to do, like going to a sports event. Sometimes people gamble because they do not understand that the odds are against them—that if they keep playing long enough they are bound to lose. And then there are a few people who gamble because it is their job, and like casinos, they almost always win when we put our money on the table. Don't envy the professional gambler too much, though. For this person, gambling is work rather than a diversion, and the hardest thing is finding willing customers—which is also the case for insurance salespeople.

4.4 ADVERSE SELECTION

Risk pooling works well because everyone in the group is at risk and therefore has an interest in making sure that solid insurance benefits are provided. Consider the heart attack example again, and suppose that instead of the risk being purely random, you knew that you were the one who would end up in the hospital. In this case, you would make sure that you got insurance and might even be willing to pay an astronomical premium to get it. However, if you were certain that you were not going to be the one ending up in the hospital, you would not try very hard to be part of the insurance group and might not be willing to pay $500, or even $50.

If higher risks result from something the insurance company can observe in advance and that both the insured and the company acknowledge, adjusting premiums up or down to account for varying risk categories causes no difficulties. For example, pricing by age is common, such as charging $300 per month for people 35 and younger, $500 for people 35 to 50, $650 for people 51 to 60, and $850 for people 61 and older. Adverse selection creates difficulties when some risk factors are known to the insured, but not to the insurance company (e.g., my chest hurts every time I go walking, I enjoy fried foods and recreational drugs, my brother and sister recently died from heart attacks). Difficulties arise even when the risks are well known but it is considered "unfair" to charge for them (e.g., female employees paying less than males, doubling the premiums for people age 61

and older, charging unmarried men more because of the perceived higher risk of HIV/AIDS). If an employer subsidizes an optional health plan for its workers, the ones most likely to buy insurance are those at high risk. This is called **adverse selection** and means that the average losses in the insured group will be larger than the expected value for the employees as a whole. If young, healthy workers do not participate, premiums have to increase. At the extreme, the plan may be left with only those who were ill to begin with and who knew that they would collect benefits, which is not considered insurance at all because there is no risk pooling. For this reason, insurance companies require that all or at least a majority of the employees in an organization be insured.

A more subtle form of adverse selection occurs when a company offers two kinds of plans, a basic plan and a more comprehensive option for which employees pay extra. Who will choose the comprehensive plan? Some people will choose it because they are very risk averse and therefore willing to pay extra for the more comprehensive benefits. This causes no difficulty for the insurance plan since the actuarial risk (expected loss) of such people is about average. The difficulty arises because there will also be a disproportionate number of high-risk individuals (e.g., those who are older or overweight) who buy the comprehensive plan. As more and more high-risk people sign up for the comprehensive plan, their medical expenses will exceed the expected value and even the "high" premium will not be sufficient

ADVERSE SELECTION AT HARVARD: GETTING PUSHED OUT OF THE PPO

In 1994, Harvard University faced a substantial deficit in the employee benefits budgets. For years, Harvard had offered both HMO and PPO health insurance plans, with the more expensive PPO plans being more generously subsidized by the university. In order to reduce cost, Harvard in 1995 implemented a new program in which they contributed the same dollar amount regardless of which plan the employee chose (although the amount contributed is larger for low-income employees). While employee contributions went up for all plans, they went up more for the relatively generous PPO Flex plan (see Table 4.3). In response, enrollment in this high-option plan began to fall. David Cutler and Sarah Reber examined the characteristics of those employees who switched out of the high priced plan.[11] As theory predicts, those who switched were more likely to be healthy, they were younger on average and had spent less on medical care in prior years than those who elected to pay more and stay in the high-option plan. Hence it is not surprising that the high-option PPO Flex lost money in 1995. To compensate, PPO premiums were raised an additional 16 percent for 1996, which pushed even more young healthy employees into the HMO plans, and the PPO lost even more money. In 1997, the pattern was clear and the high-option plan was discontinued, completing an adverse selection death spiral in only three years.

TABLE 4.3 Changes in Employee Premiums and Enrollment at Harvard

		Employee Pays		Enrollment			
	Premium	Old	New	1994	1995	1996	1997
Individual							
PPO Flex	$2,773	$ 555	$1,152	16%	13%	8%	discontinued
HMO	$1,980	$ 277	$ 421	84%	87%	92%	100%
Family							
PPO Flex	$6,238	$1,248	$2,208	22%	18%	11%	discontinued
HMO	$5,395	$ 776	$1,191	78%	82%	89%	100%

Source: Cutler and Rebler (1998).

to pay the bills. Thus, the extra premium for comprehensive insurance must be raised still higher. As the premium goes up, fewer and fewer low-risk people are willing to pay for the better coverage. Eventually, only the chronically ill who are certain to sustain a big loss will sign up for the comprehensive plan. As the difference in premiums between the basic and high-option plan becomes greater, fewer and fewer people at low risk are left in the high-option pool. The principle of risk sharing is defeated by the progressive separation of risks between the groups. This death spiral ends with the termination of the high option plan.

The more differences there are in expected costs of illnesses and the more inside information people have about their own health, the greater the potential for adverse selection. The elderly are particularly problematic because many of their medical expenses are for chronic illnesses that are well known to them, and not random. Insurers' major method for reducing adverse selection, insisting that all employees in a company be included in a group plan, is not available for the elderly since most of them are retired. The ultimate solution for adverse selection is to include everyone in a social insurance system, similar to what the United States did for the elderly by creating Medicare.

4.5 MORAL HAZARD

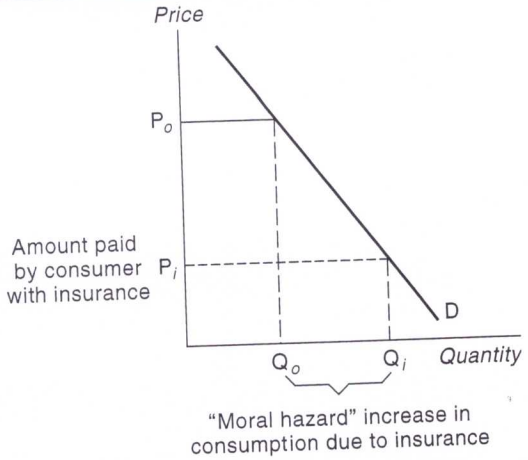
A person with medical insurance is more likely to go to the doctor because of a sore throat than someone who is not insured. If sent to the hospital, an insured person is more likely to pick a nicer and more expensive facility than an uninsured person. These changes in behavior cause the expenditures of people with insurance to be greater than what an actuary would have predicted from observing the records of people without insurance, and this increase in loss is known as **moral hazard.** One form of these behavioral changes can be illustrated using ordinary demand curve analysis (see Figure 4.3). The demand for physician visits by people without insurance is shown in line D. With insurance picking up 80 percent of the costs, the net "price" (P_i) that a patient has to pay personally is just 20 percent of the actual price; therefore, consumption will increase to Q_i. This increase in visits resulting from being insured is attributable to moral hazard.

Is it likely that people will consume medical care with little health benefit just because it is free? For heart surgery, no. Pain and the loss of time are sufficient to keep most people from undertaking surgery just for the fun of it. But what about routine office visits? Many of them are for minor symptoms that will go away without treatment. Insurance makes people much

DO PEOPLE CHOOSE TO DIE?

Actuaries have found that people who buy life insurance are more likely than average to die prematurely.[12] The reasons have less to do with the drama depicted in Arthur Miller's *Death of a Salesman* (since suicide invalidates most policies) than with mundane adverse selection. For example, people who know that their parents died young or that their heart palpitates, or who worry about their lack of physical activity since they turned fifty, are more apt to buy life insurance when it is offered. Conversely, those who buy annuities (policies that pay insureds a certain amount per year as long as they live) show positive selection and are less likely than average to die prematurely. Questionnaire respondents who reply "yes" when asked, "Do you expect to live a long time?" do, in fact, enjoy longer lives than those who respond "no," even after adjusting for the effects of age, blood pressure, cigarette smoking, and all other measurable health risks. This indicates that individuals do have private knowledge that they can use to select coverage that is most favorable to them, but costly to the insurer.

FIGURE 4.3 Moral Hazard



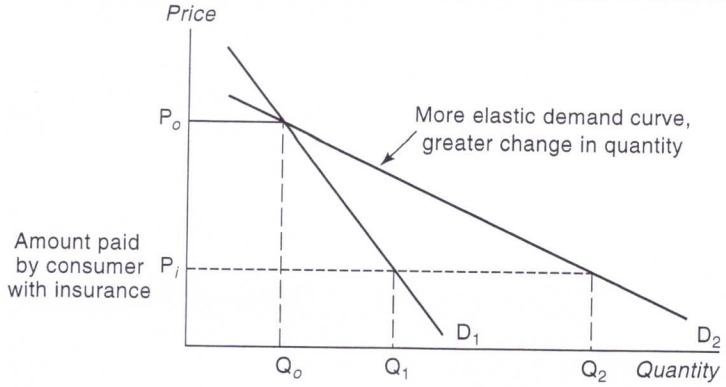
more likely to seek treatment for minor symptoms and thus to increase the overall cost of insurance. Even some surgical procedures are of limited value and are likely to be undertaken only if insurance pays. Suppose seventy-six-year-old uncle Al has a liver infection. It is probable that he will die from the infection no matter what we do, but there is a chance that he could live several more months or even years with a liver transplant—at a cost of $100,000 for the surgery and $5,000 per month after that for drugs and after care. If Uncle Al or the family had to pay directly out of their own pockets, they would probably decide that it was not worth paying so much for such an expensive operation that is unlikely to be successful. However, if insurance is picking up the tab, or if Medicare is passing the cost on to all other taxpayers, Uncle Al and the family might go ahead and try for an improbable cure.

Figure 4.4 shows that the extent of expenditure increase due to moral hazard increases with the price elasticity of the demand curve. For services that are not very price sensitive (D_1), the fact that people are insured will not cause them to purchase many more services; therefore, there will not be much of a distortion in consumer behavior due to insurance. On the other hand, for services that are very price elastic (D_2), the fact that people are insured can cause a very large increase in the quantity they consume (which insurance will pay for), thereby making moral hazard a large problem. This theoretical result provides us with a hypothesis about which services will be covered by insurance. Since moral hazard reduces gains from risk pooling, types of medical care for which there is considerable moral hazard (services with high price elasticity) will be less likely to be covered by insurance than services for which there is very little moral hazard (those with low price elasticity). A number of studies have shown that this is the case.[13] Services such as hospital care and surgery with lower price elasticity of demand are more likely to be insured than services such as nursing home care, physical therapy, mental health care, dentistry, and drugs, which have a higher price elasticity of demand. Exchange must make all parties better off, and when problems such as moral hazard reduce the value of transacting, there will be less pooling of risks through the insurance market.

Welfare Losses Due to Moral Hazard

The extra services people consume just because they are covered by insurance result in some economic waste. If it costs $20 to produce an X-ray, but the X-ray is only worth $5

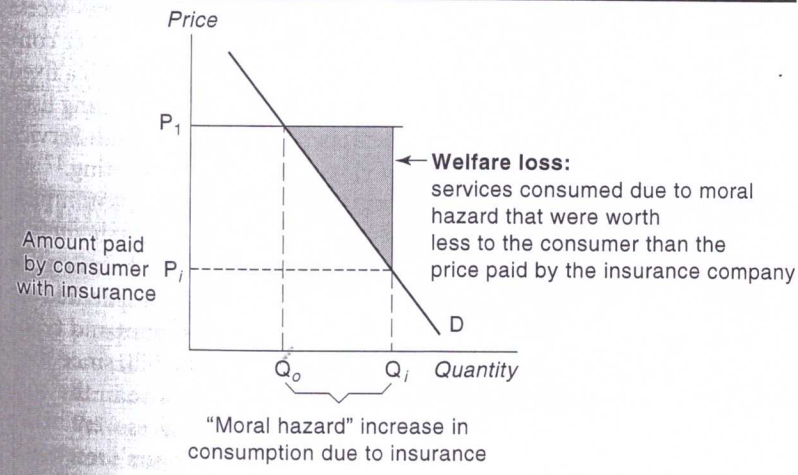
FIGURE 4.4 Amount of Moral Hazard Depends on Price Elasticity of Demand



to the patient, there is a net loss of value of $15. This loss of value is often called the **welfare triangle** because the area of the triangle between the price that the insurance company must pay and the demand curve yields a good measure of the size of the loss (see Figure 4.5). If insurance pays 80 percent of the bill, the number of X-rays consumed rises from five to nine. The cost of each X-ray stays the same, $20. The sixth X-ray is worth only $16, for a loss of $4; the seventh is worth $12, for a loss of $8; the eighth is worth $8, for a loss of $12; and the ninth is worth $4, for a loss of $16. The total amount paid for the four extra X-rays is $80, and the welfare loss is about half that, $40.[14]

Who loses? All members of the insured group lose because their premiums must be higher to cover this excess use of services. In fact, even the person getting the extra service probably would prefer a tighter contract that provided only worthwhile services at a lower premium. This is why so much work is done using contract exclusions, fee limits, second opinions, and so on to make sure that reimbursement is provided only for necessary services. There is a demand for the "hassle" of making patients and physicians justify their use of services because it reduces premiums. Evidence of this demand is that consumers choose policies that include restrictive contractual language rather than policies that pay for everything without question but cost more. This does not mean that it is pleasant when you are sick to go through all sorts of bureaucratic hoops to get a claim paid; it does mean

FIGURE 4.5 Welfare Loss due to Moral Hazard



that the effort is justified in terms of reduced premiums—or else you would choose a different plan. Insurance companies will give customers whatever they want, including aggravation, to make a profit.

Welfare losses due to moral hazard are to some extent unavoidable. They are part of the cost of insurance, the way that an unwanted orange peel is part of the cost of an orange. On net, people are better off with the insurance (including moral hazard) than without it. If people are buying insurance, the gains from trade due to risk pooling must be exceeding the welfare losses from moral hazard. If the losses were larger than the gains, people would not buy. However, when the purchase of insurance is subsidized by the government, this may no longer be the case. The extra insurance bought due to tax subsidization creates additional excess utilization of services that are not highly valued by consumers.[15]

There is a systemwide welfare loss caused by insurance that is more difficult to see. Insurance tends to increase demand and make patients less price sensitive, which increases prices overall. Whether or not one person becomes insured will have little effect on the price of X-rays. Yet if everyone who now has insurance had it taken away, demand would fall and the price of X-rays would surely decline. People who are uninsured are worse off because other people are insured, because those other people's insurance raises the price that uninsured people have to pay in order to obtain care.[16] It is even possible that we all would be better off if we were all uninsured, even though each one of us individually is better off with insurance. This paradoxical (and quite unlikely) result would only occur if the gains from risk pooling are smaller than the increase in prices resulting from universal insurance. However, the systematic distortion of prices resulting from insurance raising overall demand probably does create a larger welfare loss than the moral hazard welfare triangle attributable to tax subsidy. Such systemwide effects are difficult to gauge because looking at individual behavior may not tell us what is happening to the system as a whole. One way to measure systemwide effects is to compare different health care systems in different countries that use different types of insurance to see how well each one works and what they cost, but this ambitious effort is left for later (see Chapter 17, International Comparisons).

4.6 OPEN OR CLOSED FUNDING?

Funding for health care can be open ended, dependent on the individual decisions of many people and firms and expanding if demand increases, or closed, with a fixed total budget, usually set by the government (Table 4.4). In open-ended systems, if there are excess demands, either the insurance pool runs a deficit or individuals must reduce other consumption to pay medical bills. If excess demands are placed on closed systems with a fixed budget, no more money is spent, but troubles arise due to poor service, long waiting lists, and other frictional costs that lead to patient dissatisfaction. The National Health Service (NHS) in the United Kingdom is a notable example of closed or "global" budgeting.[17]

Parts of the U.S. health care system have had closed-end budgets (e.g., immunization programs, city health clinics, Department of Veterans Affairs hospitals, state mental hospitals). Yet traditionally, the United States relied on open-ended health insurance provided by employers, Medicare, and Medicaid. Patients were entitled to a specified set of services for which the payer had to cover all costs, regardless of the amount and types of services used. Insurance companies did not care about the size of the bill, since they were merely third-party intermediaries, raising premiums to match the rise in the cost of services. Patients had little incentive to moderate utilization, since services were being paid for with "other people's money" (i.e., taxes, insurance, employers' reserves).

TABLE 4.4 Comparison of Open-Ended and Closed-End Health Care Financing

Open-Ended Entitlement Funding

Patients	Providers	Insurance	Short-Run Problems	Long-Run Problems
Demand care	Produce services	Pays bills *(all risks are here and purely financial)*	Variability in costs	Costs escalate uncontrollably

Closed-End Budget Funding

Government	Providers	Patients	Short-Run Problems	Long-Run Problems
Allocates budget *(no financial risk—political unrest)*	Produce services *(consumer complaints)*	Receive care *(quality/quantity risk)*	Government blamed for everything	Stagnant, unresponsive system since customers carry no $$

Hospitals, physicians and other providers had even less incentive to hold the line on costs, since larger total insurance reimbursements implied larger total payments to providers. The end result was that costs soared out of control. Eventually employers, Medicare, and Medicaid were all forced to make changes to reduce expenditures. In Medicare and Medicaid, the freedom of doctors and hospitals to charge what they wanted was replaced by controlled administrative prices under the prospective payment "Resource Based Relative Value System" (RBRVS) (see Chapter 6) and "Diagnostically Related Group" (DRG) system (see Chapter 8). Corporate health insurance started to control costs by using managed care contracts (Chapter 10). All these contractual innovations can be viewed as attempts to combine open and closed funding to simultaneously control costs and maintain patient satisfaction.

SUGGESTIONS FOR FURTHER READING

Health Insurance Association of America, *Source Book of Health Insurance Data*, 1999 (www.hiaa.org).

Employee Benefit Research Institute (www.ebri.org).

Institute of Medicine, *Employment and Health Benefits: A Connection at Risk*. (Washington, D.C: National Academy Press, 1993).

David M. Cutler and Sarah J. Reber, "Paying for Health Insurance: The Trade-Off Between Competition and Adverse Selection," *Quarterly Journal of Economics* 113 (May 1998): 433–466.

Paul Gertler and Jonathan Gruber, "Insuring Consumption Against Illness," NBER working paper w6035, May 1997, available at www.nber.org/papers/w6035.

John Nyman, *Health Insurance* (Stanford University Press, Palo Alto, Calif., 2002).

Mark V. Pauly, "Taxation, Health Insurance, and Market Failure in the Medical Economy," *Journal of Economic Literature* 24, no.2 (June 1986): 629–675.

SUMMARY

1. From an individual perspective, **insurance is a form of trade** between time periods or between different possible states (healthy or sick) in the future. From a societal perspective, insurance is a method of **pooling risks** so that the burden of financial loss is distributed over many people. An individual's **savings** can spread the cost of illness over time. **Family, friends, and charity** voluntary spreads risk across people. **Private insurance contracts** spread risk through organized markets. **Social insurance** uses taxation to spread risk over all citizens.

2. Due to the uncertain and **uneven distribution of medical care costs,** with 70 percent of total dollars being spent on behalf of the 10 percent of people who become most ill during a year, most health care payments flow through **third-party insurance** intermediaries that pool and transfer funds, which differs from the direct exchange of money for services between two parties (consumers and providers) common to most markets.

3. An **actuarially fair premium** is equal to the **expected value** of a loss, the dollar amount multiplied by the probability of occurrence. The "law of large numbers" means that higher losses for some will be offset by lower losses for others; therefore, for a large group the overall loss usually will be close to the expected value. If each person contributes an average amount, the pooled funds will be enough to pay for all the individual losses.

4. **Insurance companies do not pay for losses,** people do. The entire cost of medical care, including the costs of administration and use of financial capital, is paid through premiums, taxes, or patient coinsurance (e.g., deductibles, co-payments) collected for each service rendered. Therefore, only large, random, infrequent losses are worth insuring. Insurance covering small, regular losses raises costs while providing few benefits from risk reduction.

5. People prefer having an income that is certain rather than the same average income subject to random fluctuations. Because of risk aversion, consumers are willing to pay more than the expected value of a loss to obtain insurance coverage. From the supply side, the excess of premiums received over benefits paid is called the load or **underwriting gains** of the insurance company.

6. People who know that they are likely to sustain a loss are more likely to purchase insurance, resulting in **adverse selection,** a change in the composition of the insured group. This difficulty in the grouping of people for insurance is to be distinguished from an increase in the average loss due to a change in the behavior of individuals.

7. **Moral hazard** occurs whenever having insurance leads individuals to increase the amount spent, or to increase the risk of loss. In health economics, moral hazard most commonly refers to the increase in utilization of medical services that results from being insured. The **welfare loss due to insurance** occurs because people who do not have to pay the bills tend to consume some care that is worth less to them than what it costs to provide. The gains from risk reduction must be worth more than these welfare losses or people would choose to go without insurance. However, the subsidy provided by exempting employer-provided health insurance benefits from taxes encourages extra insurance coverage. There also may be a general rise in the price of medical care because insurance increases the demand for services. This clearly causes a loss of welfare to those who are uninsured and, by increasing overall costs, creates a systemwide distortion that reduces economic efficiency.

8. The **escalation in costs** due to **open-ended entitlement financing** through indemnity insurance that paid bills without imposing restrictions on use has been the primary force driving the development of more extensive contractual solutions through managed care.

PROBLEMS

1. {*cost sharing*} Find four people who have been treated for illness in the past three years. Ask them the following questions.

a. How much did you pay for insurance?

b. How much did the insurance really cost (i.e., what you paid plus what the employer or government paid)?

c. How much did you pay in medical bills?

d. How much did the medical care really cost (i.e., what you paid plus what the insurance company or government paid)?

2. {*actuarially fair premium*} A company with 617 employees had the following experience this year:

	Cost (each)
14 hospitalizations	$5,600
37 physical therapy sessions	$340
9 births	$1,800
4.1 physician visits per employee	$55
2.4 prescriptions filled per employee	$21

Assuming that the cost of medical care rises 7 percent over the next year, what would the actuarially fair premium per employee be for the next year?

3. {*size of risk pool*} Use the information in Figure 4.2 pertaining to a loss of $50,000 that occurs randomly with a probability of one in one hundred. If the insurance company charges $750 per person per year, what is the load above the actuarially fair premium? If one hundred people are in the group, will the insurance company show an underwriting profit? Will the insurance company ever break even? How likely is it that the plan will show a loss next year? With 50 people in the group, is it more or less likely that the plan will show a loss? What about with 500 people? How large does the group have to be before the insurance company can be 99 percent sure that it will show an underwriting gain for the year?

4. {*savings, social insurance*} Explain which mechanism (savings, charity & contributions from friends, private insurance, or social insurance) you believe would cover losses resulting from each of the following conditions:

a. seasonal hay fever

b. congenital birth defects

c. schizophrenia

d. Alzheimer's disease

e. preventive dental cleaning

f. post-traumatic jaw reconstruction

g. cigarette-induced chronic pulmonary obstruction

5. {*adverse selection*} In each of the following pairs, which situation would pose the largest problems regarding adverse selection?

a. A policy covering accidents for all children attending YMCA camps or **b.** A policy covering accidents for college students traveling abroad

c. Inclusion of HIV/AIDS treatment in the standard benefit package offered to teachers or **d.** An optional rider providing HIV/AIDS coverage for an additional premium

e. Basic medical services insurance package offered to students entering college or **f.** Basic medical services package offered to professors seeking early retirement

g. Optional mental health coverage offered to employees of ABC Inc. or **h.** Optional mental health coverage offered to children of ABC Inc. employees

6. {*moral hazard*} Explain which of the following types of insurance coverage would most likely cause the biggest problems resulting from moral hazard.

a. Indemnity payments of $10,000 for each eye or limb lost or **b.** Indemnity payments of $50 for each day spent in a nursing home

c. Treatment in an emergency room or **d.** Treatment in an intensive care unit

e. Arthroscopic surgery for knee injuries or **f.** Amputation for foot injuries

g. Family counseling or **h.** Electroconvulsive therapy

i. Decongestants or **j.** Antibiotics

7. {*moral hazard*} The following table gives the demand curve for doctor visits for Ralph, who doesn't have health insurance. Assume that Ralph responds only to the amount he must pay out of pocket when deciding how much care to use. By filling in the blank lines, calculate Ralph's new demand curve if he obtained insurance coverage that paid 80 percent of the bill. If the charges are $100 (i.e., Ralph pays $20 out of pocket), how many of the additional services Ralph uses are worth less (to him) than what they cost? Worth less to him than what he pays?

Price per visit	Number of visits	Out-of-pocket cost with insurance	Number of visits with insurance
$0	20	—	—
$20	18	—	—
$50	15	—	—
$100	10	—	—
$150	5	—	—

8. {*welfare loss*} Bill's new insurance policy contains a prescription plan that provides all drugs through a local pharmacy with a $2 co-payment. Under the old insurance, Bill had to pay for his own medication and purchased 9 inhalers at $17 apiece to help control his asthma. With the new plan, Bill purchased 15 inhalers, keeping some as spares in his glove compartment and desk, since he only had to pay a $2 co-payment for each one. How much are the six additional inhalers worth to Bill? How much do they cost him? How much do they cost the insurance company? Is Bill better or worse off under the new plan?

9. {*incidence*} When medical care is reimbursed through employer-provided insurance, whose welfare is ultimately affected when the cost of medical care rises: the owners of the firm that pays the premiums (employer), the government whose revenues are reduced because insurance benefits are not taxable as wages, or the public in their roles as workers, consumers, and taxpayers? Is there any difference between short-term and long-term effects?

ENDNOTES

1. Gary Becker, *A Treatise on the Family* (Cambridge, Mass.: Harvard University Press, 1981).
2. Robert H. Frank, *Passions Within Reason: The Strategic Role of the Emotions* (New York: Norton, 1988).
3. Edward O. Wilson, *On Human Nature* (Cambridge, Mass.: Harvard University Press, 1976); Jerome H. Barkow, Leda Cosmides, John Tooby, eds., *The Adapted Mind: Evolutionary Psychology and the Generation of Culture* (New York: Oxford University Press, 1992).

4. Rosemary Stevens, *In Sickness and In Wealth: American Hospitals in the Twentieth Century* (New York: Basic Books, 1989); John D. Thompson, *The Hospital: A Social and Architectural History* (New Haven, Conn.: Yale University Press, 1975).
5. William A. Glaser, *Health Insurance in Practice: International Variations in Financing, Benefits, and Problems* (San Francisco: Jossey-Bass, 1991).
6. William Aaronson, Jacqueline Zinn, and Michael Rosko, "Medicare Catastrophic Health Insurance," *Journal of Health Politics, Policy and Law* (1993).
7. *Health Care Financing Review, Medicare and Medicaid Statistical Supplement, 1995,* p. 35; Marc L. Berk and Alan Monheit, "The Concentration of Health Expenditures, Revisited" *Health Affairs*, 20, no.2 (March 2001): 9–18.
8. The distribution of costs across individuals can be measured only for personal health care costs that are billed to individuals, not overhead items such as public health, construction, insurance administration, etc. Such overhead items make up about 10 percent of national health expenditures, and hence the "all persons" average in Table 4.2 is only 90 percent as large as the per capita average for all national health expenditures reported elsewhere. In truth, many costs have overhead components and are difficult to unambiguously assign to a single person, although they are clearly concentrated on the most ill and not evenly distributed. Many economists would argue that costs are even more concentrated than Table 4.2 indicates because hospitals and physicians typically overcharge the least complex patients to subsidize the most difficult and complex cases (see the discussion of "cost shifting" in Chapter 8).
9. Bureau of Labor Statistics, U.S. Dept. of Labor, *Employment Cost Indexes and Levels, 1975-90,* Bulletin 2372, 1990.
10. John A. Nyman, "The value of health insurance: the access motive," *Journal of Health Economics* 18 (1999): 141–152.
11. David M. Cutler and Sarah J. Reber, "Paying for Health Insurance: The Trade-Off Between Competition and Adverse Selection," *Quarterly Journal of Economics* 113 (May 1998): 433–466.
12. Lewis C. Workman, "Life Annuities," in *Mathematical Foundations of Life Insurance* (Atlanta, Ga.: Life Office Management Association, 1982), 155-195.
13. Kevin F. O'Grady, Willard G. Manning, Joseph P. Newhouse and Robert H. Brook, "The Impact of Cost Sharing on Emergency Department Use," *New England Journal of Medicine* 313 (1985): 484–490; Mark V. Pauly, "Taxation, Health Insurance and Market Failure in the Medical Economy," *Journal of Economic Literature* 24, no. 2 (June 1986): 629– 675.
14. The size of the welfare triangle is $(P_{original} - P_{insured}) \times (Q_{insured} - Q_{original}) \div 2$, which for this example would be $(\$20 - \$4) \times (9 - 5) \div 2 = \$32$. This is slightly less than in the numerical example because with discrete units (i.e., one, two, . . . eight, nine X-rays, with no fractions) the demand curve is not a continuous straight line, but a step function, and so the area between the original $20 line and the demand curve is somewhat larger. In most cases, economists use the continuous formula, since with many consumers buying many units of service, the individual bumps are less important and the demand curve approximates a continuous line.
15. Martin S. Feldstein, "The Welfare Loss of Excess Health Insurance," *Journal of Political Economy* 81, no. 2 (1973): 251– 280.
16. Gina Kolata, "Medical fees are often higher for patients without insurance," *New York Times*, April 1, 2001(http://www.nytimes.com). However, it is *sometimes* the case that the profits that hospitals make from insured patients are used to provide charity services to the uninsured (see discussion of cost-shifting in Chapter 8). Whether or not an uninsured person is made better or worse off depends upon whether or not they receive services for free, or with sufficient subsidy that the price to them is less than the market price would be without insurance.
17. Alan Maynard and Karen Bloor, "Introducing a Market to the United Kingdom's National Health Service," *New England Journal of Medicine,* 334, no.9 (1996): 604–608.