

Markets with Asymmetric Information

For most of this book, we have assumed that consumers and producers have complete information about the economic variables that are relevant for the choices they face. Now we will see what happens when some parties know more than others—i.e., when there is **asymmetric information**.

Asymmetric information is quite common. Frequently, a seller of a product knows more about its quality than the buyer does. Workers usually know their own skills and abilities better than employers. And business managers know more about their firms' costs, competitive positions, and investment opportunities than do the firms' owners.

Asymmetric information also explains many institutional arrangements in our society. It is one reason why automobile companies offer warranties on parts and service for new cars; why firms and employees sign contracts that include incentives and rewards; and why the shareholders of corporations must monitor the behavior of managers.

We begin by examining a situation in which the sellers of a product have better information about its quality than buyers have. We will see how this kind of asymmetric information can lead to market failure. In the second section, we see how sellers can avoid some of the problems associated with asymmetric information by giving potential buyers signals about the quality of their product. Product warranties provide a type of insurance that can be helpful when buyers have less information than sellers. But as the third section shows, the purchase of insurance entails difficulties of its own when buyers have better information than sellers.

In the fourth section, we show that managers may pursue goals other than profit maximization when it is costly for owners of private corporations to monitor their behavior. In other words, managers have better information than owners. We also show how firms can give managers an incentive to maximize profits even when monitoring their behavior is costly. Finally, we show that labor markets may operate inefficiently when employees have better information about their productivity than employers have.

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asymmetric information Situation in which a buyer and a seller possess different information about a transaction.

17.1 Quality Uncertainty and the Market for Lemons

Suppose you bought a new car for \$20,000, drove it 100 miles, and then decided you really didn't want it. There was nothing wrong with the car—it performed beautifully and met all your expectations. You simply felt that you could do just as well without it and would be better off saving the money for other things. So you decide to sell the car. How much should you expect to get for it? Probably not more than \$16,000—even though the car is brand new, has been driven only 100 miles, and has a warranty that is transferable to a new owner. And if you were a prospective buyer, you probably wouldn't pay much more than \$16,000 yourself.

Why does the mere fact that the car is second-hand reduce its value so much? To answer this question, think about your own concerns as a prospective buyer. Why, you would wonder, is this car for sale? Did the owner really change his or her mind about the car just like that, or is there something wrong with it? Is this car a "lemon"?

Used cars sell for much less than new cars because *there is asymmetric information about their quality*. The seller of a used car knows much more about the car than the prospective buyer does. The buyer can hire a mechanic to check the car, but the seller has had experience with it and will know more about it. Furthermore, the very fact that the car is for sale indicates that it may be a "lemon"—why sell a reliable car? As a result, the prospective buyer of a used car will always be suspicious of its quality—and with good reason.

The implications of asymmetric information about product quality were first analyzed by George Akerlof.¹ Akerlof's analysis goes far beyond the market for used cars. The markets for insurance, financial credit, and even employment are also characterized by asymmetric information about product quality. To understand the implications of asymmetric information, we will start with the market for used cars and then see how the same principles apply to other markets.

The Market for Used Cars

Suppose two kinds of used cars are available—high-quality cars and low-quality cars. Also suppose that both sellers and buyers can tell which kind of car is which. There will then be two markets, as illustrated in Figure 17.1. In part (a), S_H is the supply curve for high-quality cars, and D_H is the demand curve. Similarly, S_L and D_L in part (b) are the supply and demand curves for low-quality cars. For any given price, S_H lies to the left of S_L because owners of high-quality cars are more reluctant to part with them and must receive a higher price to do so. Similarly, D_H is higher than D_L because buyers are willing to pay more to get a high-quality car. As the figure shows, the market price for high-quality cars is \$10,000, for low-quality cars \$5000, and 50,000 cars of each type are sold.

In reality, the seller of a used car knows much more about its quality than a buyer does. (Buyers discover the quality only after they buy a car and drive it for a while.) Consider what happens, then, if sellers know the quality of cars, but buyers do not. Initially, buyers might think that the odds are 50-50 that a car will be high quality. Why? Because when both sellers and buyers know the quality,

¹George A. Akerlof, "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *Quarterly Journal of Economics* (August 1970): 488-500.

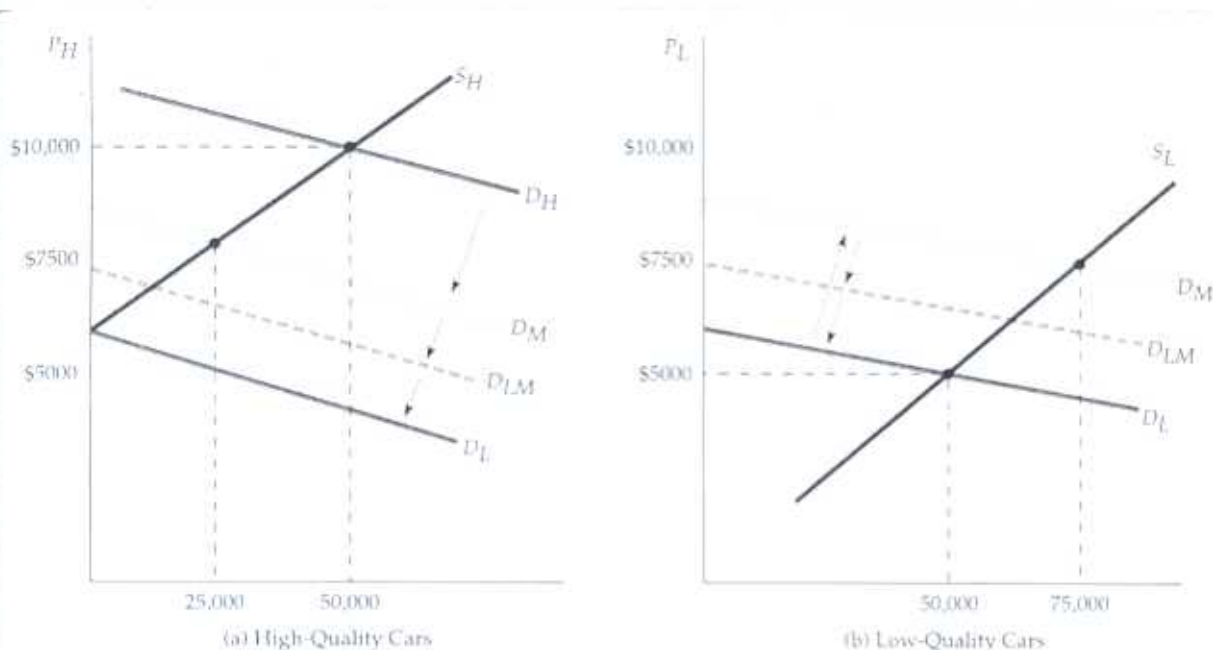


FIGURE 17.1 The Market for Used Cars

When sellers of products have better information about product quality than buyers, a "lemons problem" may arise in which low-quality goods drive out high quality goods. In (a) the demand curve for high-quality cars is D_H . However, as buyers lower their expectations about the average quality of cars on the market, their perceived demand shifts to D_M . Likewise, in (b) the perceived demand curve for low-quality cars shifts from D_L to D_M . As a result, the quantity of high-quality cars sold falls from 50,000 to 25,000, and the quantity of low-quality cars sold increases from 50,000 to 75,000. Eventually, only low quality cars are sold.

50,000 cars of each type are sold. When making a purchase, buyers therefore view all cars as "medium quality," in the sense that there is an equal chance of getting a high-quality or a low-quality car. (Of course, after buying the car and driving it for a while, they will learn its true quality.) The demand for cars perceived to be medium quality, denoted by D_M in Figure 17.1, is below D_H but above D_L . As the figure shows, these medium-quality cars will sell for about \$7500 each. However, fewer high-quality cars (25,000) and more low-quality cars (75,000) will now be sold.

As consumers begin to realize that most cars sold (about three-fourths of the total) are low quality, their perceived demand shifts. As Figure 17.1 shows, the new perceived demand curve might be D_{LM} , which means that, on average, cars are thought to be of low to medium quality. However, the mix of cars then shifts even more heavily to low quality. As a result, the perceived demand curve shifts further to the left, pushing the mix of cars even further toward low quality. This shifting continues until only low-quality cars are sold. At that point, the market price would be too low to bring forth any high-quality cars for sale, so consumers correctly assume that any car they buy will be low quality. As a result, the only relevant demand curve will be D_L .

The situation in Figure 17.1 is extreme. The market may come into equilibrium at a price that brings forth at least some high-quality cars. But the fraction of high-quality cars will be smaller than it would be if consumers could identify qual-

ity before making the purchase. That is why you should expect to sell your brand new car, which *you know* is in perfect condition, for much less than you paid for it. Because of asymmetric information, low-quality goods drive high-quality goods out of the market. This phenomenon, which is sometimes referred to as the *lemons problem*, is an important source of market failure. It is worth emphasizing:

The lemons problem: With asymmetric information, low-quality goods can drive high-quality goods out of the market.

Implications of Asymmetric Information

Our used cars example shows how asymmetric information can result in market failure. In an ideal world of fully functioning markets, consumers would be able to choose between low-quality and high-quality cars. While some will choose low-quality cars because they cost less, others will prefer to pay more for high-quality cars. Unfortunately, consumers cannot in fact easily determine the quality of a used car until after they purchase it. As a result, the price of used cars falls, and high-quality cars are driven out of the market.

Market failure arises, therefore, because there are owners of high-quality cars who value their cars less than potential buyers of high-quality cars. Both parties could enjoy gains from trade, but, unfortunately, buyers' lack of information prevents this mutually beneficial trade from occurring.

Adverse Selection Our used car scenario is a simplified illustration of an important problem that affects many markets—the problem of adverse selection. **Adverse selection** arises when products of different qualities are sold at a single price because buyers or sellers are not sufficiently informed to determine the true quality at the time of purchase. As a result, too much of the low-quality product and too little of the high-quality product are sold in the marketplace. Let's look at some other examples of asymmetric information and adverse selection. In doing so, we will also see how the government or private firms might respond to the problem.

The Market for Insurance Why do people over age 65 have difficulty buying medical insurance at almost any price? Older people do have a much higher risk of serious illness, but why doesn't the price of insurance rise to reflect that higher risk? Again, the reason is asymmetric information. People who buy insurance know much more about their general health than any insurance company can hope to know, even if it insists on a medical examination. As a result, adverse selection arises, much as it does in the market for used cars. Because unhealthy people are more likely to want insurance, the proportion of unhealthy people in the pool of insured people increases. This forces the price of insurance to rise, so that more healthy people, aware of their low risks, elect not to be insured. This further increases the proportion of unhealthy people among the insured, thus forcing the price of insurance up more. The process continues until most people who want to buy insurance are unhealthy. At that point, insurance becomes very expensive, or—in the extreme—insurance companies stop selling the insurance.

Adverse selection can make the operation of insurance markets problematic in other ways. Suppose an insurance company wants to offer a policy for a

adverse selection Form of market failure resulting when products of different qualities are sold at a single price because of asymmetric information, so that too much of the low-quality product and too little of the high-quality product are sold.

particular event, such as an auto accident that results in property damage. It selects a target population—say, men under age 25—to whom it plans to market this policy, and it estimates the frequency of accidents within this group. For some of these people, the probability of being in an accident is low, much less than .01; for others it is high, much more than .01. If the insurance company cannot distinguish between high- and low-risk men, it will base the premium for all men on the average experience—i.e., an accident probability of .01. With better information, some people (those with low probabilities of an accident) will choose not to insure, while others (those with high probabilities of an accident) will purchase the insurance. This in turn raises the accident probability among those who choose to be insured above .01, forcing the insurance company to raise its premium. In the extreme, only those who are likely to be in an accident will choose to insure, making it impractical to sell insurance.

One solution to the problem of adverse selection is to *pool risks*. For health insurance, the government might take on this role, as it does with the Medicare program. By providing insurance for *all* people over age 65, the government eliminates the problem of adverse selection. Likewise, insurance companies will try to avoid or at least reduce the adverse selection problem by offering group health insurance policies at places of employment. By covering all workers in a firm, whether healthy or sick, the insurance company spreads risks and thereby reduces the likelihood that large numbers of high-risk individuals will purchase insurance.²

The Market for Credit By using a credit card, many of us borrow money without providing any collateral. Most credit cards allow the holder to run a debt of several thousand dollars, and many people hold several credit cards. Credit card companies earn money by charging interest on the debit balance. But how can a credit card company or bank distinguish high-quality borrowers (who pay their debts) from low-quality borrowers (who don't)? Clearly, borrowers have better information—i.e., they know more about whether they will pay than the lender does. Again, the lemons problem arises. Low-quality borrowers are more likely than high-quality borrowers to want credit, which forces the interest rate up, which increases the number of low-quality borrowers, which forces the interest rate up further, and so on.

In fact, credit card companies and banks *can*, to some extent, use computerized credit histories, which they often share with one another, to distinguish low-quality from high-quality borrowers. Many people, however, think that computerized credit histories invade their privacy. Should companies be allowed to keep these credit histories and share them with other lenders? We can't answer this question for you, but we can point out that credit histories perform an important function: They eliminate, or at least greatly reduce, the problem of asymmetric information and adverse selection—a problem that might otherwise prevent credit markets from operating. Without these histories, even the credit-worthy would find it extremely costly to borrow money.

²Some people argue that pooling risks is not the main justification for Medicare, because most people's medical histories are well established by age 65, making it feasible for insurance companies to distinguish among high-risk and low-risk individuals. Another justification for Medicare is a distributional one. After age 65, even relatively healthy people are likely to need more medical care, making insurance expensive even without asymmetric information, and many older people would not have sufficient income to purchase the insurance.