

12 Asymmetric Information

Moral Hazard, Adverse Selection

So far in our study of markets we have not examined the problems raised by differences in information: by assumption buyers and sellers were both perfectly informed about the quality of the goods being sold in the market. This assumption can be defended if it is easy to verify the quality of an item. If it is not costly to tell which goods are high-quality goods and which are low-quality goods, then the prices of the goods will simply adjust to reflect the quality differences.

But if information about quality is costly to obtain, then it is no longer plausible that buyers and sellers have the same information about goods involved in transactions. There are certainly many markets in the real world in which it may be very costly or even impossible to gain accurate information about the quality of goods being sold.

One example is a labor market: so far we assumed that all the workers offer a homogenous labor for sale to firms. We assumed that each worker provides the same quality of work and the same level of effort. However, in reality it can be very difficult for a firm to determine how productive workers are.

When a consumer buys a used car it may be very difficult for him to determine if it is a good car or a lemon. By contrast, the seller of the used car probably has a pretty good idea of the quality of the car. We will see that this **asymmetric information** may cause significant problems with the efficient functioning of a market.

The market for Lemons

Let's look at a model of a market where the demanders and suppliers have different information about the qualities of the goods being sold. Consider a market with 100 people who want to sell their used cars and 100 people who want to buy a used car. Everyone knows that 50 of the cars are "plums" (high-quality cars) and 50 are "lemons" (low-quality cars). The current owner of each car knows its quality but the prospective purchasers don't know whether any given car is a plum or a lemon. The owner of a lemon is willing to sell it for \$1000 and the owner a plum is willing to sell it for \$2000. The buyers of the car are willing to pay \$2400 for a plum and \$1200 for a lemon.

If it is easy to verify the quality of the cars there will be no problems in this market. The lemons will sell at some price between \$1000 and \$1200 and plums will sell at some price between \$2000 and \$2400. But what happens to the market if the buyers can't observe the quality of the car? Buyers will have to guess about how much each car is worth. If each car is equally likely to be a plum as a lemon, then a buyer would be willing to pay the expected value of the car - $\frac{1}{2}1200 + \frac{1}{2}2400 = \1800 .

The problem is as follows: Who would be willing to sell their car at that price? The owners of lemons certainly would, but the owners of the plums wouldn't be willing to sell their car for this price because they require at least \$2000 for it. But buyers know this and hence they would only be willing to pay up to \$1200. As a result only lemons will be sold on the market for a price between \$1000 and \$1200. Even though the price at which buyers are willing to buy plums exceeds the price at which sellers are willing to sell them, no such transactions will take place.

What is the source of this market failure? The problem is that there is an externality between the sellers of good cars and bad cars; when an individual decides to try to sell a bad car, he affects the purchasers' perceptions of the quality of the average car on the market. This lowers the price that they are willing to pay for the average car, and it thus hurts the people who are trying to sell good cars. It is this externality that creates the market failure.

The cars that are most likely to be offered for sale are the ones that people want most to get rid of. The very act of offering to sell something sends a signal to the prospective buyer about its quality. If too many low-quality items are offered for sale it makes it difficult for the owners of high-quality items to sell their products.

12.1 Adverse selection

This phenomenon that we just described is known as adverse selection. In other words, **the term adverse selection or negative selection refers to a market process in which "bad" results occur when buyers and sellers have asymmetric information** (i.e. access to different information): the "bad" products or customers are more likely to be selected. A bank that sets one price for all its checking account customers runs the risk of being adversely selected against by its low-balance, high-activity (and hence least profitable) customers.

Consider another example from the insurance industry. Suppose that insurance company wants to offer insurance for car theft. In some areas there is a high probability that a car will be stolen, and in other areas thefts are quite rare. Suppose that the insurance company decides to offer the insurance based on the average theft. What would happen? Who is going to buy the insurance at the average rate? Not the people from the safe communities - they don't need much insurance anyway. Instead, the people in the communities with a high incidence of theft will want the insurance because they are the ones who need it. This means that the insurance claims will mostly be made by the consumers who live in the high-risk areas. The insurance company will get an **adverse selection**. In fact the term "adverse selection" was first used in the insurance industry to describe just this sort of problem.

It follows that the insurance company must base their rates on the "worst-case" forecasts and that consumers with a low, or negligible risk of car theft will be unwilling to purchase the resulting high-priced insurance.

A similar problem arises with **health insurance**. The potentially 'adverse' nature of this phenomenon can be illustrated by the link between smoking status and mortality. Non-smokers, on average, are more likely to live longer, while smokers, on average, are more likely to die younger. If insurers do not vary prices for life insurance according to smoking status, life insurance will be a better buy for smokers than for non-smokers. So smokers may be more likely to buy insurance, or may tend to buy larger amounts, than non-smokers. The average mortality of the combined group will be higher than the average mortality of the general population. From the insurer's viewpoint, the higher mortality of the group which 'selects' to buy insurance is 'adverse'. The insurer raises the price of insurance accordingly. As a consequence, non-smokers may be less likely to buy insurance (or may buy smaller amounts) than if they could buy at a lower price to reflect their lower risk. The reduction in insurance purchase by non-smokers is also 'adverse' from the insurer's viewpoint.

In such situation it is possible that everyone can be made better off by requiring the purchase of insurance that reflects the average risk in the population. The high-risk people are better off

because they can purchase insurance at rates that are lower than the actual risk they face and the low-risk people can purchase insurance that is more favorable to them than the one offered if only high-risk people purchased it. This may seem strange, because usually more choice is better but in this case forcing everyone to buy a certain insurance can improve the situation of all. This is caused by the externality described above.

In fact, some employers offer health plans to their employees as part of the package of fringe benefits. The insurance company can base its rates on the averages over the set of employees and is assured that all employees must participate in the program, thus eliminating the adverse selection.

12.2 Moral hazard

Another interesting problem that arises in the insurance industry is known as the moral hazard problem. Consider the car-theft insurance market again and suppose for simplicity that all of the consumers live in areas with identical probabilities of theft, so that there is no problem of adverse selection. On the other hand, the probability of theft may be affected by the actions taken by the car owners.

For example, if the car owners don't bother to lock their cars or do not use the alarm, the car is much more likely to be stolen than if they use a better security system. Similar examples arise in other sorts of insurance. In the case of health insurance, for example, the consumers are less likely to need the insurance if they take actions associated with a healthy lifestyle. We will refer to actions that affect the probability that some event occurs as taking care. When it sets its rates the insurance company has to take into account the incentives that the consumers have to take an appropriate amount of care. If no insurance is available consumers have an incentive to take the maximum possible amount of care. If it is impossible to buy car insurance, then all car owners would use high security expensive locks. In this case the individual bears the full cost of his actions and accordingly he wants to "invest" in taking care until the marginal benefit from more care just equals the marginal cost of doing so.

But if a consumer can purchase car insurance, then the cost of having his car stolen is much less. After all, if the car is stolen then the person simply has to report it to the insurance company and he will get insurance money to replace it. This lack of incentive to take care is called **moral hazard**. In other words **moral hazard refers to the situation when a person that takes no risk may behave differently compared to situation when they are fully exposed to risk**. Notice the trade-off here: too little insurance means that people bear a lot of risk, too much insurance means that people will take inadequate care.

If the amount of care is observable there is no problem. The insurance company can base the rates on the amount of care taken. The insurance company can have different rates for smokers, for the companies that installed fire sprinkles in their building, to car owners who buy car alarms and so on. But usually the insurance companies can not perfectly observe relevant actions. What does this imply about the type of insurance offered? In general, insurance companies want customers to face some part of the risk. So most of insurance policies include "deductible" - money that the customer has to pay in any claim. This type of policy guarantees that the customer has an incentive to take appropriate care.

We have a paradoxical result here: usually in competitive market the price is determined as supply equals demand, or marginal willingness to buy equals marginal willingness to sell. In the case of

moral hazard, market equilibrium has a property that each customer wants to buy more insurance and insurance companies are willing to provide more insurance if customers continue to take the same level of care. However, insurance companies can not do that, because if they provide more insurance, customers would start to take less care.

Summary:

Moral hazard refers to situations where one side of the market can not observe the actions of the other. For this reason it is sometimes called a hidden action problem. **Adverse selection** refers to situations there one side of the market can not observe the type or quality of the goods on other side of the market. For this reason it is sometimes called a hidden information problem.

Possible solutions of problems with asymmetric information:

- Signaling: to overcome adverse selection (lemon market). Owners of good cars can signal the quality of their products and offer a warranty. Only producers of high-quality goods can do that, owner of low-quality goods will not offer warranty because they would lose a lot of money.
- Incentives: to overcome moral hazard problem. An owner of the company needs his employees to work hard but their effort is not observable. He need to use incentives for the employees. An obvious solution is to make part of the salary depend on the performance (profitability of the firm). This is also known as a principal-agent problem.