SOME ISSUES IN ECONOMICS OF INFORMATION

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ABSTRACT

The article first examines into a situation in which the seller of a product have better information about its quality than the buyers have. Then it has been seen how this kind of asymmetric information can lead to market failure. A model of quality choice is considered. The market for insurance service where buyers of insurance policies have better information than sellers of such policies has also been taken up. Then the problem of moral hazard is considered. In fine, signalling has been suggested as a solution to the problem of asymmetric information.

The most rapidly growing area in economic theory in the last decade has been the area of information economics. In this article we shall discuss some of the basic themes of this subject. The first to start with is markets with <u>asymmetric information</u>. Asymmetric information is said to exist in situations where one economic agent knows something that another economic agent does not know. Asymmetric information is characteristic of many business situations. Frequently, a seller of a product knows more about its quality than the buyer does. A worker might have a better idea of how much he could produce than his employer does. Asymmetric information explains many institutional arrangements in our society. It is a 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 so on.

In the first section we examine a situation in which the seller of a product have better information about its quality than buyers have. We shall see how this kind of asymmetric information can lead to market failure. In the second section we consider a model of quality choice. In the third section we take up the market for insurance service where buyers of insurance policies have better information than sellers of such policies. In the fourth section we consider the problem of moral hazard. In section five we consider signaling as a solution to the problem of asymmetric information.

Market for Lemons

Consider the market for used cars. Suppose you bought a new Maruti Car for Rs. 100,000, drove it 100 kilometers, and then decided you really did not 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

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for it? Probably not more than Rs. 80,000- even though the car is brand new, has been driven only 100 kilometer and has a warranty that is transferable to a new owner.

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 analysed by George Akerlof in a classic paper in 1970. ["The market for Lemons: Quality uncertainty and the Market Mechanism", *Quarterly Journal of Economics,* August 1970. Akerlof is the Nobel Prize winner of 2001 for his contribution in this area.] Akerlof's analysis goes far beyond   the   market for   used   cars. The   markets   for insurance, financial   credit   and   even   employment   are   also characterised by asymmetric quality information. To understand its implications we shall start with the market for used cars and then see how the same principles apply to other markets.

Consider a market with 100 sellers who want to sell their used Maruti cars and 100 buyers who want to buy a used car. Every one knows that 50 of the cars are " plums" and 50 are"lemons" [A "plum" is slang for a good car, a "lemon" is slang for a bad car.]. The owner of a lemon is willing to sell it for Rs.50,000 while the owner of a plum wants to get Rs.100,000 buyers are willing to pay a maximum of Rs.60,000 for lemons and Rs.120,000 for plums.   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 Rs.50,000 and Rs.60,000, while plums will sell for any price between Rs.100,000 and Rs.120,000. But now suppose that only the owners know whether their cars or plums or lemons. A buyer can discover the quality of a car only after purchasing it and driving it around for a while.

In this case, the buyers have to guess about how much each car is worth. Let us make the simple assumptions about the forms that this guess takes: we assume that if a car is equally likely to be a plum or a lemon, then a typical buyer would be willing to pay the expected value of the car. Using the numbers described above this means that the buyer would be willing to pay Rs. (0.5*60000 + 0.5*120000) =Rs.90000.But who would be willing to sell their car at that price? The owners of the lemons certainly would, but the owners of the plums would not be willing to sell their cars - by assumption they need at least Rs.100,000 to part with their cars. The price that the buyers are willing to pay for an "average" car is less than the price that the sellers of the plums want in order to part with their cars. At a price of Rs.90,000 only lemons would be offered for sale.

But if the buyer was certain that he would get a lemon, then he would not be willing to pay Rs.90,000 for it. In fact the equilibrium price in this market would have to be somewhere between Rs.50,000 and Rs.60,000. For a price in this range only owners of lemons would offer their cars for sale, and buyers would therefore correctly expect to get a lemon. In this market none of the plums ever get sold. 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. There is an analogy with Gresham's Law which states that 'bad money drives out good money'. In this case we get the new version 'bad cars drive out good cars from the market for used cars'. This example shows how asymmetric information can result in market failure. In an ideal world of fully functioning markets, consumer would be able to choose between low-quality and high-quality cars. Some would choose low-quality cars because they cost less, while others would 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. So the price of used cars falls, and high-quality cars are driven out of the market.

The source of the market failure is an externality between the sellers of good cars and bad cars. When an individual decides to try sell a bad car, he affects the purchasers' perception of the quality of average car on the market. This lowers the price that the buyers are willing to pay for the average car and 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.

Quality Choice

In the lemons model there were a fixed number of cars of each quality. Consider now a variation of that model where quality may be determined by the produces. We will show how the equilibrium quality is determined in this simple market.

Suppose that each consumer wants to buy a single umbrella and that there are two different qualities available. Consumers value high-quality umbrellas at Rs. 140 and how quality umbrellas at Rs. 80. It is impossible to tell the quality of the umbrella at the store; this can only the determined after few rainstorms.

Suppose that some manufacturers produce high-quality umbrellas and some produce low-quality umbrellas. Suppose further that both high-quality and low-quality umbrellas cost Rs. 120 to manufacturer and that the industry is perfectly competitive. What would we expect to be the equilibrium quality of umbrellas produces?

We suppose that consumers judge the quality of the umbrellas available in the market by the average quality sold, just as in the case of lemons market. If the fraction of high quality umbrellas is q, then the consumer would be willing to pay $p=140q+80(1-q)$ for an umbrella.There are three cases to consider:

Case : (1). Only low-quality manufacturers produce

In this case the consumers would be willing to pay only Rs.80 for an average umbrella. But it costs Rs.120 to produce an umbrella, so none would be sold.

Case : (2). Only high-quality manufacturers produce

In this case the producers would compete the price of an umbrella down to marginal cost, Rs.120. The consumers are willing to pay Rs.140 for an umbrella, so they would get some consumers' surplus.

Case : (3). Both qualities are produced

In this case competition ensures that the price will be Rs.120. The average quality available must therefore have a value to the consumer of at least Rs.120. This means that we must have 140 q + 80 (1- q) ≥120. The lowest value of q that satisfies this inequality is q=2/3. This means that if 2/3 of the suppliers are high quality the consumers are just willing to pay Rs.120 for an umbrella.

Consumers are willing to purchase umbrellas only if 140q+80(1-q) ≥120. The equilibrium value of q is between 2/3 and 1. In this market the equilibrium price is Rs.120 but the value of the average umbrella to a consumer can be anywhere between Rs.120 and Rs.140, depending on the fraction of high-quality producers. Any value of q between 2/3 and 1 is equilibrium.

However all of these equilibria are not equivalent from the social point of view. The producers get zero producer surplus in all the equilibria, due to the assumption of pure competition and constant marginal cost. So we have only to examine the consumers' surplus. Here it is easy to see that the higher the average quality, the better off the consumers are. The best equilibrium for the viewpoint of the consumers is the one in which only the high-quality goods are produced.

Choosing the Quality :Now let us change the model a bit. Suppose that each producer can choose the quality of umbrella he produces and that it cost Rs.120 to produce a high-quality umbrella and Rs.110 to produce a low-quality umbrella what will happen in this case?

Suppose that the fraction of producers who choose high quality umbrellas is q, where 0<q <1. Consider one of these producers. If it behaves competitively and believes that it has only a negligible effect on the market price and quality, then it would always want to produce only low-quality umbrellas. Since this producer is by assumption only a small part of the market, it neglects its influence on the market price and therefore chooses to produce the more profitable product.

But every producer will reason the same way and only low-quality umbrellas, will be produced. But consumers are only willing to pay Rs.80 for a low quality umbrella so there is no equilibrium. Or, if you will, the only equilibrium involves zero production of either quality of umbrella! The possibility of low quality production has destroyed the market for both qualities of the good!

Market for Insurance

The phenomenon described in the last section is an example of adverse selection. In the model we just examined the low quality items crowded out the high-quality items because of the high cost of accruing information. This adverse selection problem may be so severe that it can completely destroy the market. Let us consider another example of adverse selection. Consider the case of insurance industry. Take the case of medical

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 does not the price of insurance rise to reflect that higher risk? The reason is asymmetric information. People who buy insurance know much more about their general health them any insurance company can hope to know, even if it insists on a medical examination. As a result, there is adverse selection, much as with 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, realising their low risks, elect not to be insured. This further increases the proportion of unhealthy people, which forces the price of insurance up more and so on, until nearly all people who want to buy insurance are unhealthy. At that point selling insurance becomes unprofitable.

Insurance companies cannot base their rates on the average incidence of health problems in the population. They can only base their rates on the average incidence of health problems in the group of potential purchasers. But the people who want to purchase health insurance the most are the ones who are likely to need it the most and thus the rates must reflect this disparity. In such a situation it is possible that everyone can be made better off by requesting 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 insurance offered if only high-risk people purchased it.

A situation like this, where the market equilibrium is dominated by a compulsory purchase plan, is quite surprising to most economists. We usually think that "more choice is better", so it is peculiar that restricting choice can result in a Pareto improvement. But it should be emphasized that this paradoxical result is due to the externality between the low-risk and high-risk people.

In fact there are social institutions that help to solve this market inefficiency. It is commonly the case that 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 programme, thus eliminating the adverse selection.

Consider another example from the insurance industry. Suppose that an insurance company wants to offer insurance for bicycle theft. The company makes a market survey and finds that the incidence of theft varies widely across communities. In some areas there is a high probability that a bicycle 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 rate. What will happen? Answer is: The insurance company will become bankrupt. Who is going to buy the insurance at the average rate? Not the people in the safe communities – they do not need much insurance anyway. Instead the people in the communities with high incidence of theft will want the insurance – they are the ones who need it.

But this means that the insurance claims will mostly be maid by the consumers who live in the high-risk areas. Rates based on the average probability of theft will be a misleading indication of the actual experience of claims filed with the insurance company .The insurance company will not get and unbiased selection of customers; rather they will get on adverse selection.

It follows that in order to break even the insurance company must base their rates on the "worst-case" forecasts and that consumers with low, but not negligible, risk of bicycle theft will be unwilling to purchase the resulting high-price insurance. Thus 'bad' customer drive out 'good' customer out of the insurance market just as bad cars drive out good cars out of the market for uses cars.

Moral Hazard

Another interesting problem that arises in the insurance industry is known as the moral hazard problem. The term is somewhat peculiar, but the phenomenon is not hard to describe. Consider the bicycle-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 bicycle owners.

For example, if the bicycle owners do not bother to lock their bikes or use only a flimsy lock, the bicycle is much more likely to be stolen than if they use a secure lock. Similar examples arise in other sorts of insurance. For example, in the case of health insurance the consumers are less likely to need the insurance if they take actions associated with a healthy lifestyle. We will refer to action that affect the probability that some event occurs as taking care.

When it sets the rates the insurance company has to take into account the incentive 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 bicycle theft insurance, then all bicyclists would use large expensive locks. In this case the individual bears the full cost of his actions and accordingly he wants to invest much in taking care. But if a consumer can purchase bicycle insurance then the cost inflicted on the individual of having his bicycle stolen is much less. After all, if the bicycle is stolen then the person simply has to report it to the insurance company and he will get insurance money to replace it .In the extreme case, where the insurance company completely reimburses the individual for the theft of his bicycle, the individual has no incentive to take care at all. This lack of incentive to take care is called moral hazard.

Note the trade off involved: 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, then there is no problem. The insurance company can base its rates on the amount of care taken. In real life it is common for fire insurance companies to give different rates to businesses that have a fire sprinkler system in their building. Similarly medical insurance companies may charge smokers different

rates than nonsmokers. In this cases the insurance companies attempt to discriminate among users depending on the choices they have made that influence the probability of damage.

But insurance companies can't observe all the relevant actions of those they insure. Therefore we will have the trade-off described above: full insurance means too little care will be undertaken because the individuals don't face the full costs of their actions.

What does this imply about the types of insurance contracts that will be offered? In general, the insurance companies will not want to offer the consumers "complete" insurance. They will always want the consumer to face some part of the risk. This is why most insurance policies include a "deductible", an amount that the insured party has to pay in any claim. By making the consumers pay part of a claim, the insurance companies can make sure that the consumer has an incentive to take some amount of care. Even though the insurance company would he willing to insure a consumer completely if they could verify the amount of care taken, the fact that the consumer can choose the amount of care he takes implies the insurance company will not allow the consumer to purchase as much insurance as he wants if the company cannot observe the level of care.

This is also a paradoxical result when compared with the standard market analysis. Typically the amount of a good traded in a competitive market is determined by the condition that demand equals supply. In the case of moral hazard, market equilibrium has the property that each consumer would like to buy more insurance and the insurance companies would be willing to provide more insurance if the consumers continued to take the same amount of care but this trade can't occur because if the consumers were able to purchase more insurance they would rationally chose to take less care.

Moral hazard refers to situation where one side of the market can't observe the action of the other. For this reason it is sometimes called a <u>hidden action</u> problem. Adverse selection refers to situations where one side of the market can't observe the type or quality of the goods on other side of the market. For this reason it is sometimes called a <u>hidden information</u> problem.

Equilibrium in a market involving hidden action typically involves some form of rationing-firms would like to provide more than they do, but they are unwilling to do so since it will change the incentive of their customers. Equilibrium in a market involving hidden information will typically involve too little trade-taking place because of the externality between the good and bad types.

Equilibrium outcomes in this market appear to be inefficient, relative to equilibrium with full information. Now the question is whether some sort of governmental intervention in the market could improve efficiency even if the government had the same information problems as the firms.

In the case of hidden action considered above, the answer is usually "no". If the government can't observe the care taken by the consumers, then it can do no better than the insurance companies. Of course, the government might have other tools at its disposal that are not available to the insurance company-it would compel a particular level of care, and it could set criminal punishments for those who do not take care. But if the

government can only set prices and quantities, them it can do no better than the private market can do.

Similar issues arise in the case of hidden information. We have already seen that if the government can compel people of all risk classes to purchase insurance, it is possible for everyone to be made better off. This is, on the face of it, a good case for intervention. But there are costs of government intervention as will.

Signalling

We saw that in the model of the used car market asymmetric information about the quality of cars could cause problems in the market; in some cases, the adverse selection problem would result in too few transactions being made. The owners of good used cars have an incentive to try to convey the fact that they have a good car to potential customers. They would like to choose actions that signal the activity of their car to those who might buy it. One sensible signal in this context would be for the owner of a good used car to offer a warranty. This would be a promise to pay the purchaser some agreed upon amount if the car turned out to be a lemon, owners of good cars can afford to offer such a warranty while the owners of lemons can't afford this. This is a way for the owners of the good used cars to signal that they have good cars. In this case signaling helps to make the market perform better. By offering the warranty the sellers of good use cars can distinguish themselves from the sellers of bad used cars. Such sellers will be able to change higher prices that reflect higher quality of their products.

The moral hazard problem also arises in the context of guarantees or warranties provided by sellers of different products like consumer durables. In this case the term of warranty may create an incentive for the buyer to give the product insufficient maintenance or to handle it carelessly. This is a first moral hazard problem. A similar problem raised on the sellers' side when the actual quality is not observable by buyers. A seller may not maintain high quality. There is thus a double moral hazard. It is double, because information is imperfect on both sides: buyers are Imperfectly inform about product quality and the sellers are imperfectly informed about the way in which buyers will subsequently use their product. If the buyers have to pay a part of the cost of repair, then it is possible to limit abuses on the buyers' side. Sellers may provide information in the form of standers and certification to demonstrate quality. Standers are established for a good by deigning a scale for evaluating that product. Certification means that a particular product has been found to meet a stander .For example the mark of the Indian Standard Institution on a consumer good in India certifies that it is a good quality product.

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