Economics 352: Intermediate Microeconomics

Notes and Sample Questions
Chapter 19: The Economics of Information

As the title suggests, this chapter discusses economic issues surrounding information. This might be the value of information itself to a person, problems that arise when there is asymmetric information in an exchange (that is, when one person has information that another doesn’t have) or issues in monitoring an employee (or agent) hired to do a job.

Informational issues in economics are a relatively new area of research and present some very interesting and important questions and results.

Properties of Information
Information has properties that make it different from other goods. Like other goods, every person possesses different information. If two people are engaged in a transaction and they have different information about some aspect of that transaction (the quality of a used car, for example) this is a situation of asymmetric information. Second, information can be replicated at something approaching zero cost, meaning that in some respects information is non-rival in consumption in that one person using a particular piece of information doesn’t reduce another person’s enjoyment of it. However, if this piece of information is secret information about the profitability of a publicly traded firm or about which horse will win a race, sharing the information too broadly will reduce its value to the original holder of the information.

The Value of Information
This section has a fairly complicated mathematical derivation in it that, to be totally honest, made me glaze over. However, Example 19.1 is instructive.

The story in Example 19.1 is that a consumer knows that good y is priced at $3 at one store and $5 at another store, but doesn’t know which store has the lower price. Using the indirect utility function from the Cobb-Douglas utility function $U(x,y)=x^{0.5}y^{0.5}$:

$V(p_x, p_y, I) = \frac{1}{2p_x^{0.5}p_y^{0.5}}$

The expected indirect utility with $I=8$ and $p_x=1$ is given by

$E[V(p_x, p_y, I)] = 0.5 \cdot V(1,3,8) + 0.5 \cdot V(1,5,8) = 2.049$

On the other hand, if this person knew for sure which store was selling good y at a price of $3, her (indirect) utility level would be

$V(p_x, p_y, I) = V(1,3,8) = \frac{8}{2 \cdot 1^{0.5}3^{0.5}} = 2.309$
Now, the question is, if this person knew for sure which store had a price of $3, what level of income would be necessary to give her a utility level equal to the expected utility when she didn’t know which store had which price? That is, how much would she be willing to pay for the information about which store had the lower price?

This is given by solving for the income level with indirect utility equal to 2.049, the utility level when she didn’t know which store had the lower price:

\[
V(p_x, p_y, I) = V(1,3, I) = \frac{I}{2 \cdot 1.5^0.5} = 2.049
\]

\[I = 7.098\]

That is, she is just as well off with the information and income of I=7.098 as she was without the information and income of I=8. So, her maximum willingness to pay for the information is the difference between these two income levels, or 0.902.

To add a bit more to this idea, you might imagine that the consumer discussed in Example 19.1 might simply observe some other tennis players (the good discussed in the book is tennis balls) and watch where they go to buy balls and simply follow the most experienced players to where they make their purchases. She might also ask around (a somewhat costly activity) about prices in order to get that information.

**Asymmetry of Information**

A situation of asymmetric information exists when one party in an exchange knows something that the other party does not know. In particular, as said in the textbook, the seller of a product will usually know more about its limitations than will the buyer. If both buyer and seller are aware of this, the asymmetry can cause real problems in markets.

To illustrate this, consider the standard lemons model. Imagine that in the population of used cars, half are good used cars and have a value of $8,000 and half are lemons (bad used cars) and have a value of $1,000. A buyer doesn’t know whether the car he buys is good or is a lemon until after the sale. His expected value of a randomly selected used car is \(E[V] = 0.5 \times 8,000 + 0.5 \times 1,000 = 4,500\). It might be suspected that a buyer’s willingness to pay for a used car would then be $4,500. However, there is asymmetric information in that the seller knows whether her car is a good car or a lemon. The owner of a good car wouldn’t sell her car for $4,500 when it is worth $8,000. The result is that bad cars drive good cars out of the market (pardon the automobile joke) and the only remaining market is the market for lemons, which would sell for about $1,000. In the absence of some means of positively identifying the quality of a used car, the only market will be for bad used cars. This is the essential problem of asymmetric information.

**Informational Problems in Insurance: Moral Hazard and Adverse Selection**

Insurance markets usually suffer from two informational problems.
The first is *moral hazard*, the fact that people who have insurance will not behave as cautiously as they would if they had insurance. More precisely, they will exercise an inefficiently small amount of caution because they have insurance against the loss. For example, a person who would choose not to go skiing when she did not have health insurance would go skiing when she does have health insurance. A person whose automobile is not insured against theft would be very careful to lock it and may even install a theft prevention system while a person whose automobile is insured won’t take these precautions. The one type of insurance for which moral hazard isn’t likely to be a big problem is life insurance.

The mathematical model presented in the text shows that if an insurance company can perfectly monitor the level of caution (a) that a person puts forth, then the efficient level of caution will be put forth regardless of whether or not a person has insurance. However, if an insurance company cannot perfectly and costlessly monitor how cautious a person is (which they cannot) then an inefficiently small amount of caution will be exercised when people have insurance.

To get around this problem, insurers will often offer discounts for some easily monitored precautionary steps (having an alarm system on a house, not smoking, having an anti-theft system on a car) and will include deductibles in their policies so that the insured party bears at least some of the cost of a loss.

The second problem in insurance is *adverse selection*, the fact that the people who are most willing to buy insurance are those who know that they’re unusually likely to suffer a loss.

The book offers several diagram that show pooling and separating equilibria. As these diagrams are a bit challenging, I offer these descriptions. A pooling equilibrium is one in which an insurer who cannot tell the difference between a high risk person and a low risk person offers one type of insurance policy which both high risk and low risk people will purchase. This equilibrium is often difficult to sustain because the cost of covering high risk people will tend to drive low risk people out of the insurance market. The more likely outcome is that an insurance policy will be devised that high risk people will buy but that low risk people will choose not to buy. The result is that the high risk people will drive low risk people out of the insurance market.

The alternative to a pooling equilibrium is a separating equilibrium, in which an insurer offers two types of policies, one intended for low risk people and the other intended for high risk people. The key is that the policies are designed such that the low risk people prefer to buy the low risk policy and the high risk people prefer to buy the high risk policy. In real life, the differences between the two policies might be the premium paid and the deductible amount. A high risk policy would have a high price, but a low deductible while the low risk policy would have a much lower price, but a higher deductible. The high risk person would see the lower deductible as being worth the higher price because she expects to have lots of losses while the lower risk person would choose to have a higher deductible because he doesn’t expect to suffer a loss. In terms of
Figure 19.3, point G represents the high risk policy (a small or zero deductible and a high premium) while point J represents the low risk policy (a large deductible and a lower premium). For a high risk person, point G is preferred to point J. What the book doesn’t show is that for a low risk person, point J should be preferred to point G.

**Signaling Models**

In any situation with asymmetric information, one potential solution to the problems that the asymmetry presents is signaling, in which the sellers of high quality goods or the low risk people undertake some costly action to show that they are selling high quality goods or that they are of the low risk type.

For example, potential employees might be stupid and lazy or smart and hard working. Those who are smart and hard working can signal this fact by getting a college degree. Getting such a degree, while costly and difficult for a smart and hard working person, would be unimaginable for a stupid and lazy person. So, the fact that a person has a college degree, even if the information gained in getting that degree is of no practical value, signals that they are smart and hard working and should result in them getting paid a higher salary.

The book offers the example of a careful driver signaling the fact that he is a careful driver by buying an “unexciting sedan.” If aggressive drivers really hate driving unexciting sedans, then you can be assured that a person who drives an unexciting sedan will be a passive rather than an aggressive driver.

The important thing in a signaling model is that the signal be prohibitively costly for the wrong type of person to send.

**The Principal-Agent Problem**

A principal-agent situation exists any time one person, the principal, hires someone, the agent, to do something for him. The principal-agent problem is that the principal can’t costlessly monitor the agent to be sure that she is working diligently and carefully. The agent has an incentive to maximize her utility, which is not what the principal would like.

For example, the university hired me to teach this course. They would like me to put forth a maximum effort to deliver an excellent course that will challenge students and offer them every opportunity to learn and excel. I, on the other hand, would prefer to prepare a course that will be marginally acceptable and require a minimum of effort on my part, but not so bad that it gets me fired. The university can’t monitor the quality of the course very effectively, so there is a principal-agent problem.

Two usual ways of getting around the principal-agent problem are incentive contracts (perhaps profit-sharing plans) and monitoring of the agent. Both of these are flawed and will not perfectly resolve the problem. Profit sharing plans are imperfect because an agent will receive only a portion of the additional wealth she generates by working hard, so she will not have sufficient incentive to put forth an efficient level of effort. Monitoring of the agent is usually costly, and may be more costly than it is worth.
Practice Problems
You should try the following problems from the book: 19.1a,b, 19.6

1. In your own words, define the following terms:
   - moral hazard
   - adverse selection
   - pooling equilibrium
   - separating equilibrium
   - signaling
   - principal-agent problem

2. Imagine that there is a loss of $12,000 against which people would like to purchase insurance. Further, imagine that there are three types of risk neutral people, A, B and C, each of which makes up one third of the population. People of type A have a probability of suffering this loss of 0.10. People of type B have a probability of suffering this loss of 0.20. People of type C have a probability of suffering this loss of 0.25. If an insurer cannot tell the difference between people of types A, B and C, what will be the equilibrium in the market for insurance against this loss? That is, what will be the price of the insurance and who will buy it?