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Econ 812

Week 9: Asymmetric Information

I. Moral Hazard
   A. In the real world, everyone is not equally in the dark. In every situation, some people usually know more than others. Economists refer to this as *asymmetric information*. If information is not only imperfect but also asymmetric, inefficient outcomes *may* be the consequence.
   B. Simple case: moral hazard. It is efficient to insure risk-averse agents, but the insured normally knows more about the risks he undertakes than the insurer. Examples:
      1. Auto insurance
      2. Employment contracts (risk-averse workers want constant wage, but apply little effort without performance-based pay)
   C. Thus, once you insure a risk-averse agent, they may want to take additional risks. To cope with such opportunism, agents have to choose a mix of two sub-optimal outcomes:
      1. Less-than-full insurance
      2. Inefficient risk-taking
   D. Example: Insurance deductibles.
   E. Of course, you can often *infer* behavior from outcomes. If you can do so perfectly, then information asymmetries make little difference. But usually inferences from behavior to outcomes are less than perfect, so the moral hazard problem persists to some degree.
   F. Moral hazard is not, however, an efficiency problem if agents are risk-neutral. A risk-neutral CEO, for example, could simply buy all of the stock of his firm and become the sole proprietor. Then he would exert management effort if and only if the expected gain exceeded the expected effort cost.
   G. Furthermore, contractually arranged "punishments" may be able to mitigate or even eliminate moral hazard problems. In particular, if the less-informed can pay to observe the more-informed, then they can enforce good behavior at a low cost with random monitoring and threats of severe punishment.

II. Adverse Selection
   A. A more complex form of asymmetric information is known as adverse selection. Basic idea: You know your own characteristics, but others treat you based on the *average* characteristics of people who superficially resemble you.
   B. So if you are *above average*, you may decide that the market does not make participation worth your while. If enough above average people think this way, the whole market can "unravel"!

C. Simple example. Suppose that true company values are uniformly distributed from 0 to 100. Each company is worth 50% more in the hands of the buyer than it is in the hands of the seller. But sellers know their company's value, while buyers only know averages. What happens?

D. Suppose you, the buyer, bid 50. Then anyone whose company is worth between 0 and 50 sells. The average company sold, therefore, is worth 25*1.5=37.5 to you. You have to pay 50 to for an average payout of 37.5.

E. What happens in equilibrium? The market price falls to 0, and the whole market disappears.
   1. Note how different the outcome is with symmetric information.

F. Of course, the effect of adverse selection could be less severe. If the companies were worth twice at much to buyers as to sellers, there is no effect at all. If half the companies are worth 50 and half are worth 100, then the buyer offers 50, and half of the mutually beneficial potential deals work out.

G. The implications of adverse selection are often poorly understood. Take the used car market. The argument is *not* that asymmetric information allows car sellers to cheat or "take advantage of" car buyers. On average, buyers still benefit from whatever purchases they make. The efficiency problems stem from the exchanges that *don't* happen because buyers can't distinguish good cars from bad.

H. Adverse selection is probably economists' favorite argument for insurance regulation - most credibly, for regulations requiring everyone to buy insurance.

I. This is analogous in the previous example to forcing everyone to sell. Then buyers pay 50, sellers with value of 50 or less gain, and sellers with value of more than 50 lose. But the dollar losses of the last group will be much less than the dollar gains of the first two groups.

J. Economists rarely notice, however, that many insurance regulations are designed to make adverse selection worse! Many regulations specifically forbid insurers from conditioning premia on buyer characteristics. States often subsidize car insurance for reckless drivers, or force insurers to cover them at a loss. Medical insurers are often barred from denying coverage to customers with "pre-existing conditions."

K. A couple of recent empirical studies find little evidence of adverse selection. Two takes on this:
   1. Insurance companies actually know more about you than you do about yourself. They have the actuarial tables. You don't.
   2. More conscientious people both take fewer risks and are more likely to buy insurance.

3. A paper in the *Rand Journal* theoretically models "advantageous" (or "propitious") selection.

L. Free-market defense example.

III. Signaling, I

A. Some Puzzles

1. Why does non-job-related schooling still raise your income? ("What does this have to do with real life?")
2. Why won't people buy goods without a warrantee?
3. Why do you use nice paper on a job application?
4. Why do you (sometimes) have to wear a suit to work?
5. Why are wedding rings so expensive?
6. Why do countries have tons of weapons they never intend to use?
7. Why do male peacocks have such huge tails?

B. A popular way to resolve these paradoxes goes under the heading of "signaling." Basic assumptions:

C. Assumption #1: There are different "types" of people and firms: able and unable, smart and dumb, honest and dishonest, hard-working and lazy...

D. Assumption #2: It is difficult to observe "types" directly. (Asymmetric information).

E. Assumption #3: However: different types (may) have different costs (lower disutility) of performing the same *observable* activity.

1. Smart and hard-working people find it easier to do schoolwork.
2. Lazy people find it more costly to take extra effort with an application.
3. Honest firms find it cheap to provide warrantees.

F. Therefore: It may be in the interest of the type in higher demand to go to school, fill out an application with extra care, provide a warrantee, etc. - *even if the effort itself does NOTHING for buyer or seller!* People only want what the effort proves you already had in the first place.

IV. Signaling, II

A. Example. Suppose there are two kinds of workers, good and bad. Both types are equally numerous. Good workers are worth $100 k to me; bad workers are worth $25 k to me. It costs good workers $25 k to complete school, but $50 k for bad workers to do so. I can tell if a worker finished school, but cannot observe their quality directly. Workers can earn 50% of their value to me if they choose to be self-employed.

B. In any equilibrium:

1. I, the employer, must maximize profits.
2. Good workers must not want to look like bad workers.
3. Bad workers must not want to look like good workers.

C. What happens?

1. There are many obviously silly strategies, like paying all workers the same regardless of education.
2. In equilibrium, though, we should expect only good workers to be educated. So good workers have to be offered at least $75 k, and bad workers at least $12.5 k, or else they turn to self-employment.
3. But offering the lowest wages necessary to prevent self-employment can't be an equilibrium either, because at those wages, bad workers would want to be educated.
4. To deter them, I would have to raise uneducated wages up to $25 k. Can anyone propose a better strategy from my point of view than this one, where I make an average of $12.5 k per worker? If not, we have a NE.

D. Note the deadweight costs: Expected surplus per worker is $31.25 k, but realized surplus is only $18.75 k. The other $12.5 k is a deadweight cost of signaling.
1. Sometimes, though, a costless cash transfer - like a money-back guarantee - can be an effective signal. It is cheaper for an honest firm to give refunds than a dishonest firm.

E. Signaling models have been used to analyze a variety of real-world situations.
1. Education
2. Health care?
3. Funerals

F. Question: If signaling is a deadweight cost, could government action make matters more efficient?

G. Answer: Yes - government could *tax* the signal. Then everyone could get e.g. half as much education and still get the same job offers.

V. The Winner's Curse

A. Imagine there is a second-price auction with N participants. (In a second-price auction, the winner pays the bid of the second-highest bidder).

B. Every bidder has RE about the true value of the item being auctioned. Thus, each estimates its value at $V_i=V+\varepsilon_i$, where V is the true value and $\varepsilon_i \sim N(0,\sigma^2)$.

C. Since your estimate is unbiased, it seems sensible to simply bid your estimate. (Indeed, this seems like a weakly dominant strategy. Can you see why?)

D. In fact, though, this strategy is likely to be disastrous. Why? Even though the *average* estimation error equals 0, the average *winning* estimation error is positive. Conditional on winning, then, you can expect to have over-estimated the item's value.

E. This is known as the "winner's curse." The more serious your error, the more likely you are to win; if you win, you are likely to have made a serious error.

F. If the V_i's were all common knowledge, you could simply take the average to solve this problem.

G. Even when you only know your own V_i, however, there is an obvious solution: underbid! If the winner normally over-estimates the true value by 20%, bid only 80% of your estimate. Then if you win, you won't expect to be burned.

VI. Efficiency Implications of Asymmetric Imperfect Information

A. Symmetric imperfect information has no efficiency implications.

B. If all market agents are equally informed, but the government knows more, the government can simply *publicly reveal* what it knows. There is no need to do more.

C. Asymmetric information *sometimes* has efficiency implications, as we have seen.

D. Even when market outcomes are inefficient, government may be unable to improve matters.

1. Moral hazard

E. In many cases where government could improve matters, actual regulations do the opposite.

1. Limiting contractual punishment
2. Restricting risk-adjusted premiums
3. Subsidizing education