Public Finance II. / Public Economics

Lecture X - Asymmetric information

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Office Hours (Room 5C.30)
Mon 15:15 – 16:00
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Readings:

- Gruber, J. (2005). Public finance and public policy. Macmillan.
- Varian, H. R. (2014). Intermediate Microeconomics: A Modern Approach: Ninth International Student Edition. WW Norton & Company.
- Hindriks, J., & Myles, G. D. (2013). *Intermediate public economics*. MIT press.

The Market for Lemons

- When a consumer buys a used car it may be very difficult for him to determine whether or not 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.

- Such asymmetric information may cause significant problems with the efficient functioning of a market.

- 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” and 50 are “lemons.” 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 part with it for $1000 and the owner of a plum is willing to part with it for $2000. The buyers of the car are willing to pay $2400 for a plum and $1200 for a lemon. In this case the buyers have to guess about how much each car is worth. If a car is equally likely to be a plum as a lemon, then a typical buyer would be willing to pay the expected value of the car = $1800.

- But who would be willing to sell their car at that price? At a price of $1800 only lemons would be offered for sale. 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.

- 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 thus hurts the people who are trying to sell good cars. It is this externality that creates the market failure.

Asymmetric information

- Basic economic theories assume that buyers and sellers are 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.

- However, if the 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. Thus, a key feature of the real world is asymmetric information.

- In economics asymmetric information arises when the two sides of the market have different information about the goods and services being traded. In particular, sellers typically know more about what they are selling than buyers do.

- While information asymmetries inevitably arise, the extent to which they do so and their consequences depend on how the market is organized, and the anticipation that they will arise affects market behavior.

- In this lecture we discuss the ways by which information asymmetries affect the market functioning and how they can be partially overcome though policy intervention.

Hidden knowledge vs. hidden action

- There are two basic forms of asymmetric information that can be distinguished.

  - Hidden knowledge refers to a situation in which one party has more information than the other party on the quality (or “type”) of a traded good or contract variable.

  - Hidden action is when one party can affect the “quality” of a traded good or contract variable by some action and this action cannot be observed by the other party.

Hidden knowledge

- Examples
    - Workers know more about their own abilities than the firm does;
    - Doctors know more about their own skills, the efficacy of drugs and what treatment the patients need than do either the patients themselves or the insurance companies;
        - The person buying life insurance knows more about his health and life expectancy, than the insurance firm;
        - The owner of a car knows more about the quality of the car than potential buyers;
        - The owner of a firm knows more about the firm than a potential investor;
        - The borrower knows more about the riskiness of his project than the lender does; etc.
- Hidden knowledge leads to the adverse selection problem.

Quality Choice

- Unlike in used cars market, quality may be determined by the producers.

- Suppose that each consumer wants to buy a single umbrella and that there are two different qualities available. Consumers value high-quality umbrellas at $14 and low-quality umbrellas at $8. It is impossible to tell the quality of the umbrellas in the store; this can only be determined after a few rainstorms.

- Suppose that each producer can choose the quality of umbrella that he produces and that it costs $11.50 to produce a high-quality umbrella and $11 to produce a low-quality umbrella. What will happen in this case?

- If the producer behaves competitively and believes that it has only a negligible effect on the market rice 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 $8 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 pos-siblity of low-quality production has destroyed the market for both qualities of the good!

Adverse Selection

- The phenomenon described in the last slide 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 acquiring information. As we just saw, this adverse selection problem may be so severe that it can completely destroy the market. Let's consider a few other examples of adverse selection.

- Consider first an example from the insurance industry. Suppose that an insurance company wants to offer insurance for bicycle theft. They do a careful market survey and find that the incident 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 do you think will happen?

- Answer: the insurance company is likely to go broke quickly! Think about it. Who is going to buy the insurance at the average rate? Not the people in 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—they're the ones who need it. It follows that in order to break even the insurance company must base their rates on the "worst-case" forecasts and that consumers with a low, but not negligible, risk of bicycle theft will be unwilling to purchase the resulting high-priced insurance.

- Similar problems & solutions arise with more vs. less productive workers in the company, etc.

Adverse Selection - Government intervention

- If market inefficiency is caused by adverse selection, it is possible that everyone can be made better off by requiring some sort of common action

- For example, in insurance markets, governments typically force all individuals to purchase the insurance that reflects the average risk in the population.

- Compulsory insurance is then a policy that can make many consumers better-off. 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.

Actions convey information

- One fundamental lesson of information imperfections is that actions convey information. Many examples can be given.

    - A willingness to purchase insurance at a given price conveys information to an insurance company, because those most likely to decide the insurance is not worthwhile are those who are least likely to have an accident.

    - The quality of a guarantee offered by a firm conveys information about the quality of its products as only firms with reliable products are willing to offer a good guarantee.

    - The years of schooling may also convey information about the ability of an individual. More able people may go to school longer and the higher wage associated with more schooling may simply reflect the sorting that occurs rather than the ability-augmenting effect of schooling itself.

    - The willingness of an investor to self-finance a large fraction of the cost of a project conveys information about his belief in the project.

    - The size of deductibles and co-payments that an individual chooses in an insurance contract may convey information that he is less risk prone.

Screening

- If insurance companies are faced with consumers whose probabilities of having accidents differ, then it will be to their advantage if they can find some mechanism that allows them to distinguish between the high risk and low risk. Doing so allows them to tailor insurance policies for each type and hence avoid the pooling of risks that causes market unravelling.

- The mechanism that can be used by the insurance companies is to offer a menu of different contracts designed so that each risk type self-selects the contract designed for it. By self-select we mean that the consumers find it in their own interest to select the contract aimed at them.

- Self-selection will involve the high risks being offered full insurance coverage at a high premium while the low risks are offered partial coverage at a low premium requiring them to bear part of the loss. The portion they have to bear consists of a deductible (an initial amount of the loss) and coinsurance (an extra fraction of the loss beyond the deductible).

- An equilibrium like this where different types purchase different contracts is called a separating equilibrium. This should be contrasted to the pooling equilibrium of the previous slide in which all consumers purchasing insurance purchased the same contract. Obviously the high risks will lose from this separation since they will no longer benefit from the lower premium resulting from their pooling with the low risks.

Signalling

- The fundamental feature at the heart of asymmetric information is the inability to distinguish the good from the bad. This is to the detriment of both the seller of a good article, who fails to obtain its true value, and to the purchaser who would rather pay a higher price for something that is known to be good. It seems natural that this situation would be improved if the seller could convey some information that convinces the purchaser of the quality of the product. For instance, the seller may announce the names of previous satisfied customers (employment references can be interpreted in this way) or provide an independent guarantee of quality (such as a report on the condition of a car by a motoring organization). Warranties can also serve as signals of quality of durable goods because if a product is of higher quality it is less costly for the seller to offer a longer warranty on it. Such information, generally termed signals, can be mutually beneficial.

- For a signal to work it must satisfy certain criteria. Firstly, it must be verifiable by the receiver (i.e., the less-informed agent). Being given the name of a satisfied customer is not enough - it must be possible to check back that they are actually satisfied. Secondly, it must be credible. In the case of an employment reference this is dependent partly upon the author of the reference having a reputation to maintain and partly upon the possibility of legal action if false statements are knowingly made. Finally, the signal must also be costly for the sender (i.e., the better-informed agent) to obtain and the cost must differ between various qualities of sender. In the case of an employment reference, this is obtained by a record of quality work. Something which is either costlessly obtainable by both the senders of low- and high-quality or equally costly cannot have any value in distinguishing between them. We now model such signals and see the effect that they have on the equilibrium outcome.

Screening vs. signalling

- In equilibrium both sides of the market are aware of the informational consequences of their actions. In the case where the insurance company or employer takes the initiatives, self-selection is the main screening device. In the case where the insured, or the employee, takes the initiative to identify himself as a better type, then it is usually considered as signalling device. So the differences between screening and signalling lies in whether the informed or uninformed side of the market moves first.

- In other words, the less-informed players (like the insurance companies) use screening (different insurance contracts) to find out what the better-informed players (insurance customer) know (their own risk). In contrast, more-informed players use signals to help the less-informed players find out the truth.

Observability

- Another set of issues arise when actions are not easily observable.
    - An employer would like to know how hard his employee is working
    - A lender would like to know the actions which borrower undertake that might affect the chance of reimbursement.
    - These asymmetries of information about actions are as important as the situations of hidden knowledge. They lead to what is referred to as the moral hazard problem.

Hidden action

- 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.

- 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" in taking care until the marginal benefit from more care just equals the marginal cost of doing so. 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.

- This lack of incentive to take care is called moral hazard. Note the tradeoff involved: too little insurance means that people bear a lot of risk, too much insurance means that people will take inadequate care.

- 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.

- 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—the marginal willingness to pay equals the marginal willingness to sell. In the case of moral hazard, a 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 won't occur because if the consumers were able to purchase more insurance they would rationally choose to take less care!

Hidden action

- Second form of information asymmetry is hidden action. Examples:
    - The manager of a firm does not seek to maximize the return for shareholders but instead trades off her remuneration for less work effort, when it does not simply divert some profit.
    - Firms may find most profitable to make unsafe products when quality is not easily observed.
    - Employers also want to know how hard their workers work.
    - Insurers want to know what care their insured take to avoid an accident.
    - Lenders want to know what risks their borrowers take.
    - Patients want to know if doctors do the right things or if, in an attempt to protect themselves from malpractice suits, they choose conservative medicine, ordering tests and procedures that may not be in the patient's best interests, and surely not worth the costs.
    - The tax authority wants to know if taxing more may induce people to work less or to conceal more income.
    - Government wants to know if more generous pension replacement rates may induce people to retire earlier.

Moral hazard

- From hidden actions arises the moral hazard problem. This refers to the inefficiency that arises due to the difficulties in designing incentive schemes that ensure the right actions are taken. For instance, the price charged for insurance must take into account of the fact that an insured person may become more careless once they have the safety net of insurance cover.

- In other words, moral hazard problem arises when an agent can affect the “quality” of a traded good or contract variable by some action which is not observed by other agents. For instance, a worker, once in employment, may not fully exert themself reasoning that their lack of effort may be hidden amongst the effort of the workforce as a whole. Such possibilities provide the motive for contracts to be designed that embody incentives to lessen these effects.

- In the case of the worker, the employment contract could provide for a wage that is dependent upon some measure of the worker’s performance. Ideally, the measure would be their exact productivity but, except for the simplest cases, this can be difficult to measure. Difficulties can arise because production takes place in teams (a production line can often be interpreted as a team) with the effort of the individual team member impossible to distinguish from the output of the team as a whole. They can also arise through randomness in the relation between effort and output As examples, agricultural output is driven by the weather, maintenance tasks can depend upon the (variable) condition of the item being maintained, and production can be dependent upon the random quality of other inputs.

- As Shakespeare wrote in Act III, Scene 5 of Timon of Athens, “Nothing emboldens sin so much as mercy.”

Moral hazard - government intervention

- When we discussed externalities, the analysis was straight-forward: there was a failure in the market and, in principle, the government could achieve efficiency by forcing the relevant actors to internalize the external costs (or benefits) they were imposing. When governments intervene in insurance markets, however, the analysis is one step more complicated because of moral hazard.

- The existence of moral hazard means that it may not be optimal for the government to provide the full insurance that is demanded by risk-averse consumers. Consider the example of workers' compensation insurance, a $55 billion program that insures workers against injury on the job. Clearly, getting injured on the job is a bad thing, and individuals would like to insure against it. There is a big problem with workers' compensation insurance, however: it is difficult to determine whether individuals are really injured, and whether that injury occurred on the job. Many injuries are impossible to precisely diagnose, particularly chronic problems like back pain or mental impairment, and it is hard to tell whether injuries, particularly chronic injuries, have occurred on the job or during a weekend softball game.

- The difficulty of assessing injuries is a problem because it can be quite attractive to qualify for the workers' compensation program. Workers' compensation benefits include payment of the medical costs of treating an injury, and cash compensation for lost wages, which can amount to two-thirds or more of a worker's pre-injury wages. Recall that in standard economic models we assume that leisure is a normal good and that, all else equal, individuals would rather be home than at work. If you can claim that you have an on-the-job injury, even if you really don't, you can stay home from work and continue to take home two-thirds of what you earned when working. Thus, the existence of this program may actually encourage individuals to fake injury.

What determines moral hazard?

- The extent of moral hazard varies with two factors.

- The first factor is how easy it is to observe whether the adverse event has happened. If an employer truly knows whether a worker has been injured on the job, the moral hazard prob-lem with workers' compensation is greatly diminished.

- The second factor is how easy it is to change behavior in order to establish the adverse event. When it is neither easy nor attractive to change behavior in order to qualify for insurance, such as in the case for insurance against death, moral hazard is unlikely to be a problem.When the insurance is for an adverse event that is easily and costlessly attained (or faked), however, moral hazard may be a larger problem.

Moral hazard is multidimensional

- Moral hazard can arise along many dimensions. In examining the effects of social insurance, four types of moral hazard play a particularly important role:

    - Reduced precaution against entering the adverse state. Examples: because you have medical insurance that covers illness, you reduce preventive activiies to protect your health, or because you have workers' compensation insurance, you aren't as careful at work.

    - Increased odds of entering the adverse state. Examples: because you have workers' compensation, you are more likely to claim that you were injured on the job, or because you have unemployment insurance, you are more likely to become unemployed.

    - Increased expenditures when in the adverse state. Examples: because you have medical insurance, you use more medical care than you otherwise would, or because you have workers' compensation, you don't work hard to rehabilitate your injury.

    - Supplier responses to insurance against the adverse state. Examples: because you have medical insurance, physicians provide too much care to you, or because you have workers' compensation, firms aren't as careful about protecting you against workplace accidents.

The Consequences of Moral Hazard

- Why is moral hazard a problem? Moral hazard is costly for two reasons.

    - First, the adverse behavior encouraged by insurance lowers social efficiency, for example, because it reduces the provisions of socially efficient labor supply. In a perfectly competitive labor market, a worker's wage equals his marginal product, the value of the goods he is producing for society. With no workers' compensation, workers will supply labor until their wage (their marginal product) equals their marginal valuation of the next hour of leisure time (such as their value of watching TV). If the wage is above the value of leisure time, it is socially efficient for individuals to work, since the benefit of work (the marginal product of that labor) exceeds the cost (the value of the foregone TV).

    - When workers' compensation is introduced, the value of leisure rises: each hour of leisure not only provides one hour of TV, but also a workers' compensation payment. Thus, individuals will supply labor only until the wage equals their marginal value of leisure plus the workers' compensation income they can receive by pretending to be injured.This will lead individuals to work less than is socially efficient: even if the wage (and therefore the marginal product) is above the value of watching TV, individuals may still choose not to work because of the promise of workers' compensation benefits.

    - The second cost for social insurance due to moral hazard is revenue raising. Whenever the government increases its expenditures, it must raise taxes to compensate (at least in the long run). Thus, when social insurance encourages adverse events, which raise the cost of the social insurance program, it increases taxes and lowers social efficiency further.

Moral hazard - government intervention

- Can the government improve efficiency by intervention when moral hazard is present?

- In answering this question it is important to specify what information is available to the government. For a fair evaluation of government intervention it is natural to assume that the government has the same information as private sector. In this case it can be argued that efficient government intervention is still possible.

- The beneficial effects of government intervention stem from the government's capacity to tax and subsidize. To take an example, the government cannot monitor smoking which has an adverse effect on health, any better than the insurance company. But the government can impose taxes, not only on cigarettes, but also on commodities that are complements and subsidize substitutes which have less adverse effect.

- Also the taxation of insurance induces firms to offer insurance at less than fair price. As a consequence, individuals buy less insurance and expend more effort (as efficiency requires).

Summary

- 1. Imperfect and asymmetric information can lead to drastic differences in the nature of market equilbrium.

- 2. Adverse selection refers to situations where the type of the agents is not observable so that one side of the market has to guess the type or quality of a product based on the behavior of the other side of the market.

- 3. In markets involving adverse selection too little trade may take place. In this case it is possible that everyone can be made better off by forcing them to transact.

- 4. Moral hazard refers to a situation where one side of the market can’t observe the actions of the other side.

- 5. Signaling refers to the fact that when adverse selection or moral hazard are present some agents will want to invest in signals that will differentiate them from other agents.

- 6. Investment in signals may be privately beneficial but publically wasteful. On the other hand, investment in signals may help to solve problems due to asymmetric information.

Questions?

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