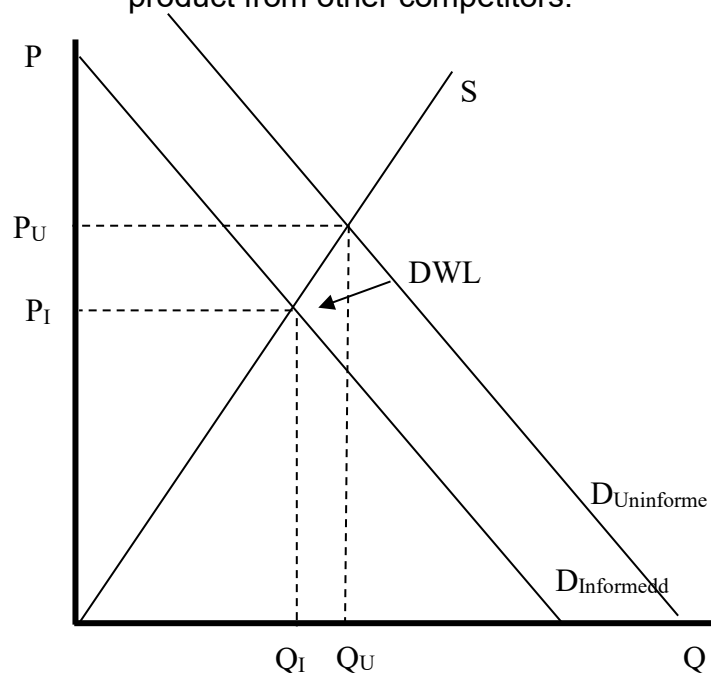


# Lecture # 22 – Information Market Failures

## I. Information Asymmetry

- The market depends on perfect information, so that everyone knows all of the options available to them. If this is not possible, people may not make optimal choices.
- Imperfect information occurs when different parties have different levels of information.
  - If no one realizes an activity is bad (e.g. Mercury pollution in Onondaga Lake in 1950s), imperfect information is not the problem.
  - It may be that the result is uncertain. Uncertainty is important, but is dealt with in other ways.
  - However, if all sides have the same knowledge, even if uncertainty exists, imperfect information is not a problem.
- Information asymmetry is about the differences in information that different parties have about a good
  - Thus, we aren't thinking about information as the good itself, but rather about what information people have about a good's attributes
- Search goods versus experience goods
  - A search good is a good that consumers can determine the characteristics of before purchase
    - Note that searching costs money
      - Spend more time researching a car than a sandwich
      - Effectiveness of information gathering depends on:
        - Variance in quality of goods
          - If there is more variance, less likely to find a match with your preferences before the cost of searching is too high
        - Frequency with which consumers make purchases
          - If you purchase the good frequently, you will gather information over time
      - Brands are used to reduce search costs
        - Brands establish a reputation
    - Information asymmetry rarely a problem for search goods

- An experience good is a good that consumers can only determine the characteristics of after purchase
  - E.g. you learn about the good by consuming it
    - Used cars
    - Meals
    - Hairstyling
  - Here you pay both the search costs and also the cost of the good.
  - The more heterogeneous the goods, the greater the potential inefficiency from information asymmetry.
  - The more heterogeneous the goods, the less one learns from any given experience
    - Thus, learning occurs more slowly
- Why is information asymmetry a market failure?
  - It is a market failure if the producer does not provide enough information to maximize the difference between the reduction in deadweight loss and the cost of proving this information.
  - If a buyer is uninformed about a good's quality, they may buy too much of the good or too little
    - If the true quality is worse, consumers buy too much of the good and pay too high a price
    - If the true quality is better, they consume too little, and the seller gets too low a price.
      - While the producer would have incentive to provide information to get the higher price, a market failure may occur because the producer is unable to distinguish her product from other competitors.



- The graph above represents a case where the actual quality is worse than the consumer expects.
  - In the graph above,  $D_{\text{Uniformed}}$  shows how much the consumer would buy without perfect information.
  - $D_{\text{Informed}}$  is how much the consumer would buy if they knew the true quality.
  - Without accurate information, quantity and price are too high
    - In this case, there is a deadweight loss because too much is produced. The value to consumers (if quality known) is less than the cost of production.
  
- Implication: markets for lemons
  - With information asymmetry, sellers know more than buyers.
  - Consider buying a used car.
    - The quality of the used car may be high or low.
    - Assume that there is 50% chance of each.
    - Your demand will be based on the average of your demand for low quality and high quality.
      - E.g.: Willing to pay \$1,000 for high quality, but just \$500 for low quality.
      - If cannot know quality with certainty, and have 50/50 chance of each, will pay \$750 for a used car.
        - Thus, you offer too low a price for a high quality car and too high a price for a low quality car.
        - But this drives high quality cars out of the market, as the seller cannot get enough for them.
          - Problem can cycle – if buyers know only poor cars in market, only offer \$500. Now the incentive to offer quality used cars for sale is even lower.
  
- Potential solutions
  - Warranties
    - Provide insurance against low quality
    - But lead to other issues, such as moral hazard
      - Will the buyer do required maintenance on the car?
  - Third party certification services
  - Regulation
    - “Lemon laws” require auto dealers to take back defective new cars, and prohibit re-selling them until they are repaired
      - Note doesn’t help private re-sellers
      - Labeling: e.g. how energy efficient is a home or car
  - Information provision
    - Insurers set premiums on the type of equipment used to reduce risks

- Implication: job markets
  - How do employers tell which job candidates are the best?
  - How do job candidates reveal their quality to employers?
  - Signaling is a solution
    - Earning a degree from a high-quality school is a signal of ability
      - Depends on the signal being credible
    - Question: Does this mean the value of education is mostly private (as a signal) rather than public (by making workers more productive)?
  - Credit score example from *Economist*
    - Several states banned employers from asking for the credit score of job applicants, as poor and minorities are likely to have lower scores
    - But credit history is a credible signal
    - After the ban, employers put more weight on other signals, such as education and experience, that are harder for disadvantaged groups to get.
  - Other examples of signals
    - Firms pay dividends, rather than reinvesting profits, to show they are a strong firm and don't need to hoard cash.
    - Restaurants locate in expensive areas to signal high quality food

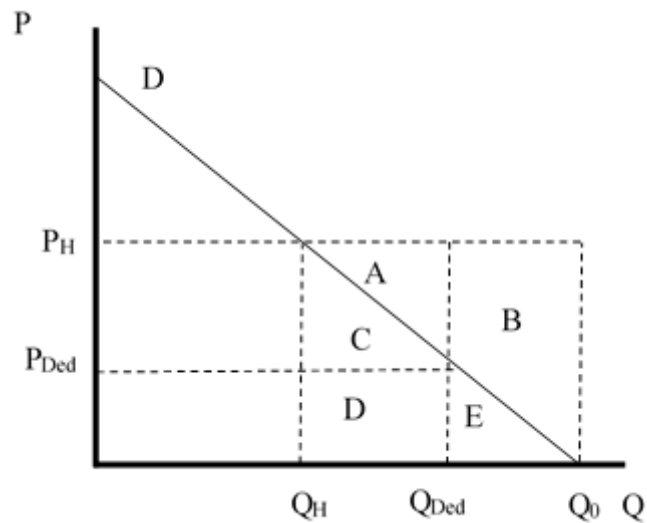
## II. Uncertainty and Insurance

- We can extend our basic models to include uncertainty.
  - Here, people maximize expected utility (or expected profits)
- If insurance is available for all contingencies, people can insure so that their actual utility remains constant no matter which outcome occurs
  - Actuarially fair insurance is when the premium equals the expected payout
    - Requires knowing the probability of each outcome
- Expected utility model
  - Utility depends on a person's wealth:  $U(w)$
  - There are two possible outcomes: high wealth,  $w_H$ , or low wealth,  $w_L$
  - The probability of being in the high wealth state is  $p$ .
  - Expected utility is thus:
    - $pU(w_H) + (1-p)U(w_L)$
  - Because of diminishing marginal utility, the lost utility from losing a dollar will be greater than the increase from gaining a dollar.
    - Thus, insurance can make individuals better off by smoothing outcomes across the two states

- Example:
  - Suppose your car is worth \$10,000. There is a 1% probability it will be stolen.
    - Thus, the expected value of the loss from theft is \$100 ( $=\$10,000 \times 0.01$ )
  - In this example, an insurance premium of \$100 would be “actuarially fair”:
    - $EV(\text{with insurance}) = 100\%(\$10,000 - \$100) = \$9,900$
    - $EV(\text{no insurance}) = 0.99(\$10,000 - \$0) + 0.01 (\$10,000 - \$10,000) = \$9,900$
  - As a result, if you were risk averse, you would prefer to pay \$100 for the insurance policy.
  - Utility theory suggests that people will be risk averse, because of diminishing returns to income.
    - Suppose  $u = X^{0.5}$ . Now compare the utility in each case.
      - $EV(\text{with insurance}) = 9,900^{0.5} = 99.5$
      - $EV(\text{no insurance}) = 0.99(\$10,000)^{0.5} + 0.01 (0) = 99$
    - Purchasing insurance makes you better off
- Behavioral economics extensions
  - People value gains and losses differently
  - As a result, people deviate from an expected utility framework
  - Instead, they base decisions from a reference point, usually considered the status quo.
    - Known formally as the endowment effect.
    - Place more weight on losses than on gains.
  - Also are risk averse – prefer a smaller certain gain to a larger probable gain when expected values are the same
    - But exhibit loss aversion when facing losses: prefer a larger probable loss to a smaller certain loss.
- However, perfect insurance markets do not exist.
  - Insurers need to earn a profit and need to cover transaction costs
    - Risk averse consumers do make this possible
  - Insurance reduces individual risk through pooling of independent risks borne by members of a group.
    - Can be purchased in private markets (e.g. auto insurance, home insurance), but market failures may make insurance markets incomplete
  - Knowing probabilities difficult for extreme events
    - Easier to observe the probability of an auto accident than the expected damage from an earthquake
    - Insurance rates include a risk premium to account for the lack of perfect information on probabilities

- Risks may not be independent
  - Insurance depends on risk pooling – those not filing a claim help pay for the claims of those that do file
  - If risks aren't independent, some social risk remains
    - Damage from flooding affects all those in path of a storm
    - Large insurers diversify portfolios to mitigate such risk.
- Multiple market failures make knowing the probabilities difficult
  - Adverse selection occurs because insurance is more attractive to people with a high probability of suffering a loss.
    - If the characteristics that affect risk are observable, insurance companies can charge different premiums based on risk.
    - But, what if risks are unobservable?
      - Consider a policy based on average risk.
      - For those with high risk, the price will be lower than needed to get them to buy
      - But, for low-risk people, the price will be too high. They will choose not to buy insurance.
      - If low-risk people don't buy insurance, the insurance company will lose money. They will raise thus raise premiums.
      - This continues until prices are high and only high risk people are willing to buy insurance.
    - Possible solutions
      - Provide policies to a group of people, such as company employees, for which people have other reasons to join the group
      - Mandatory insurance
      - Exclude coverage for pre-existing conditions
        - Note difference between mandate and excluding coverage. One tries to increase access to less healthy people, where the other increases access for healthy people.
    - Screening
      - Insurer can offer two different policies, each of which is attractive to a different group.
        - E.g. offer a low price option with a high deductible. Bad drivers will not want that. Safe drivers will.
          - But, not a perfect resolution, as good drivers are stuck with high deductibles.

- Moral hazard occurs when people take fewer precautions when they are insured.
  - Note that adverse selection is an issue before a transaction occurs. Moral hazard is the result of imperfect information after a transaction occurs.
  - Results in overuse of insurance
  - Three types of moral hazard in medical insurance:
    - Less use of preventive care/more risky behaviors
    - May not buy insurance because expect will get free treatment at ER if get sick.
    - Overconsumption



- On the graph above, D is the demand curve for healthcare
- The full cost of health services,  $P_H$ , is paid by the insurer
- If the patient pays no costs for health insurance, consume up to  $Q_0$ .
  - Compared to  $Q_H$ , extra cost is ABCDE
  - Extra consumer surplus is CDE
  - AB is wasted money (e.g. DWL)
- If there is a deductible,  $P_{Ded}$ , the consumer only consumes  $Q_{Ded}$  of insurance
  - Cost savings are BE
  - Compared to before, consumers lose areas DE
    - D is a transfer from consumers to the insurance company, which paid D before
  - A is wasted money (e.g. DWL)

- So, a higher deductible reduces the inefficiency from moral hazard.
  - But, higher deductibles will also discourage the purchase of insurance.
    - Intuitively, if the deductible was 100% (e.g. consumer pays  $P_H$ ), there would be no point to the insurance.
  - Moral hazard occurs in other settings
    - Banks giving risky mortgages because mortgages are insured
    - People living in flood prone areas
  - How to limit moral hazard?
    - Invest in monitoring systems
    - Use copayments to require beneficiaries to pay a fraction of claimed costs
      - Reduces incentives for unnecessary expenses
- Role of government in insurance markets
  - Because of these market failures, government often intervenes in insurance markets.
  - Examples of government intervention
    - Flood insurance
    - Health care
    - Social Security
      - Note: not pure insurance, but a transfer from one generation to another



- What roles can government play in insurance markets?
  - Mandatory insurance
    - Rationales for mandatory insurance
      - Adverse selection
        - If individuals have better risk about individual risk than insurers, adverse selection will limit the availability of insurance
        - Mandating that everyone buy insurance keeps low risk people in the insurance pool and helps keep premiums lower
      - Negative externalities
        - Uninsured drivers impose costs on others if they get in an accident
      - Paternalism
        - People may not save enough for retirement. Possible reasons include:
          - Myopia, bad luck, poor information, laziness
        - Social Security insures against the possibility that people outlive their savings
          - Note moral hazard at work here as well.
          - Such people would likely end up on government support
      - Regulatory
        - Even in cases where regulation prevents bad behavior (e.g. regulating against release of toxic chemicals), accidents happen.
        - Smaller firms may not have sufficient resources to pay damages for cleanup
        - Requiring firms to carry liability insurance provides a way to ensure compensation to victims is possible.
  - Subsidize insurance
    - Flood insurance is an example where coverage is subsidized by the government
    - Challenges to providing flood insurance in private markets:
      - Flood risk is difficult to monitor – thus information is poor
      - It is difficult to spread risks around
        - Britain does this by mandating that every policy cover floods
        - But government intervenes through reinsurance to keep costs affordable
        - If risks are pooled, there is moral hazard
          - Those in risk prone areas do not pay more
    - Rationale for subsidies:
      - Fairness – can low income families get insurance otherwise?

- Stockpiling
  - Stockpiling resources during normal times to have available during periods of disruption
    - US Strategic Petroleum Reserve is an example

### III. Principal-Agent Problem

- Moral hazard relates to the principal-agent problem.
  - How does one actor (the principal) get another (the agent) to behave as he wants?
    - E.g. how do managers get workers to perform as they want, when constant monitoring is not possible?
  - The principal-agent problem also relates to information
    - The problem is that the principal has different information about the agent (e.g. how much effort does an employee give?)
  - Note that principals and agents have different goals
    - The employer wants workers to work hard. Employees have less incentive to work hard.
  - A principal-agent framework provides a way to think about crafting an effective agreement
    - The goal is for the principal to provide sufficient incentives to the agent so that the agent follows through on a commitment.
  - Principal designs an agreement to maximize expected utility subject to:
    - A participation constraint
      - Agent's expected utility higher if he participates than if not
    - Incentive compatibility constraint
      - Agent must choose to comply with the agreement ex post
  - The key is to provide incentives that are consistent with what the principal wants.
    - E.g. profit sharing
    - Reservation wages
      - Paying a worker a wage premium raises the costs of the worker shirking. They have more to lose if they get fired.
      - This suggests, however, that in markets with imperfect information, prices will not equal marginal cost.
- The *Economist* article provides an application related to education funding
  - Even if benefits are private (e.g. high private returns), markets might not work well.
  - We'll discuss possible solutions in class on Wednesday.