Lecture 13: Asymmetric information

EC 105. Industrial Organization.

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Asymmetric information in markets

- Many markets characterized by *asymmetric information*:
  - firms and consumers are differentially informed.
- Previously, focus on *consumers' information costs* (search)
- Here: focus on types of *verification costs*
  - Difficulties of consumers to verify seller quality
  - Difficulties in verifying that both sides are abiding by contract

Two scenarios of asymmetric information

Adverse selection: individuals have different, but unobserved types. "Hidden information": information is asymmetric at time of transaction.

1. Used cars: only seller knows true quality of car
2. Similar in spirit to 2-degree price discrimination (airline pricing)

Moral hazard: individuals can take unobserved actions which affect market outcome. "Hidden action": information becomes asymmetric *after* transaction.

1. Insurance markets: insured people may not take necessary precautions — raises the avg. payment of insurance company and, therefore, average premium
2. Labor markets: when employees work in teams where individual effort not observable, each employee has incentive to "free-ride"

Additional examples?

Adverse selection

Example: the used car market

- Two types of used cars: "good" and "bad", providing utility of u_G and u_B. Proportion p are "bad".
- In competitive market, with perfect information: $p_b = u_B$, $p_G = u_G$.
- Consider asymmetric information: only seller knows car type, buyer doesn't know.
- "Average" used car in the market yields expected utility $\tilde{u} \equiv (1-p) * u_G + p * u_B$. Buyer is willing to offer $\tilde{u}$ for any given car; by doing so, break even "on average".
- At $\tilde{u}$: only owners of bad cars willing to sell, since $u_b < \tilde{u}$. Owners of good cars stay out of market, since $u_G > \tilde{u}$.
- Outcome: buyer offers u_B, and only bad cars in the market. "Lemons market". Market outcome "selects" only the bad cars: adverse selection.

Lemon's problems: other situations

- "Winner's curse" in auctions
  - Winner is bidder with *most optimistic* information
  - most likely to have *overbid* in auction
- Thin financial markets: Asset markets with few traders
  - real estate in emerging markets
  - thinly traded stocks
  - Offer to sell is "bad news"
  - Offer to buy is "good news"
  - Leads to *no trade* in these markets

Remedies for Adverse selection

- What is the problem? Buyer can set only one price. How can relaxing this solve the problem?
- Via 2-degree price discrimination. Example: third party certifications
  - Buyer pays different price depending on whether or not a used car is certified $(p_C,\ p_{NC})$.
  - Effective if certification is substantially more costly for bad cars (ie. high required repairs for bad cars).
  - So that sellers only go through the hassle of certifying good cars. (Prices p_C, p_{NC} must satisfy self-selection constraints)
  - Certification becomes "signal" of quality
- Furthermore, problem mitigated if buyer/seller differ in intrinsic valuation of used car.
  - Best time to buy used car is at beginning/end of school year.

Cost quality signalling: examples

- Ability signaling via education.
  - Only hi-ability individuals willing to spend $$$ on education
  - Explains high cost of MBA degrees?
  - “Burning Money”.
- Price and advertising as signal of product quality
  - Expensive hi-end, brand-name products
  - Status signalling via conspicuous consumption (Veblen)

Moral hazard

Example: incentives of individuals with home insurance to install preventive device.
Main idea: insurance reduces the incentives of policy-holders to take necessary precautions

- Probability of fire with prevention is p, without prevention is p^*, so that $p^* > p$. It costs C to install prevention device.
- Individual decides first whether or not to purchase fire insurance, then decides whether or not to install prevention measures
- Individual has income M. Pays K_1 premium for insurance, loses K_2 in case of fire. W/insurance, individual paid K_2 in case of fire.
- Insurance is "fair", so that insurance company makes zero expected profit:

$$K_1 - pK_2 = 0 \Longrightarrow K_1 = pK_2 \quad (1)$$

Assume: insurance company cannot know whether individual takes necessary precautions ("hidden action")

Moral hazard 2

Individual's payoffs summed up by following matrix, where $U(\cdot)$ is her utility function

Outcome	No fire	Fire
Insurance/No prevention	$U(M - K_1) = U(M - pK_2)$	$U(M - K_1) = U(M - pK_2)$
No insurance/No prevention	$U(M)$	$U(M - K_2)$
Insurance/Prevention	$U(M - pK_2 - C)$	$U(M - pK_2 - C)$
No insurance/Prevention	$U(M - C)$	$U(M - K_2 - C)$

Moral hazard 3

- Insured individuals will install prevention measures if

$$EU(\text{Insur}/\text{Prev}) > EU(\text{Insur}/\text{No prev}) \tag{2}$$

- For fair premium:

$$\begin{aligned} EU(\text{Insur}/\text{Prev}) &= U(M - pK_2 - C) \\ EU(\text{Insur}/\text{No prev}) &= U(M - pK_2) \end{aligned} \tag{3}$$

  So never take preventive measures.

- Similar outcome as in "lemons market": insured never take precautions, so that in long run insurance company will not break even if it sets "fair" premium.
- Problem: Perfect insurance makes individual indifferent about whether a fire occurs or not, since she gets same utility whether or not a fire occurs. Strengthen incentives by removing this indifference. One way is to offer only incomplete insurance.

Remedies for Moral hazard

- Offer a deductible $D < K_2$: so that in event of fire, individual only recovers $K_2 - D$. Now:

$$\begin{aligned} EU(\text{Insur/Prev}) &= p * U(M - pK_2 - C - D) + (1-p) * U(M - pK_2 - C) \\ EU(\text{Insur/No prev}) &= p^* * U(M - pK_2 - D) + (1-p^*) * U(M - pK_2) \end{aligned} \tag{4}$$

- In some cases (depending on shape of $U(\cdot)$), deductible will be enough to make $EU(\text{Insur/Prev}) > EU(\text{Insur/No prev})$, so that insured people also take preventive measures.
- Interpretation: Strengthen incentives by imposing risk on individual (ie. remove indifference between states of the world).

Asymmetric information: traditional vs. internet markets

- Traditional markets have higher search costs
  - Very costly to find out prices at all gasoline stations, restaurants, etc.
  - But verification costs smaller since transactions done in person.
- For internet retailers, search costs are much smaller ...
  - Due to search engines, price comparison websites
- But internet markets have higher quality verification costs
  - Potential buyers and sellers located very far apart
  - Product quality difficult to verify on virtual marketplaces
  - fraud, counterfeits, used products labelled as "new"
- Remedies:
  - Feedback and reputation
    - Penalties on bad reputation incentive "lemons" to improve, or leave market
  - "Escrow" system (Taobao): buyer's payment held in escrow until product is received and verified.
  - "Amazon is in the insurance business"