Uncertainty II

ECON 420: Game Theory

Spring 2018

Market for Lemons (Akerlof, 1970)

- Two types of used cars: high quality and low quality ("lemons")
- Buyers cannot directly observe car quality
  - Willing to pay $6,000 for low quality
  - Willing to pay $16,000 for high quality
- Sellers know quality of their car
  - Value of high quality: $12,500
  - Value of low quality: $3,000

Buyers

- Single market price for both cars p
  - Buyers can't observe quality, so only one market
- Suppose buyers can observe fraction of high quality cars in the market f
- Buyers will purchase a used car if $EV > p$

$$EV = 16{,}000(f) + 6{,}000(1-f)$$
$$= 16{,}000f - 6{,}000f + 6000$$
$$= 6000 + 10000f$$

Buy if: $6000 + 10000f > p$

Sellers

- High quality owners sell if $p > 12,500$
- Low quality owners sell if $p > 3000$
- When will high-quality cars be bought and sold on the market?

$$12500 < p < 6000 + 10000f$$

If $12500 < 6000 + 10000f$, then there is a price that clears the market

$$6500 < 10,000f$$

$$f > 0.65$$

Market for high quality cars

- What happens if f falls below the critical value? *(0.65)*
- Consumers would be willing to pay $p > 12,500$ (if they were assured of getting high quality car)
- But sellers unable to find buyers at that price
- No high quality cars will be bought or sold!
    - $f = 0$
- Market price: $3,000 < p < 6,000$

Market failure

- Sellers willing to sell high quality for $p > 12,500$
- Buyers willing to buy high quality for $p < 16,000$
- Market equilibrium is *inefficient*
    - Buyers *and* sellers could be made better off without making anyone worse off

Adverse selection

- Market for lemons is an example of *adverse selection*
- With imperfect information, one side must form expectations
- This can make p low enough that some high-quality goods (or services) exit the market
- This reduces EV, further reducing price
- Only products that remain in market are low quality

Example: Health insurance

- Health insurance providers do not know consumers' health as well as the individual
- Offer a single price to "similar" consumers
- Healthiest consumers may find price to be too high (expected utility greater without insurance)
- This reduces the average health of remaining consumers
- Insurance companies raise price to account for higher risk
    - Process repeats
- "Death spiral" – market collapses
    - Rationale behind "individual mandate" and universal systems

Signalling

- How do we overcome uncertainty and adverse selection?
- "Cheap talk" insufficient, no cost to lying about quality
- Quality signals must impose a cost on the player signalling in order to prevent "cheaters"
- Example: Product warranties
  - Used car dealers sometimes offer promises to repair a car if it breaks down
  - Unlikely to offer warranty for lemons
- Example: Product design and marketing
  - Producers of high-quality products can "afford" fancy design and marketing

Screening

- ▶ Why do employers value some majors higher than others?
- ▶ In general, degrees that are harder result in higher wages
- ▶ Employers know that "low quality" workers are unlikely to take hard classes
  - ▶ High quality workers may have an easier time, less of an investment
- ▶ This separates high-quality from low-quality workers
- ▶ Major choice is (partly) a *signal* to employers

Separating vs pooling equilibrium

- ▶ Screening costs must be high enough to prevent low-quality players from cheating
- ▶ But screening costs must be *low* enough to make it worth it for high-quality players to join
- ▶ If the screening costs are too high or too low, then all players will *pool* together and be indistinguishable
- ▶ Examples: California food labeling laws vs "certified organic" labels