Information in Competitive Markets

- **In purely competitive markets all agents are fully informed about traded commodities and other aspects of the market.**
- **What about markets for medical services, or insurance, or used cars?**

Asymmetric Information in Markets

- **A doctor knows more about medical services than does the buyer.**
- **An insurance buyer knows more about his riskiness than does the seller.**
- **A used car's owner knows more about it than does a potential buyer.**

Asymmetric Information in Markets

- **Markets with one side or/and the other imperfectly informed are markets with imperfect information.**
- **Imperfectly informed markets with one side better informed than the other are markets with asymmetric information.**

Asymmetric Information in Markets

- **In what ways can asymmetric information affect the functioning of a market?**
- **Four applications will be considered:**
  - **adverse selection**
  - **signaling**
  - **moral hazard**
  - **incentives contracting.**

Adverse Selection

- **Consider a used car market.**
- **Two types of cars; “lemons” and “peaches”.**
- **Each lemon seller will accept $1,000; a buyer will pay at most $1,200.**
- **Each peach seller will accept $2,000; a buyer will pay at most $2,400.**

Adverse Selection

- **If every buyer can tell a peach from a lemon, then lemons sell for between $1,000 and $1,200, and peaches sell for between $2,000 and $2,400.**
- **Gains-to-trade are generated when buyers are well informed.**

Adverse Selection

- **Suppose no buyer can tell a peach from a lemon before buying.**
- **What is the most a buyer will pay for any car?**

Adverse Selection

- Let q be the fraction of peaches.
- 1 - q is the fraction of lemons.
- Expected value to a buyer of any car is at most

$$EV = \$1200(1 - q) + \$2400q.$$

Adverse Selection

- **Suppose EV > $2000.**
- **Every seller can negotiate a price between $2000 and $EV (no matter if the car is a lemon or a peach).**
- **All sellers gain from being in the market.**

Adverse Selection

- **Suppose EV < $2000.**
- **A peach seller cannot negotiate a price above $2000 and will exit the market.**
- **So all buyers know that remaining sellers own lemons only.**
- **Buyers will pay at most $1200 and only lemons are sold.**

Adverse Selection

- Hence “too many” lemons “crowd out” the peaches from the market.
- Gains-to-trade are reduced since no peaches are traded.
- The presence of the lemons inflicts an external cost on buyers and peach owners.

Adverse Selection

- How many lemons can be in the market without crowding out the peaches?
- Buyers will pay $2000 for a car only if

$$EV = \$1200(1-q) + \$2400q \geq \$2000$$

$$\Rightarrow q \geq \frac{2}{3}.$$

- So if over one-third of all cars are lemons, then only lemons are traded.

Adverse Selection

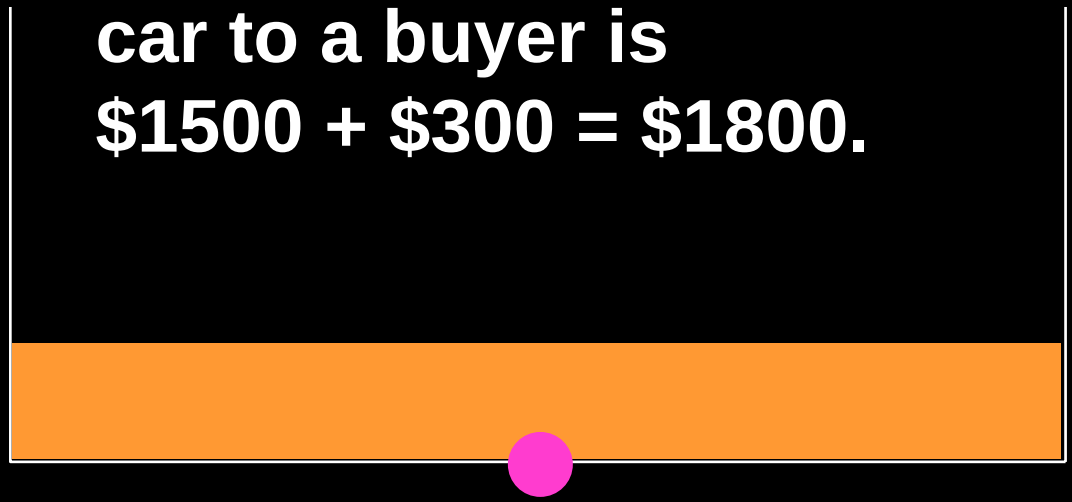
- A market equilibrium in which both types of cars are traded and cannot be distinguished by the buyers is a **pooling equilibrium**.
- A market equilibrium in which only one of the two types of cars is traded, or both are traded but can be distinguished by the buyers, is a **separating equilibrium**.

Adverse Selection

- What if there is more than two types of cars?
- Suppose that
  - car quality is Uniformly distributed between $1000 and $2000
  - any car that a seller values at $x is valued by a buyer at $(x+300).
- Which cars will be traded?

Adverse Selection

The expected value of any car to a buyer is $1500 + $300 = $1800.



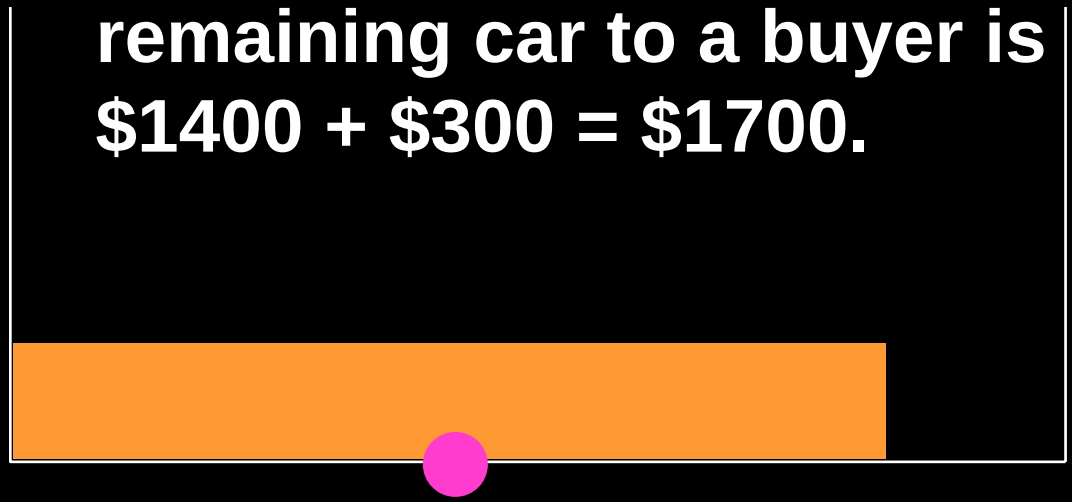
1000 1500 2000

Seller values

So sellers who value their cars at more than $1800 exit the market.

Adverse Selection

The expected value of any remaining car to a buyer is $1400 + $300 = $1700.



So now sellers who value their cars between $1700 and $1800 exit the market.

Adverse Selection

- Where does this unraveling of the market end?
- Let v_H be the highest seller value of any car remaining in the market.
- The expected seller value of a car is

$$\frac{1}{2} \times 1000 + \frac{1}{2} \times v_H .$$

Adverse Selection

- So a buyer will pay at most

$$\frac{1}{2} \times 1000 + \frac{1}{2} \times v_H + 300.$$

- This must be the price which the seller of the highest value car remaining in the market will just accept; i.e.

$$\frac{1}{2} \times 1000 + \frac{1}{2} \times v_H + 300 = v_H.$$

Adverse Selection

$$\frac{1}{2} \times 1000 + \frac{1}{2} \times v_H + 300 = v_H$$

$$\Rightarrow \quad v_H = \$1600.$$

Adverse selection drives out all cars valued by sellers at more than $1600.

Adverse Selection with Quality Choice

- **Now each seller can choose the quality, or value, of her product.**
- **Two umbrellas; high-quality and low-quality.**
- **Which will be manufactured and sold?**

Adverse Selection with Quality Choice

- **Buyers value a high-quality umbrella at $14 and a low-quality umbrella at $8.**
- **Before buying, no buyer can tell quality.**
- **Marginal production cost of a high-quality umbrella is $11.**
- **Marginal production cost of a low-quality umbrella is $10.**

Adverse Selection with Quality Choice

- **Suppose every seller makes only high-quality umbrellas.**
- **Every buyer pays $14 and sellers' profit per umbrella is $14 - $11 = $3.**
- **But then a seller can make low-quality umbrellas for which buyers still pay $14, so increasing profit to $14 - $10 = $4.**

Adverse Selection with Quality Choice

- **There is no market equilibrium in which only high-quality umbrellas are traded.**
- **Is there a market equilibrium in which only low-quality umbrellas are traded?**

Adverse Selection with Quality Choice

- **All sellers make only low-quality umbrellas.**
- **Buyers pay at most $8 for an umbrella, while marginal production cost is $10.**
- **There is no market equilibrium in which only low-quality umbrellas are traded.**

Adverse Selection with Quality Choice

- **Now we know there is no market equilibrium in which only one type of umbrella is manufactured.**
- **Is there an equilibrium in which both types of umbrella are manufactured?**

Adverse Selection with Quality Choice

- **A fraction q of sellers make high-quality umbrellas; $0 < q < 1$.**
- **Buyers' expected value of an umbrella is**

$$EV = 14q + 8(1 - q) = 8 + 6q.$$

- **High-quality manufacturers must recover the manufacturing cost,**

$$EV = 8 + 6q \geq 11 \Rightarrow q \geq 1/2.$$

Adverse Selection with Quality Choice

- **So at least half of the sellers must make high-quality umbrellas for there to be a pooling market equilibrium.**
- **But then a high-quality seller can switch to making low-quality and increase profit by $1 on each umbrella sold.**

Adverse Selection with Quality Choice

- **Since all sellers reason this way, the fraction of high-quality sellers will shrink towards zero -- but then buyers will pay only $8.**
- **So there is no equilibrium in which both umbrella types are traded.**

Adverse Selection with Quality Choice

- **The market has no equilibrium**
  - **with just one umbrella type traded**
  - **with both umbrella types traded**
- **so the market has no equilibrium at all.**
- **Adverse selection has destroyed the entire market!**

Moral Hazard

- If you have full car insurance are you more likely to leave your car unlocked?
- **Moral hazard** is a reaction to incentives to increase the risk of a loss
- and is a consequence of asymmetric information.

Moral Hazard

- If an insurer knows the exact risk from insuring an individual, then a contract specific to that person can be written.
- If all people look alike to the insurer, then one contract will be offered to all insurees; high-risk and low-risk types are then pooled, causing low-risks to subsidize high-risks.

Moral Hazard

- **Examples of efforts to avoid moral hazard by using signals are:**
  - **higher life and medical insurance premiums for smokers or heavy drinkers of alcohol**
  - **lower car insurance premiums for contracts for drivers with histories of safe driving.**