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Hidden Characteristics I: Lemons market example
Updated 27-March-08

Problem: Purchase durable good in second-hand market (e.g., car). Seller has personal knowledge about quality of good that is very costly or impossible for buyer to uncover through inspection. (THINK eBAY)

**Model**

Car quality $k \sim U[0,1]$ , 0 is worst quality  
Seller willing to accept $p_0k$  
Buyer willing to pay $p_1k$  
For any transactions to occur, necessary that $p_1 > p_0$

Simplify: $p_1 = \frac{3}{2}p_0$

**ASK QUESTION:** If quality can be determined? Cars of type $k$ would sell for $P \in [p_0k, p_1k]$ , depending on relative bargaining power.

**ASK QUESTION:** If quality cannot be determined by buyer? Buyer calculates average (expected) quality, *conditional on offered selling price*, decides to buy based on average quality.

**Reasoning**

- If price is $P$, then only sellers would be those for whom $P \geq p_0k$, so only qualities offered will be $k \leq P/p_0$  
- Since we assumed qualities were evenly distributed, the average will be the midpoint between 0 and $P/p_0$; average quality offered at $P$ will be $P/(2p_0) = k$  
- At that average quality, buyers receive average utility $p_1\tilde{k} = (p_1/2p_0)P = \frac{3}{4}P$  
- But price greater than expected utility: $P > \frac{3}{4}P$, so no transactions take place.  
- True for any price $P$ except $P = 0$ (only cars of lowest quality sell)

**Comments**

- Crucial insight: The *sellers know* their quality, so they don't offer qualities that have right *average* for $P$, but instead offer qualities less than or equal to quality associated with $P$: they offer the lemons only
• Result in this example is not just an inefficiency, but disappearance of market!
• But strong assumption: there is no information to help buyers distinguish quality
• If there is some discriminating information, can have transactions, but inefficient (some valuable transactions don't occur)

What to do? Warranty

• A low quality seller less willing to offer long warranty since breakdown soon is likely
  • If cost of servicing warranty is more than gain from selling at "peach" (high quality) price, don't offer warranty
• This might sort out good and bad cars
  • To sort multiple levels of quality would need multiple types of warranty
  • For warranty to work, depends on two things: price premium for peaches, and cost differential for servicing warranties