INFORMATION

Context and concepts

- Context: You are considering the purchase of a business unit from another firm. You know the unit's value is between $100m and $200m, but you don't know the exact value. You suspect the seller knows more than you. How much should you offer?
- Concepts: adverse selection, signaling, common knowledge.

Games of asymmetric info

When one party has more information than the other. The 2001 Nobel Prize in Economics recognized contributions in this area by:

George Akerlof  Michael Spence  Joseph Stiglitz

Adverse selection

- When the uninformed player moves first, he must think about the response of informed players:
  - Buyer must worry about the quality of products offered when quality cannot be verified.
  - Insurance company must worry about riskiness of purchasers of insurance.
  - Lender must worry about the credit-worthiness of borrowers.
- We call the tendency for low-quality products (or high-risk customers) to fill the market “adverse selection.”
- Solutions: warranties, reputation and branding, credit rationing, verification (medical examinations).

Sale of Shearson

- In the early 1990s, American Express held talks to discuss the sale of its Shearson brokerage unit to Primerica (a precursor of Citigroup). The deal made strategic sense for both companies.
- The stumbling block was outstanding legal claims against Shearson: the value of these claims was hard to judge, and Primerica was in a poor position to judge them in any case.
- How would this affect the negotiation? What resolutions come to mind?

Please accept my resignation.
I don't care to belong to any club that will have me as a member.

— Groucho Marx
Signaling

When the informed player moves first, she must think about the information conveyed by her actions to uninformed players (the "signal"):
- Seller must worry about the information conveyed by price: does a low price suggest low quality?
- Advertising not only sends a message, it reminds customers you have the money to spend on it.
- MBA student must think about information conveyed to potential employers by school, dress, interview skills, undergrad major, etc.
- Spence's insight: signals convey high quality only when they cannot be imitated by the low-quality player.
- The usual solutions may also help: warranties, reputation and branding, information verification.

A signaling game

Can prices signal quality?
- One seller, many buyers. Seller sets price, buyers decide whether or not to buy (one unit each max).
- Supply: Seller knows quality of stereo, buyers do not.
- Demand
  - 80% of the customers are willing to pay at most $200 regardless of quality.
  - 20% of the customers would pay $400 for high-quality product, only $200 for low quality one.
- Costs
  - High quality product costs $300.
  - Low quality product costs $100.
- Demand and cost information are common knowledge to customers and sellers.

A signaling game...

Claim: It is an equilibrium for seller to set \( p=400 \) if quality is high and \( p=200 \) if quality is low.
- In this equilibrium, price conveys information about quality: consumers know that a high price implies high quality.
- Why wouldn't a low-quality seller want to "masquerade" as a high-quality seller by setting a high price? Because it loses too much of the market. (Numbers are profit per customer.)
  \[
  \begin{align*}
  p=400 & \Rightarrow \text{Profit} = (400 - 100) \times 20\% = 60 \\
  p=200 & \Rightarrow \text{Profit} = (200 - 100) \times 100\% = 100 
  \end{align*}
  \]

Selling information

When information itself is the product, other problems arise:
- Pitfall #1: By showing what you have, you are giving it away (the Hirschleifer problem).
  - Disney
  - Venture capital (hence nondisclosure agreements)
- Pitfall #2: Competition may drive price to zero (=MC).
  - Britannica and Encarta
  - Phone CDs
  - Bloomberg (not just info!)

Rationality and reputation

- The above analysis deals with information about a product or asset (what it is, its value, etc).
- But sometimes the crucial piece of information is what kind of player you are dealing with.
- Game theory discusses these issues under the heading of "common knowledge of rationality" (feel free not to memorize this).
- Several examples will appear in the context of entry and exit games. One amusing situation appears in the "classic" The Princess Bride.

Advertising as a signal

- Two-period model of experience goods (you have to try them to know how good they are).
- At \( t=1 \), high-quality firms spend a lot on advertising, as if they were saying:
  "My product is so good that I can afford to spend this much on advertising. I know that if you buy today, you'll like the product and buy again tomorrow. That's why it's worth advertising. Since a low-quality firm can't make the same claim, you should believe I am really a high-quality firm."
- Examples:
  - 1984 campaign for Ford Ranger truck
  - E*TRADE in Superbowl XXXIV

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Asymmetric information in:

Takeaways

- Think about how your rival:
  - Use its information advantage; Or
  - React to your information advantage.
- If you possess information, remember that your actions convey information to your rival. You will be known by what you do.
- Information is a tricky product to sell: it's easily stolen and typically has a low marginal cost.
- It may be rational to behave irrationally and thus acquire the reputation for being irrational ("dumb like a fox").

Sale of business unit

Asymmetric Information

Sale of business unit...

Suppose buyer offers $p$ (in $m$).
- Probability seller will accept offer: \((p-100)/100\).
- Seller's expected value in case offer is accepted:
  \(((100+p)/2)\).
- Seller's expected value in case offer is accepted:
  \(((100+p)/2+10)\).
- Buyer's expected payoff: \((p-100)/(110+10)\).
- Maximize with respect to $p$: $p=110$.

Sale of business unit...

Suppose buyer offers $p$ (in $m$).
- In most cases (90%) offer is rejected.
- Offering more would imply higher probability of sale, but expected value of unit would increase by less than price paid.
- Intuition = adverse selection: seller will only sell if unit's is relatively low.

Question: Why did American Express indemnify Primerica? Because not doing so would have led to a lower price.