Hidden Characteristics: Applications

SI 680, ICD: Contracts & Signaling
Jeff MacKie-Mason
SI examples
NEESGrid

-$80$ million collaboratory

- Mandate: share equipment for 2-3 month experiments with multiple teams

- Who values what, how much, and for when?

SI Faculty Involved: Thomas Finholt and Yan Chen
Making spammers pay for attention

Figure 1, distribution of Message Values (p. 6)

Source:
Available at: http://www.bepress.com/bejeap/advances/vol6/iss1/art2
General examples
Warranties / guarantees

What is the hidden characteristics problem?

Q: Which is more effective:
  - Money-back guarantee?
  - Replacement warranty (renewable)
Price discrimination

Inverse elasticity rule:

\[ \frac{p - MC}{p} = -p'(q) \frac{q}{p} = \frac{1}{|\varepsilon_D|} \]

What is the hidden characteristics problem?

Airline pricing
- What are some of the schemes?
- Why do they work?
What problems with these schemes?
ICD method: Metering

- Want to identify high-intensity users (higher wtp for device)
  - They don’t want to report usage
  - So charge them based on supplies

Problems?
- Not perfectly correlated with value (low value high volume users vs. high value low volume)
- Need to prevent third party suppliers, or prices get bid down to MC
  - Laser cartridges, ink jet cartridges
  - Lexmark case: Tried to protect ink jets with DMCA!

Examples?
- United Shoe (staples)
- IBM (punch cards; leasing)
- Electrofax (coated paper)
- Kodak, Xerox (per copy service contract; leasing)
Voting

- Who should pay how much to support IPL (SI, UM, other libraries, users...)?
- How should a multidisciplinary faculty select a new faculty member (with more than one “favorite”)?
- How should an e-community decide on which new service to implement if it can only afford time/resources for one of N?
- How should a project team reach a decision on a meeting time? Project assignments?
- Closely related to matching problems that are increasingly tackled with networked systems
  - medical resident matching
  - law clerk matching
  - kidney exchange
  - public school assignment
  - college housing assignment
## Majority voting

### Voter Preferences

<table>
<thead>
<tr>
<th>Voter</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st choice</td>
<td>x</td>
<td>y</td>
<td>z</td>
</tr>
<tr>
<td>2nd choice</td>
<td>y</td>
<td>z</td>
<td>x</td>
</tr>
<tr>
<td>3rd choice</td>
<td>z</td>
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<td>y</td>
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</table>

Who wins in pair-wise majority vote?

- No one: Condorcet cycle
- Individual preferences are transitive, but group preferences are not transitive
Repairing majority voting?

Suppose status quo wins if cycle occurs; say z

What happens below?

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Clear majority winner: y

But, suppose #3 votes according to z>x>y (misrepresents). What happens?

- Then we have a Condorcet cycle
- z wins, which #3 prefers to y

So, #3 has incentive to manipulate
Summary: majority voting

Pairwise majority voting subject to

- cycles
- manipulation

*manipulation*: not incentive compatible to always tell the truth