Game Theory
for
Strategic Advantage

15.025

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MIT Sloan
Today’s Class: Game-Changers and Game Changers

• Changing the payoffs

• Changing the available moves

• Enabling retaliation

• Changing the order of moves

• Leaving some things to chance
“Most game theorists aren’t very strategic: they solve the game as given, rather than change the game.”

Richard Thaler, “Nudge”

http://www.youtube.com/watch?v=2jxq1B7NkhE

(1) **Categorization**: what kind of game is this?

(2) **Play**: what should I do?
Chapter 1: Prisoners’ Dilemmas

• The classic game (prisoners)

• Advertising games (e.g., cigarette companies)

• “Commons” games (fishing, water use, etc.)

• Pricing games in oligopolies

• “Rat races” in the workplace
# William the Conqueror

## Soldiers

<table>
<thead>
<tr>
<th></th>
<th>Stay &amp; Fight</th>
<th>Go Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill</td>
<td>10, 5</td>
<td>-10, 10</td>
</tr>
<tr>
<td></td>
<td>-10, -10</td>
<td>-5, 15</td>
</tr>
</tbody>
</table>
**Burning the Boats**

*(your opponent’s payoffs)*

<table>
<thead>
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<th>Go Home</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bill</strong></td>
<td>10, 5</td>
<td>-10, -200</td>
</tr>
<tr>
<td>Stay &amp; Fight</td>
<td>-200, -10</td>
<td>-200, -200</td>
</tr>
</tbody>
</table>

- All payoffs are now lower
- Bill has fewer viable actions
- Direct effect vs. strategic effect
Credible Commitments

• “Burning the Boats” – any experience?
• Binding yourself vs. opponent vs. both
• Is it easy to commit?
• Credibility and irreversibility
• What if there’s no smoke?
**Game without Price-Match**

<table>
<thead>
<tr>
<th></th>
<th>Competitor</th>
<th>Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hi</td>
<td>Lo</td>
</tr>
<tr>
<td><strong>You</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hi</td>
<td>(6, 6)</td>
<td>(0, 7)</td>
</tr>
<tr>
<td>Lo</td>
<td>(7, 0)</td>
<td>(3, 3)</td>
</tr>
</tbody>
</table>
Game with Price-Match (by You only)

Competitor

<table>
<thead>
<tr>
<th>Prices</th>
<th>Hi</th>
<th>Lo</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hi</td>
<td>(6,6)</td>
<td>(3,3)</td>
</tr>
<tr>
<td>Lo</td>
<td>(7,0)</td>
<td>(3,3)</td>
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A Related Principle: Mutually-Assured Destruction
Most-Favorite Nation (MFN) Clauses
(payoffs across games)

• In 1971, Congress passed the Federal Election Campaign Act, requiring campaign spots to be given the lowest rate for TV ads.

• In 1990, it required Medicaid to pay no more than 88% of the average price for drugs (at a time when HMOs were getting great deals).

• A 2010 antitrust lawsuit against Blue Cross Blue Shield took aim at contract provisions that required hospitals to offer the company the lowest non-government rate for hospital services.

• Now Michigan (and 20 other states) have laws barring insurers from using MFN clauses.
Apple, Amazon and MFN

- In 2010, Amazon accounted for 80%-90% of all e-book sales.
- Amazon was discounting titles below cost to lure customers to the new format and promote its Kindle e-book reader.
- Apple's let publishers set the prices themselves, under an "agency model," but required the publishers to give iTunes store the best deal in the marketplace.
- Publishers could not keep low prices on Amazon without taking a hit.
- Publishers approached Amazon and demanded that it switch to the agency model, threatening to withhold e-books.
- July 2013: a federal judge ruled that “the MFN clause eliminated any risk that Apple would ever have to compete on price for e-books.”
Chapter 2: Coordination Games

• Standard adoption

• Innovative technology adoption

• Investment

• Speculative attack
Pharma research is difficult...

- "Most scientists at Merck will work an entire career and not develop a single drug."
  - Ray Gilmartin (former Merck President & CEO)

- "You desperately need all teams (management, litigation, sales, R&D) to pull their weight."
  - Joe Fuller (Founder, Monitor Consulting)
Weakest Link: pairs

• Teamwork!

• Choose your investment level from 1 to 3

• *Unit* cost of investment = 1

• *Total* benefit of investment  
  = 2*lowest investment in the team
## Weakest Link: pairs

<table>
<thead>
<tr>
<th>Effort levels</th>
<th>Colleague</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>(1, 1)</td>
</tr>
<tr>
<td>2</td>
<td>(0, 1)</td>
</tr>
<tr>
<td>3</td>
<td>(-1, 1)</td>
</tr>
</tbody>
</table>

**You**
Weakest Link

• “I don’t play the game, I’m a banker at best: I choose the people, I set the rules.”
   Kevin Sharer (former Amgen CEO)

• How would you change this game?
Recap: Game-Changers

• Introducing certainty
  – Credible commitments
  – Changing order of moves

• Changing the payoffs (e.g. investment)

• Introducing uncertainty
  – Leaving some things to chance
Designing Games
Frontiers of game theory

- Kids’ cake
- Pasta and lobster
- High-frequency trading
- Design auction rules FCC
- New York School choice
- Kidney Exchanges
Look Forward, Think Back

• Two-stage games: what happens in the 2nd stage?

• Evaluate ALL possible scenarios, ROLL BACK

• Build a “Larger Game” for stage 1

• Key principle: *backward induction*