Lecture 5 Game Plan

- Qwest Bond Swap
- Chicken Game
- Sequential move games
  - ... escaping from the Annoying Servant
  - ... escaping from the Prisoners’ Dilemma
- More on strategic moves
  - Pre-emptive moves, threats, and promises
Qwest Bond Swap

“If Judge Chin allows the offer to go ahead, institutional investors who own bonds will find themselves in a position with some resemblance to the classic ‘prisoners’ dilemma’... If no one tendered, then Qwest would be in the same position as before the offer, and any bondholder would be no worse off. But if a lot of holders tender, those who refuse will be worse off than they were.”

Figure for Q1, Q2 (and Q3)

Figure for Questions #1, 2 (and 3)
Figure for Q5

Given \( P (\text{\$1 Billion assets}) = 50\% \)

Suppose we offer \( \$T \) per \( \$1 \) debt \( (T < \$1) \)

Expected payoff per unit of debt

\( \$T \)

\( \$0.50 \)

Tender

Not Tender

By "sure-thing" fact about payoffs for not tender, you destroy \( \$1 \) billion

Minimal successful \( T \) will be such that curves coincide with everyone tenders

FIGURE FOR QUESTION #5

$\text{\$} \) millions of newly issued debt
Changing the Game

“Always be wary of the superstructure of whatever situation you're in. It may just be that the whole game that you're into is something very bogus and you should get out.”

Prominent “power paisley pop” band in 80s
- formed in 1981
- signed by Rational Records

From first album, “Blaze of Glory”...
- “All I Want is Everything”
- “Bad Year at UCLA”
- “Sleeping Through Heaven”
Some Prototypical Games

- Prisoner’s Dilemma
- Loyal Servant
- Hunter and Hunted
- Assurance
- **Chicken**
- price war
- defensive innovation
- audits, bluffing
- driving, cooperation
- **negotiation**
On-Line Game #6

New Market Game
Negotiation Game

- Used car dealer says that the lowest possible price is $20,000
  - actual cost is $17,000
- Buyer says that the highest possible price is $18,000
  - actual value is $21,000

- Each player has two strategies: “Give in” or “Not”
# Negotiation Game

<table>
<thead>
<tr>
<th>Buyer</th>
<th>Dealer</th>
<th>Give in</th>
<th>Don’t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give in</td>
<td>(2,2)</td>
<td>(1,3)</td>
<td></td>
</tr>
<tr>
<td>Don’t</td>
<td>(3,1)</td>
<td>(0,0)</td>
<td></td>
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</tbody>
</table>

*in thousands of dollars*

- How would you play this game?
Mixed Strategies in the Negotiation Game

- (Give In, Don’t) and (Don’t, Give In) are the two *pure strategy equilibria*

- There is also a *mixed strategy equilibrium*: $\text{Prob}(\text{Give In}) = 50\%$
  
  - failure to agree 25% of the time!

- Are any of these equilibria evolutionarily stable?
## Chicken Game

<table>
<thead>
<tr>
<th></th>
<th>Column Player</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Swerve</td>
<td>Don’t</td>
</tr>
<tr>
<td>Swerve</td>
<td>(2,2)</td>
<td>(1,3)</td>
</tr>
<tr>
<td>Don’t</td>
<td>(3,1)</td>
<td>(0,0)</td>
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</table>

### Key features:
- Each wants the *other* to choose Swerve
- Both better off if both choose Swerve rather than Don’t
Reaction Curves in Chicken Game

Col’s prob. of Swerve

Row’s prob. of Swerve
Evolution in Chicken Game with One Population

- If initial condition < 50% Swervers, then non-Swervers are relatively better off.
- Only the mixed strategy equilibrium is evolutionarily stable with one population.
Evolution in Chicken Game with Two Populations

Now Row is drawn from “reds” and Col from “greens”, where these populations evolve separately.

- Only the pure strategy equilibria are evolutionarily stable with two populations.
Sequential Moves in Chicken Game

Swerve

Swerve

Don’t

Don’t

Swerve

Don’t

Don’t

2, 2

1, 3

3, 1

0, 0
Sequential Moves in Chicken Game

- Each player prefers to be first-mover
- Being first-mover here allows you to “select your favorite equilibrium”
“Life must be understood backward, but it must be lived forward.”

- Soren Kierkegaard
Lazy Husband Game

- Husband and wife both work long hours but can’t afford a housekeeper
- Wife happy to do housework if Husband also does, but not if Husband shirks
- Husband has dominant strategy to shirk
- Both prefer that both do housework than that both shirk
Loyal Servant Game

Servant

Safe

Dangerous

Master

Safe

Dangerous
Special Case: Annoying Servant Game

Servant

Safe

Dangerous

Master

Safe

Dangerous

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“Story” behind Annoying Servant Game

- Servant wants to be with Master
- Servant is annoying → Master likes (S,D) most
- Dangerous route not passable alone → Master prefers (S,S) over (D,S)
- Servant might “accidentally” fall off the cliff → Master prefers (D,D) over (S,S)
Lazy Husband Game

- Work
- Shirk

Wife

- Work
- Shirk

Husband

<table>
<thead>
<tr>
<th></th>
<th>Work</th>
<th>Shirk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>(2,2)</td>
<td>(-1,1)</td>
</tr>
<tr>
<td>Shirk</td>
<td>(3,-1)</td>
<td>(0,0)</td>
</tr>
</tbody>
</table>

What should Husband do?
Lazy Husband Game

- Work, Work: (2, 2)
- Work, Shirk: (-1, 1)
- Shirk, Work: (3, -1)
- Shirk, Shirk: (0, 0)
Not Dominant Anymore ...

- Husband commits *not* to Shirk
Strategic Moves

“The Power to Constrain an Adversary Depends Upon the Power to Bind Oneself.”
- Thomas Schelling
“What’s For Dinner?”

- Child decides whether to eat veggies
  - wants to not eat veggies
  - wants very much to eat dessert

- Parent decides if dessert will be served
  - wants Child to be happy
  - wants very much for Child to eat veggies
Payoffs in Dinner Game

<table>
<thead>
<tr>
<th></th>
<th>Dessert</th>
<th>Not</th>
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</thead>
<tbody>
<tr>
<td>Veggies</td>
<td><img src="image1" alt="Face emoji" /></td>
<td><img src="image2" alt="Face emoji" /></td>
</tr>
<tr>
<td>Child</td>
<td><img src="image3" alt="Face emoji" /></td>
<td><img src="image4" alt="Face emoji" /></td>
</tr>
<tr>
<td>Not</td>
<td><img src="image5" alt="Face emoji" /></td>
<td><img src="image6" alt="Face emoji" /></td>
</tr>
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</table>

In simultaneous move version, both have dominant strategies: No Veggies and Dessert
Dinner w/ Sequential Moves

- No Veggies & Dessert is unique subgame-perfect equilibrium when Child moves first
Strategic Moves at Dinner

- Does moving first help Parent?
- What should Parent do?
“You don’t get dessert unless you eat veggies”

- Parent can improve outcome by committing to a response rule

- “Threat” = response rule that punishes others if they do not cooperate with you, in a way that goes against your own incentives

- “Promise” = response rule that rewards others if they do cooperate, in a way that goes against your own incentives
“You don’t get dessert unless you eat veggies”

- This is a “threat” in our game
  - Parent will act against incentive to give Dessert if Child doesn’t eat veggies

- Would be a “promise” if Parent would normally not give Dessert even if Child ate veggies
Threats and Promises

- A school bully says to me: “I will beat you up if you come to school”
  - This is a fact, not a “threat”!!
  - Saying this will not change whether I decide to go to school

- To be effective, promised or threatened actions must go against one’s own incentives
Students’ Dilemma

- Two students in a class. Professor announces an unusual “final exam”:
  1. “If neither of you shows up to class tomorrow, you both get A’s.
  2. “If both of you show up, you both get B’s.
  3. “If one of you shows up, that person gets an A plus TAship for next year, while the other person gets an F.”
     - both students would like the TAship

- How can the students escape this Prisoners’ Dilemma?
Escaping the Prisoners’ Dilemma

“I won’t confess if you don’t but I will confess if you do”

- Is this a promise or a threat?
- If credible, what is its effect?
Warnings and Assurances

- Just stating what you will do without commitment is called a “warning” or “assurance”

- Warnings and assurances are effective for coordinating behavior when there are multiple Nash equilibria
  - To be effective, warnings or assurances must be consistent with one’s own incentives
“Continental Airlines said yesterday that it would raise airfares on about two-thirds of its routes ... to take effect September 5.”

“Continental Airlines has dropped its plan to raise domestic airfares by 5%.”
Boeing Co. “announced it was building a plane with 600 to 800 seats, the biggest and most expensive airliner ever. Some in the industry suggest Boeing’s move is a bluff to preempt Airbus from going ahead with a similar plane.”

... And Getting Cheaper

Airbus announces commercial launch of the A3XX, the largest civil aircraft ever.

“Boeing ... has said that there is no market for such a large plane and has decided to modernize its trustworthy 747 family of planes rather than build its own megaseater.”

Reagan Tax Plan

<table>
<thead>
<tr>
<th>Mostly Support Reagan</th>
<th>Repubs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Support Reagan Completely</td>
</tr>
<tr>
<td>Dems</td>
<td>![Smiley Face]</td>
</tr>
<tr>
<td>Attack Reagan</td>
<td>![Crying Smiley Face]</td>
</tr>
</tbody>
</table>
Senate vs. House

- Senate Dems hoped for compromise by not attacking Reagan ... but Repubs didn’t yield

- Can House Dems do anything to get a better outcome?
In-Class Game Next Time

- Please prepare for “Dynamic Pricing Game” to be played next class
- See handout