Econ 110/PoliSci 135
Section 7 Notes

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1 Announcements

- **I will hold a midterm review session on Sunday, October 20, from 4-6 PM in 56 Barrows.**
- There will be no section or OH right after the midterm, on October 22.
- I've posted a Midterm Review Study Guide that another GSI for this class put together a few years ago. It has a helpful summary of all the topics we've covered so far. Ignore bargaining - we're going to cover that after the midterm.

2 Brinkmanship

2.1 Resolve

Resolve is a convenient summary statistic for Brinkmanship games - it tells us the maximum risk a player is willing to face before giving up. In these games, players compete by "bidding up" the risk of disaster. To calculate each player's resolve, we set the payoff to Acquiescing as equal to or less than the payoff for Escalating.

Call R_1 Player 1's resolve. Let s_1 be Player 1's payoff to acquiescing if Player 2 challenged. r is the probability that disaster will occur if a player escalates. Let w_1 be Player 1's prize if he escalates and no disaster occurs. Let d_1 be Player 1's payoff if he escalates and disaster occurs.

$$\begin{aligned}
\text{U}_1(\text{Acquiesce}) &\leq \text{U}_1(\text{Escalate}) \\
s_1 &\leq w_1(1-r) + d_1 \cdot r \\
s_1 &\leq w_1 - w_1 r + d_1 \cdot r \\
r &\leq \frac{w_1 - s_1}{w_1 - d_1} = R_1
\end{aligned}$$

We just found that whenever $r \leq R_1$ then Player 1 prefers to escalate. The only outcome allowed by a SPNE of the Brinkmanship game is for the player with the higher resolve to win. If the player with lower resolve goes first, he will simply choose not to confront. If the higher-resolve player goes first, he will confront and the other player will immediately acquiesce.

3 War of Attrition

Last week we talked about Brinkmanship games where both players made decisions in light of the risk of a horrible horrible sanction happening (such as Nature deciding that the world would end). This week, we transition to talking about Wars of Attrition. Wars of Attrition basically have the opposite kind of setup - instead of one huge sanction that *might* happen, players face small, incremental costs *for sure* every time they decide to Fight.

When players have finite resources, the game must end when one player runs out of resources. Therefore, the player who can fight the longest without running out the resources will win the game. We determine how long players can keep fighting by diving their total resources by the per-period cost (assuming the costs are constant): $\frac{R}{C}$. Notice that the value of the prize doesn't affect who the winner is.

Moreover, players will choose to Fight only if $V - C > 0$.