Bargaining
Applications of SPNE

- Bargaining
- Repeated games
Splitting the Kitteh 1: unilateral choice

Clicker vote: As founder, you get to decide how to split the surplus:

A) Keep everything, give partner $0.00
B) Give your partner $0.25
C) Give your partner $0.50
D) Give your partner $0.75
E) Give your partner $1.00
Splitting the Kitteh 2a: take-it-or-leave-it offer

Clicker vote [odd perm]: As founder, you get to propose a way to split the surplus. If your partner [even] rejects your proposal, the company dissolves and the $1 is reclaimed by your investors, leaving you both with nothing:

A) Keep everything, give partner $0.00
B) Give your partner $0.25
C) Give your partner $0.50
D) Give your partner $0.75
E) Give your partner $1.00
Splitting the Kitteh 2b: take-it-or-leave-it offer

Clicker vote [even perm]: As junior partner, you can only accept or reject the founder’s [odd] split. If you reject, the company dissolves and the $1 is reclaimed by your investors, leaving you both with nothing.

A) Accept all offers
B) Accept if $\geq 0.25$
C) Accept if $\geq 0.50$
D) Accept if $\geq 0.75$
E) Accept only $1.00$
Bargaining over a surplus

Partnerships can create surpluses, but how are they divided?

- Intuitive answer: more bargaining power $\rightarrow$ more surplus, but what does that mean?

- Game theory applied to bargaining and negotiation $\rightarrow$ insight into the determinants of bargaining power

- How do these factors affect our predictions?
  1. Which player gets to propose an offer?
  2. The cost of delayed or failed negotiations, impatience
Basic model of alternating offers

- Player 1 proposes share $x \in [0, 1]$ of the unit surplus for player 2: $(1 - x, x)$
- Player 2 accepts (game ends) or rejects
- If offer is rejected, surplus is multiplied by factor $\delta \in (0, 1]$, player 2 makes a proposal
- Player 1 accepts (game ends) or rejects
- Offers keep alternating and pie keeps shrinking by factor $\delta$ as long as no proposal is accepted
- If offer is rejected in final period ($T$), both players get zero

Will the players agree? When? On what?
The Dictator Game

- A zero-period version of the model: player 2 has no opportunity to respond
- Unilateral choice → all the power is with player 1
- Prediction for selfish person with no other strategic concerns?
- Do you believe this prediction?
The Ultimatum Game

- A one-period version of the model
- Player 1’s makes a TIOLI offer
- Player 2 accepts or rejects and they both get zero
- Unique SPNE? Player 1 keeps entire surplus and player 2 to accepts any offer.

The ability to make a TIOLI offer gives power to the proposer.
General alternating-offer bargaining

\( T = 2 \)

- How much will 1 offer?
- As little as possible
- But too little risks rejection, loss of bargaining power, possibility of bargaining failure
- Offer just enough to make 2 indifferent between accepting and rejecting
- What would 2 get from rejecting? Backwards induct from 2’s offer
- Player 2 would then be playing an Ultimatum Game, as proposer with a \( \delta \)-shrunken pie → would get \( \delta \)

SPNE: Player 1 offers \( x = \delta \) and player 2 accepts if and only if \( x \geq \delta \), so payoffs are \((1 - \delta, \delta)\)
General alternating-offer bargaining

\( T = 3 \)

- How much will 1 offer?
- Backwards induction: in period 3, 1 will again be proposer and will get everything, but twice discounted to \( \delta^2 \)
- In period 2, 2 will offer a \((\delta, 1 - \delta)\) split, making 1 indifferent between accepting and rejecting
- So in period 1, 1 must offer \( \delta(1 - \delta) \), making 2 indifferent

Each time we make the game a period longer, player 1 gets the payoff that player 2 would have had in the game that was one period shorter. If player 1’s offer is rejected, that is what she would get, so she offers player 2 only enough to make her indifferent b/w acceptance and rejection.
General alternating-offer bargaining

As $T \to \infty$?

- Notice: subgame that begins in period $t$ looks exactly like the subgame beginning in period $t + 2$.
- So in any SPNE, the offer by a player who makes an offer in odd periods must look the same every time she makes an offer.
- Suppose that each player has a strategy to accept other player’s offer. If player 2 deviates by rejecting (and makes offer $x_1$ to player 1 in the subsequent subgame), player $j2$ will end up with $1 - x_1$ in the next subgame. So player 1 has to offer enough to player 2 today to make 2 indifferent.
- In other words, $x_2 = \delta(1 - x_1)$. Also, $x_1 = \delta(1 - x_2)$. Solving yields $x_2 = \frac{\delta}{1+\delta}$.
- So 1 offers $(\frac{1}{1+\delta}, \frac{\delta}{1+\delta})$ and 2 immediately accepts (NO delay!)

Who benefits and who is hurt by impatience?
Now you try!

Suppose you and your Qatz.com partner have a falling-out. You agree set up two meetings to negotiate a way to split the value of your assets, which amount to $1 million if liquidated without delay. The first meeting will involve just the two of you. You show up with a proposal, which your partner can either accept or reject. If she rejects the proposal, you will each hire a team of lawyers to help negotiate the dissolution of your partnership and have to pay a 40% fee to your lawyers. At the second meeting you again propose a split, which your partner can accept or reject. If she rejects at the second meeting, it will take a full year to liquidate your assets (qat fotoz), which is enough time for their value to drop to just $400000, which will be split evenly between the two of you—before you each pay your lawyers their 40% fee.

Describe the SPNE of this game