Ultimatums & Bargaining

2 players 1 and 2

1 can make a "take it or leave it" offer to 2 \( (s, 1-s) \)

2 can accept offer \( \rightarrow (s, 1-s) \)

or 2 can reject \( \rightarrow (0, 0) \)

BI \( \rightarrow (99\$, 14) \) or \( (100, 0) \)

2-period bargaining

Stage 1
Player 1 makes offer to 2 \( (s', 1-s') \)
Player 2 can accept \( \rightarrow (s', 1-s') \)
if 2 rejects

Stage 2
2 gets to make an offer to 1 \( (s^2, 1-s^2) \)
1 can accept \( \rightarrow (s^2, 1-s^2) \)
if rejects \( \rightarrow (0, 0) \)

discounting \( \$ \delta > \delta < 1 \)

Solving geometric series

\[
1 - \delta + \delta^2 - \delta^3 + \cdots + \delta^8 - \delta^9 = 5^{10}
\]

\[
\delta - \delta^2 + \delta^3 - \delta^4 - \delta^5 + \delta^6 - \delta^7 - \delta^8 - \delta^9 = 5^{10}
\]

\[
\delta^{10} = \frac{1 - \delta^{10}}{1 + \delta}
\]

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Suppose rapid offers, so $S \approx 1$

$S \rightarrow 1 \Rightarrow S = \frac{1}{2}, \quad 1 - S = \frac{1}{2}$

**Conclude**  
Alternating offer bargaining

1. **Even split if**
   - Potentially can bargain forever
   - $S \rightarrow 1$, no discounting or rapid offers
   - Same discount factor $S_1 = S_2$  
   
   (relax on homework)

2. The first offer is accepted  
   (no haggling in equilibrium)

   Value of the pie and the value of time

   \[
   \text{when assumed known}
   \]

<< the poor will do less well in bargaining >>

<< when valuations unknown, sometimes you fail to execute a deal that is efficient >>

(efficient in that buyer's valuation > seller's valuation)