14.13 Economics and Psychology (Lecture 19)

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1 FAIRNESS

1.1 Ultimatum Game

- a Proposer (P) and a receiver (R) split \$10

- P proposes s

- R can accept or reject

  – if R accepts, the payoffs are (P,R)=$(10 - s, s)$

  – if R rejects, they are $(0, 0)$

- Evidence from “In Search of Homo Economicus: Behavioral Experiments in 15 Small-Scale Societies”, American Economic Review 91, (2001), 73-78, by Henrich, Fehr, Boyd, Bowles, Gintis, Camerer and McElreath: Table 1.

- Societies with lots of interactions
  - reputation is important (for example society with no or a very weak state)
  - incentives to never accept something below 50% (short term loss but long term gain)

- measure one dimension of fairness / equality

1.2 2 interesting variants

1. Market game with several proposers

   - $n - 1$ proposers who propose simultaneously s_i
   - 1 responder who accepts or rejects the highest offer $s^{\text{max}} = \max s_i$
   - empirically $s^{\text{max}} = 10$: incentive to offer more than the other proposers

2. Market game with several responders

   - 1 proposer
   - n-1 responders

- if all reject the offer, everybody gets 0

- if some accept, the offer is randomly assigned among the responders who accepted

- empirically $s = \varepsilon$ and it is accepted

3. It would be nice to have a model that explains all of these phenomena.

1.3 Fehr-Schmidt QJE'99

- n players

- final monetary payoffs x_i $i = 1...n$

- utility function

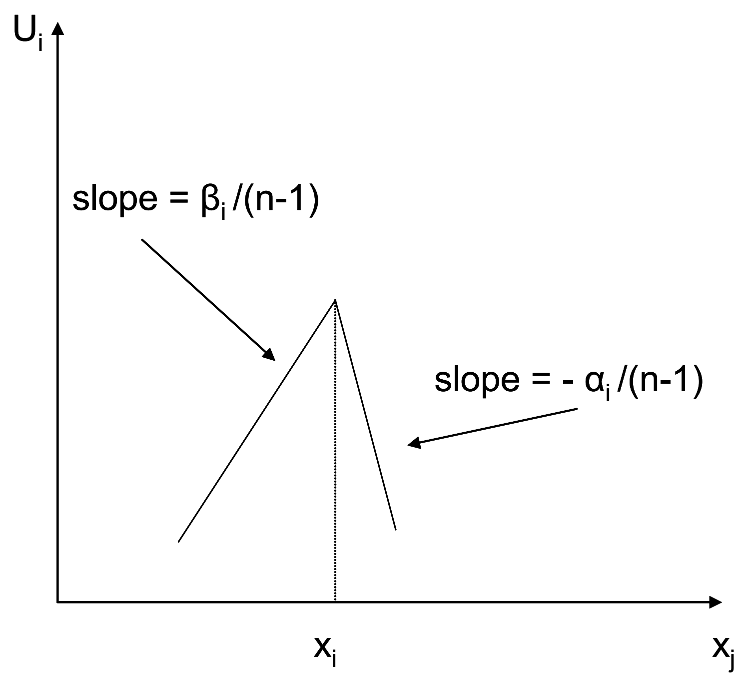
$$U_i(x_1, ..., x_n) = x_i - \frac{\alpha_i}{n-1} \sum_j (x_j - x_i)^+ - \frac{\beta_i}{n-1} \sum_j (x_i - x_j)^+$$

  where $\alpha_i \geq \beta_i \geq 0$ and $1 > \beta_i$. Notation $y^+ = \max(y, 0)$

- utility of i as a function of the monetary payoff of j x_j

– if $x_j < x_i$, then $u_i = -\frac{\beta_i}{n-1}(x_i - x_j) + terms\ independent\ of\ x_j$

– if $x_j > x_i$, then $u_i = -\frac{\alpha_i}{n-1}(x_j - x_i) + terms\ independent\ of\ x_j$



- i cares about the payoffs j gets

- i dislikes that j gets more than him

- i dislikes that j gets less than him

- i cares more about being behind than being ahead

1.4 Application to the Ultimatum Game

- player 1 is the proposer

- player 2 is the receiver

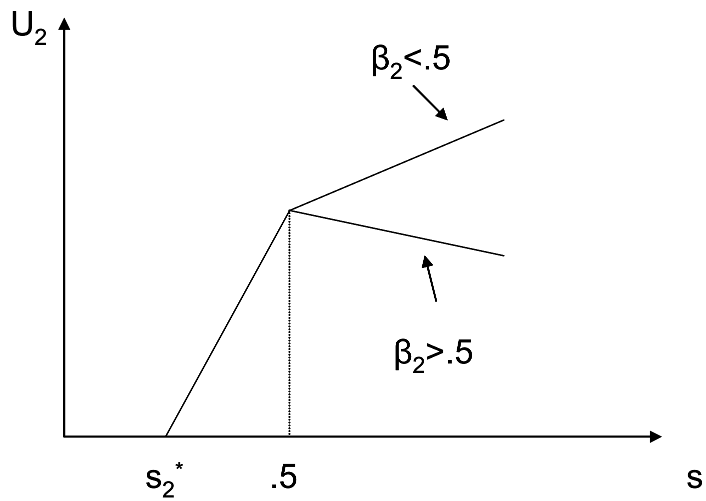
- they try to share \$1

- $s =$ offer of the proposer

Receiver's strategy

- if he rejects, the payoffs are 0 and $U_2 = 0$
- if he accepts
  - the payoffs are $x_1 = 1 - s$ and $x_2 = s$
  - his utility is

$$
\begin{aligned}
U_2 &= s - \alpha_2(1 - s - s)^+ - \beta_2(s - 1 + s)^+ \\
&= \begin{cases} s - \alpha_2(1 - 2s) & \text{if } \frac{1}{2} \geq s \\ s - \beta_2(2s - 1) & \text{if } \frac{1}{2} \leq s \end{cases} \\
&= \begin{cases} (1 + \alpha_2)s - \alpha_2 & \text{if } \frac{1}{2} \geq s \\ (1 - 2\beta_2)s + \beta_2 & \text{if } \frac{1}{2} \leq s \end{cases}
\end{aligned}
$$



R accepts iff $s \in [s_2^*, 1]$, where $s_2^* = \dfrac{\alpha_2}{1 + 2\alpha_2}$

- when $\alpha_2 = \beta_2 = 0$, $s_2^* = 0$ R accepts any offer

- when α_2 is high, $s_2^* \simeq 0.5$ fairness is really important (at least not being behind is), R accepts only if 50/50

Proposer's decision

- if $s < s_2^*$, R rejects then $U_1 = 0$

- if $s \geq s_2^*$, the payoffs are $x_1 = 1 - s$ and $x_2 = s$

$$
\begin{aligned}
U_1 &= 1 - s - \alpha_1(s - 1 + s)^+ - \beta_1(1 - s - s)^+ \\
&= \begin{cases} 1 - s - \alpha_1(2s - 1) & \text{if } \frac{1}{2} \leq s \\ 1 - s - \beta_1(1 - 2s) & \text{if } \frac{1}{2} \geq s \end{cases} \\
&= \begin{cases} (1 + \alpha_2)s - \alpha_2 & \text{if } \frac{1}{2} \leq s \\ (1 - 2\beta_2)s + \beta_2 & \text{if } \frac{1}{2} \geq s \end{cases}
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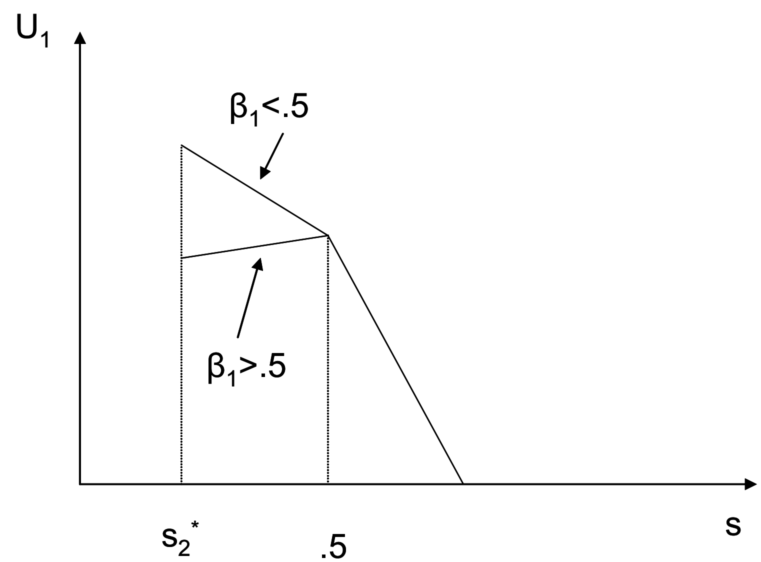

$\beta_1 > .5$ $\quad s = .5$ $\qquad$ R accepts

$\beta_1 < .5$ $\quad s = s_2^* = \frac{\alpha_2}{1+2\alpha_2}$ $\quad$ R accepts

Remark: Empirically $s^* \simeq 1/3$ this implies $\alpha_2 \simeq 1$ which means same weight on own wealth than on relative wealth with wealthier people.

Proposition 1: In the market game with n-1 proposers, the equilibrium is $s^* = 1$.

Proposition 2: In the market game with n-1 receivers, it exists an equilibrium with $s^* = 0$.

1.5 Cooperation and Retaliation

(Public Good Games or Cooperation Games)

1. Game 1: "Pure public good game"

   - n players
   - player i contributes g_i to the public good
   - monetary payoffs

   $$x_i = 1 - g_i + a \sum_j g_j$$

   with $a \in (\frac{1}{n}, 1)$

- if people are not altruistic $\alpha_i = \beta_i = 0$
  - individual rationality

$$\frac{\partial x_i}{\partial g_i} = -1 + a < 0 \Longrightarrow g_i^* = 0 \Longrightarrow x_i^* = 1$$

  - social optimal

$$S = \sum_j x_j$$

$$\frac{\partial S}{\partial g_i} = \sum_j \frac{\partial x_j}{\partial g_i} = na - 1 > 0 \Longrightarrow g_i^c = 1 \Longrightarrow x_i^c = na$$

2. Game 2: Public good game with punishment.

   - everything is public knowledge
   - player i can punish player j by an amount p_{ij} with cost $c.p_{ij}$ with $c \in (0, 1)$

3. Empirically

   - game 1: people contribute 0
   - game 2: people contribute 1 and get punished if they do not do so

4. Predicted by the Fehr-Schmidt model