ECON4260 Second lecture, topic 3:
Inequity aversion

Readings:
Fehr and Schmidt (1999)
Camerer (2003), Ch. 2.8, pp.101-104
Puzzles from experiments

Compared to self-interest model:

- Too much generosity & cooperation
  - Dictator, public good, trust games
  - Ultimatum games (genuine/strategic generosity?)
- Too much sanctioning
  - Ultimatum games, public good games
- Too conditional on others’ behavior
  - Ultimatum, public good, and trust games
- Too context dependent
  - Dictator games, Prisoners’ dilemma
Strange things happen in labs - so what?

- **Internal validity**: Replicability
  - Will others get the same result?
  - Was the experiment conducted professionally?
- **External validity**: Will similar results occur outside the lab?
  - Similarities between lab and outside world?
  - Dissimilarities: Which of them *matter*?
  - Refer to existing theories: Which differences would we, theoretically, expect to matter?
  - E.g.: ”In the real world, stakes are higher”
  - New experiment: Higher stakes!
Proposed explanations

• Inequity aversion
  – A preference for equal payoffs

• Reciprocity
  – A preference for repaying kindness with kindness and meanness with meanness

• Altruism
  – Caring for others’ payoff, or others’ utility

• Preferences for social approval
  – Prefers to be liked by others

• All of these involve ”non-standard” preferences (note: not irrationality!).
Preferences as explanations

• **Anything** can be "explained" by *ad hoc* assumptions on preferences!
  – Bill sleeps on the street
  – «Explanation»: Bill likes sleeping on the street

• For preferences to «explain» things: must be consistent with a wide array of data

• Input: knowledge from other disciplines (psychology, anthropology, biology, neurology)
https://www.youtube.com/watch?v=-KSryJXDpZo&feature=player_detailpage

(Frans de Waal: Capuchin monkey fairness experiment)
Preferences for equity

• What if some individuals dislike inequity?
  – Utility: Increasing in own income and in equity

• Dislike
  – any earning differences?
  – that others earn more than me?
  – that I earn more than others?

• Several models proposed in literature, see Sobel’s paper.
Fehr & Schmidt’s (1999) model of inequity aversion

- Individuals care about own income, advantageous inequity, and disadvantageous inequity
  - Disadvantageous counts most!
  - Simplification: Linearity, 2 persons

\[ U_i = x_i - \alpha_i \max \{x_j - x_i, 0\} - \beta_i \max \{x_i - x_j, 0\} \]

where \( i \neq j \), \( \beta_i \leq \alpha_i \), \( 0 \leq \beta_i < 1 \)

- Can alternatively be written:

\[
\begin{align*}
U_i &= x_i - \beta_i (x_i - x_j) \text{ if } x_i > x_j \\
U_i &= x_i - \alpha_i (x_j - x_i) \text{ if } x_i \leq x_j
\end{align*}
\]
**2-person inequity aversion model**

\[ U_i = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\} \]

where \( i \neq j \), and \( \beta_i \leq \alpha_i \), \( 0 \leq \beta_i < 1 \)

All else given, \( i \) prefers \( j \)'s income to equal hers; \( i \)'s utility declines in their income *difference*, more so if \( i \) herself is worst off.
Ultimatum game: Inequity averse responder

- Responder, $B$, prefers high payoff to himself, and equality between himself and the proposer, $A$.
  - Reject: $\{x_A, x_B\} = \{0,0\}$
  - Accept: $\{x_A, x_B\} = \{(1-s)X, sX\}$

- If $A$ offers $s = 0.5$: Will $B$ accept?
  - Accept: same income difference as reject.
  - Accept: more income than reject.
  - $B$ accepts.

- If $A$ offers $s > 0.5$:
  - Accept: higher income difference than reject.
  - Accept: more income (for both) than reject.
  - Assumption $\beta_i < 1$: One will never throw away income to avoid advantageous inequality
  - $B$ accepts.
Inequity averse responder (cont.)

- Offered share \( s < 0.5 \): Will B accept?
  - *Accept*: higher income difference than *reject*.
  - *Accept*: more income (for both) than *reject*.
  - No upper boundary on \( \alpha_i \): We may throw away income to avoid *disadvantageous* inequality.

\[
U_i = x_i - \alpha_i (x_j - x_i) \text{ if } x_i \leq x_j
\]

\[
U_B(\text{accept}) = sX - \alpha_B [(1-s)X - sX] = sX - \alpha_B [X - 2sX] = X[s - \alpha_B (1 - 2s)]
\]

\[
U_B(\text{reject}) = \text{ if } X[s - \alpha_B (1 - 2s)] < 0
\]

- *Reject* is preferred if \( X[s - \alpha_B (1 - 2s)] < 0 \)
- i.e. if \( s < \frac{\alpha_B}{1 + 2\alpha_B} \)
- Note: \( X \) doesn’t matter!
Example

- $\alpha_B = 2$, $\beta_B = 0.4$
- Offer from Proposer (A): $s = 0.2$

$$U_i = x_i - \alpha_i \max \{x_j - x_i, 0\} - \beta_i \max \{x_i - x_j, 0\}$$

$$U_B(\text{accept})$$

$$= 0.2X - 2 \max \{0.8X - 0.2X, 0\} - 0.4 \max \{0.2X - 0.8X, 0\}$$

$$= 0.2X - 2 \cdot 0.6X$$

$$= X (0.2 - 1.2)$$

$$= -X$$

$$U_B(\text{reject}) = 0$$

- B will reject, regardless of the size of the "pie" to be shared.
Inequity averse Proposer (A)

• Prefers high payoff to himself (A) and equality between himself and the responder (B).

• If A offers $s = 0.5$:
  – If B accepts: max. equality, less than max. income
  – Both self-interested and inequality-averse responders will accept $s = 0.5$

• Offered share $s > 0.5$:
  – If B accepts: less income to A than $s = 0.5$, and less equality
  – Proposer will never offer $s > 0.5$
Inequity averse Proposer (cont.)

- If A offers $s < 0.5$:
  - *If B accepts:* The lower $s$, the higher income for A, but the more inequality
  - Which is most important?
  - A’s utility when $s \leq 0.5$, given that B accepts:
    \[
    U_A = x_A - \alpha_A \max \{x_B - x_A, 0\} - \beta_A \max \{x_A - x_B, 0\}
    \]
    \[
    = (1-s)X - \beta_A[(1-s)X - sX]
    \]
    \[
    = X(s(2\beta_A - 1) + 1 - \beta_A)
    \]
  - This is increasing in $s$ whenever $\beta_A > 0.5$
  - If acceptance were not a concern (dictator game), A would offer $s = 0$ if $\beta_A < 0.5$, $s = 0.5$ if $\beta_A > 0.5$, and be indifferent between any offer $s \in [0, 0.5]$ if $\beta_A = 0.5$. 
Strategic interaction

• A must take into account: will B accept?
• Assume inequity averse preferences, common knowledge:
  \[ \alpha_A = \alpha_B = 2, \beta_A = \beta_B = 0.4 \]
• Since \( \beta_A < 0.5 \), A would prefer to keep all of X himself, despite his inequity aversion.
• However, B will reject if
  \[
  s < \frac{\alpha_B}{1 + 2\alpha_B} = \frac{2}{5} = 0.4
  \]
• Knowing this, A offers \( s = 0.4 \) (or: *slightly more*).
• B accepts.
Self-interested Proposer (A), inequity-averse Responder (B)

- Let $\alpha_A = 0$, $\beta_A = 0$, $\alpha_B = 2$, $\beta_B = 0.4$
  - Common knowledge
- Responder will reject if $s < 0.4$
  - Threat is credible, due to B’s inequity aversion
- Knowing this, Proposer will offer 0.4
- No difference between the behavior of self-interested and inequity-averse Proposers!
If Proposer does not know Responder’s type

- A must consider the probability that $B$ is inequity-averse.
- If possible (in the lab, it is usually not!), a self-interested $B$ would pretend being inequity-averse.
- The existence of inequity-averse types can make self-interested types behave as if they were inequity-averse too.
Competition

• Responder or proposer competition:
  – Observed outcomes usually very inequitable
  – 1 person reaps (almost) all gains, others get (almost) nothing.

• Double auction markets:
  – Observed outcomes usually conform nicely to the self-interest model

• Do such results contradict the assumption that (at least some) players are inequity averse?
n-person inequity aversion

- Fehr-Schmidt model with $n$ individuals:
  - Normalizes inequity aversion by the number of others (otherwise every new player $k$ would decrease $i$’s utility unless $x_k = x_i$)
  - Self-oriented: compares himself to everyone else, but does not care about inequality between others
  - Crucial question: What’s the relevant peer group?

\[
U_i(x_i) = x_i - \alpha_i \frac{1}{n-1} \sum_{j \neq i} \max\{x_j - x_i, 0\} \\
- \beta_i \frac{1}{n-1} \sum_{j \neq i} \max\{x_i - x_j, 0\}
\]
Proposer competition

- You’re selling a house
  - No sale: your gain is 0 (you’re moving, no rental market).
  - For any interested buyer: value is $X$.
- Buyer = Proposer (A), seller = Responder (B)
- Sales process:
  1. Potential buyers $i$ give sealed offers $s_iX$
  2. You accept preferred offer, or reject all (no sale). If indifferent, buyer picked randomly.
  3. Sale: your payoff is $s_hX$ ($h$ is the buyer). Buyer’s gain is $(1-s_h)X$. No sale: All get payoff 0.
- If only 1 potential buyer: Standard ultimatum game.
- Assume:
  - 10 potential buyers.
  - Your $\beta_B < 0.5$, so you will pick the highest offer.
Proposer competition – cont.

• Self-interest prediction:
  – Several proposers offer $s=1$, which is accepted
  – If several buyers value house at $X$, you will get $X$.

• Assume: Every player is inequity-averse
  – If buyer $i$’s offers is rejected, he will experience unfavourable inequity: His payoff=0, someone else’s>0
  – If his offer is accepted, there will be inequity anyway, but his income will increase, and the inequity can be turned to his advantage
  – The only (subgame perfect) Nash equilibrium is that at least two proposers offer $s=1$, of which one is accepted.
Why doesn’t inequity aversion affect outcome with proposer competition?

- "No single player can enforce an equitable outcome. Given that there will be inequality anyway, each proposer has a strong incentive to outbid his competitors in order to turn part of the inequality to his advantage and to increase his own monetary payoff.” (Fehr and Schmidt 1999, p.834)

- No buyer can secure less disadvantageous inequality between himself and the monopolist (you) by offering you a relatively low share: If he tries, you can just pick someone else’s offer. Thus, inequity aversion becomes irrelevant.
Criticisms of Fehr-Schmidt model

• Linearity
  – Dictator games: Dictator A will give either 0 (if $\beta_A < 0.5$) or 0.5 (if $\beta_A > 0.5$)
  – Possible modification: Utility concave in inequity

• Who is the reference group?
  – Lab: All subjects in experiment? Opponent(s)?
  – Outside lab...?

• Flaws and aggressive marketing?
  – Binmore and Shaked (JEBO 2010)
  – See http://www.wiwi.uni-bonn.de/shaked/rhetoric/

• Micro data across games not consistent with fixed individual $\alpha$’s and $\beta$’s (Blanco, Engelmann, Normann 2011)
Next time: Reciprocity

• A preference to repay kind intentions by kind actions, and mean intentions by mean actions

• Readings:
  – Camerer, C. (2003), pp. 105-117 (Compendium; Ch. 2.8.4 can be skipped).
  – Sobel, J. (2005), Section 3.4