UiO : University of Oslo

ECON4260, Third lecture, topic 3:

Reciprocity

Readings:

Camerer (2003), pp. 105-117 (2.8.4 can be skipped)

Sobel (2005), Section 3.4

Rabin, M. (1993)

Fehr, E., and S. Gächter (2002)

Inequality aversion or reciprocity?

- Inequality aversion: Outcome-oriented preferences
- No concern for process
  - Why did the outcome occur? Was it intentional? Fair? Who decided? Was there a choice?
- Micro data: α_i and β_i not stable across games
- One interpretation:
  - The inequality aversion model fits nicely with certain experimental evidence because *in these contexts*, it captures aspects of a more fundamental human drive, *reciprocity*

- Monkey rejects unequal outcome
  - But can it really be Fehr & Schmidt inequality aversion?

https://www.youtube.com/watch?v=-KSryJXDpZo&feature=player_detailpage

Reciprocity

A *preference* to repay kindness by kindness and unkindness by unkindness

- «Kind»?
  - If «equal split» corresponds to «kind» (ultimatum game): Inequality aversion and reciprocity may yield similar results
- Inequality aversion (self-interest, altruism): Only *outcomes* matter
- Reciprocity: **Intentions** matter
  - Disappointment & satisfaction
  - Punishment & reward

- I feel bad if I think you're trying to be mean
  - Paul pays Ann's bill at a restaurant.
  - Ann thinks Paul does so to insult her, and feels bad
- I feel better if I can repay your meanness
  - Ann's pain is reduced if, when leaving the [illegible]hat he's a snobbish

Angry Gal Bites Off Boyfriend's Tongue

DA says he was attempting a 'make-up kiss'

Feb 18, 2013 7:12 PM CST

The role of intentions

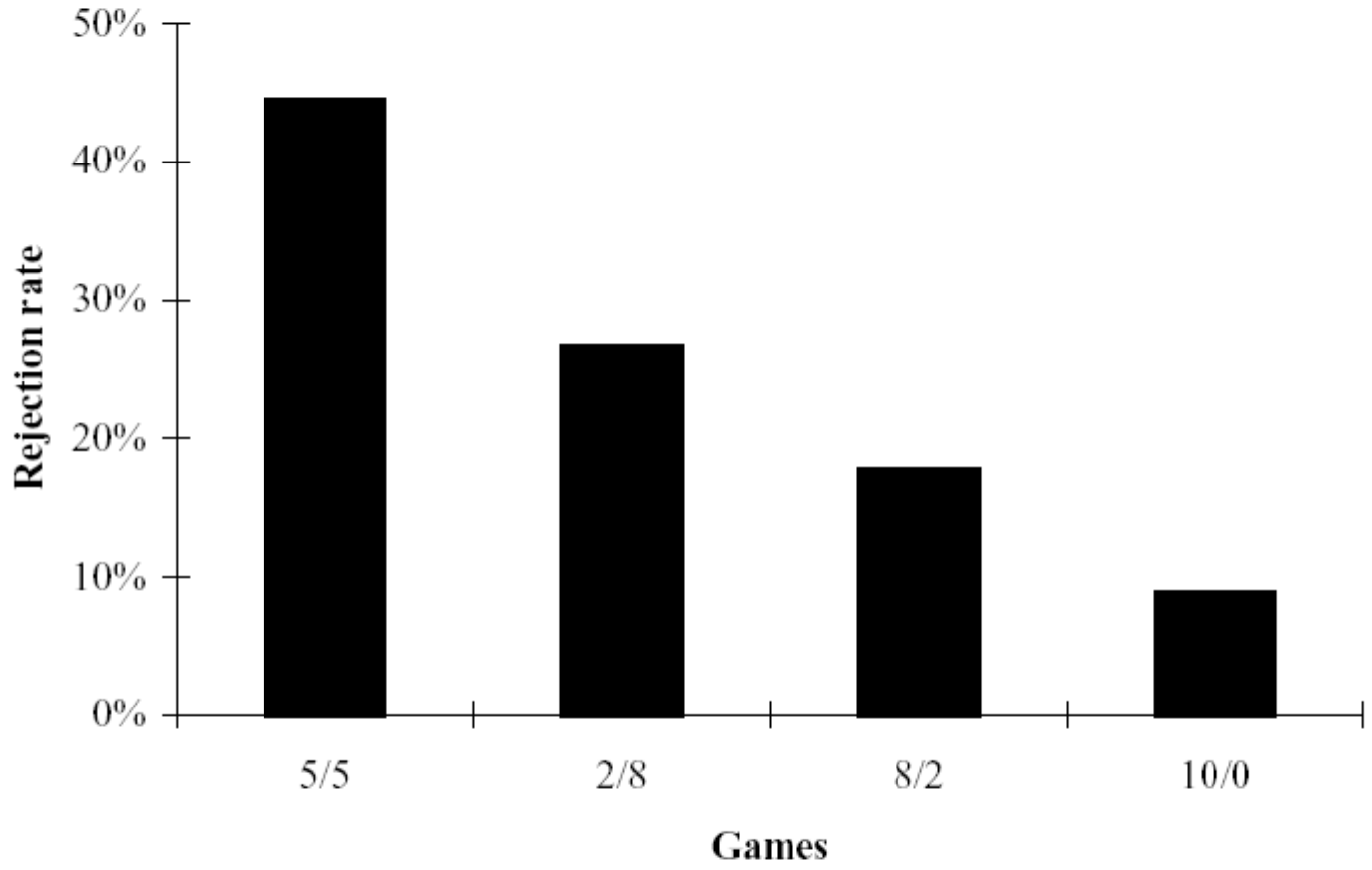
- Ultimatum game
  - Assume: Proposer A offers $s = 0.2$
  - Is this offer kind?
- Standard case: Proposer can choose any $s \in [0,1]$
- Would perceived kindness of $s = 0.2$ change if
  - Proposer could only choose $s = 0.2$ or $s = 0.5$?
  - Proposer could only choose $s = 0.2$ or $s = 0$?
  - Proposer could only choose $s = 0.2$ or $s = 1$?
- With inequality aversion (or self-interest):
  - A's unchosen alternatives do not matter for B
  - B's alternative to {0.8X, 0.2X} is, anyway, {0,0}!

Impact of unchosen alternatives

Falk, Fehr, and Fischbacher (2003): On the Nature of Fair Behavior, *Ec. Inquiry* 41(1), 20-26

- Binary ultimatum games
- Proposer can choose between {8,2} (i.e. $s = 0.2$) and either
  - {5,5} (equal sharing, $s = 0.5$)
  - {2,8} (responder gets most, $s = 0.8$)
  - {8,2} (proposer gets most, $s = 0.2$ – no real choice!)
  - {10,0} (proposer gets everything, $s = 0$)
- Result: Rejections of {8,2} depend strongly on the available unchosen alternatives.

Figure 2
Rejection rate of the (8/2)-offer across games



Rejection rates when offered s = 0.2, depending on proposer's unchosen alternative.

Hyper-fair offers

- Ache of Paraguay, Lamelara of Indonesia
  - Average offers more than half
  - But offers > 0.5 often rejected
  - Inequity aversion: Offers > 0.5 will always be accepted
  - Potlatch/competitive gift-giving culture: Large gift can be an insult

Modelling reciprocity

$$U_i = x_i + \alpha_i(\tilde{k}_{ji} + k_{ij}\tilde{k}_{ji})$$

k_{ij} = *i*'s kindness towards *j*

$\tilde{k}_{ji}$ = *i*'s belief about *j*'s kindness towards *i*

$\alpha_i \geq 0$ = *i*'s weight for kindness concerns (vs. income)

- Alternative, simpler specification:
  - Disregard disappointment/pleasure part, include only in multiplicative term
  - In games studied here: does not change behavioral predictions (you cannot alter others' intentions).
  - In what follows, assume:

$$U_i = x_i + \alpha_i k_{ij}\tilde{k}_{ji}$$

Kindness and unkindness

- Being kind in the UG
  - Proposing s = 0.5?
- What matters when judging if *j* was kind to *i*?
  - Consequences:
    - Is the outcome good for *i*? For *j*?
    - Equality: Is it better/worse for *i* than for *j*?
  - Intentions: Did *j mean* to be nice?
    - Was *j able* to influence the outcome?
    - Is the outcome good for *i* (and/or *j*) compared to the *alternatives available* to *j*?
    - Why did he make the choice he did?
  - Beliefs about others' strategies/intentions
    - What did *j* believe *i* would do, and why?

Models of reciprocity

- Rabin (1993):
  - Normal form: static, abstracts from sequence of moves
  - ”Kindness” of *j* towards *i*: Depends only on *i*’s payoff and the payoff *j could have* secured to *i*
  - No concerns for *j*’s sacrifice or intrinsic kindness
- Dufwenberg and Kirschsteiger (1998):
  - Sequential games: sequence of moves may matter
- Falk and Fischbacher (1998):
  - Sequential games; ”kindness”: payoff equality
- Levine (1998): people care about others’ *types*
- Cox et al. (2007):
  - Behavior varies with emotional state
  - Emotional state depends on others’ previous behavior

Psychological games

- Traditional game theory:
  - Players' utilities depend on *outcomes*
  - *Beliefs* about others' preferences and strategies may affect one's strategy choice, thus *indirectly* affecting outcomes
- Psychological game theory:

  Geanakoplos, Pearce, and Staccetti (1989)
  - Players' utilities may depend *directly* on beliefs
  - «You were trying to kill me!»

Note: in certain games, this can be simplified – no need to use psychological game theory (Segal and Sobel 2007)

”Fairness equilibrium” (Rabin 1993):

- A situation in which no player can increase his utility by changing his strategy, given everyone else’s strategy, and in which *beliefs are correct*
  - including beliefs about others’ strategy, and beliefs about others’ beliefs about your strategy
- In a fairness equilibrium, no player has reason to change strategy and/or beliefs, given the strategies and beliefs of the other players.

Example: Prisoners' dilemma

	Cooperate	Defect
Cooperate	4,4	-2,5
Defect	5,-2	1,1

Numbers indicate material payoffs

Self-interest model: (D,D) only Nash equilbrium

- 2's best response
- 1's best response

Example: Prisoners' dilemma

	Cooperate	Defect
Cooperate	4,4	-2,5
Defect	5,-2	1,1

Reciprocal preferences: In (C,C), both players think the other is trying to be kind. Each thus wants to be kind.

(C,C) can be a fairness equilibrium.

Example: Prisoners' dilemma

	Cooperate	Defect
Cooperate	4,4	-2,5
Defect	5,-2	1,1

(D,D): Both players think the other is *not* trying to be kind. Each thus *does not* want to be kind.

(D,D) can also be a fairness equilibrium.

A simple model of reciprocity

- s_i = i's strategy (e.g.: D)
- b_{ij} = i's belief about j's strategy (e.g.: C)
- c_{iji} = i's belief about j's belief about i's strategy (e.g., D)

- **Kindness from *i* to *j*:**
  - Material payoff to *j* (x_j) minus the "fair" payoff to *j*
  - "Fair" payoff: the average of the highest and lowest payoff *i* could have secured to *j*.

$$k_{ij} = x_j(s_i, b_{ij}) - \tfrac{1}{2}[x_j^{max}(b_{ij}) + x_j^{min}(b_{ij})]$$

- *i's* **beliefs** about *j*'s kindness towards *i*:

$$\tilde{k}_{ji} = x_i(b_{ij}, c_{iji}) - \tfrac{1}{2}[x_i^{max}(c_{iji}) + x_i^{min}(c_{iji})]$$

- i's utility: $U_i = x_i + \alpha_i k_{ij} \tilde{k}_{ji}$

Finding a fairness equilibrium

- A state S is described by *strategies* and *beliefs*:

  $S = [(s_1, b_{12}, c_{121}), (s_2, b_{21}, c_{212})]$

  – Is $S' = [(s'_1, b'_{12}, c'_{121}), (s'_2, b'_{21}, c'_{212})]$ a fairness eq.?

- Check:

  1. given all expectations $(b'_{12}, c'_{121}, b'_{21}, c'_{212})$, and the other's strategy s'_2, can **player 1** increase his utility by playing a strategy $s_1 \neq s'_1$?
  2. given all expectations , and the others' strategy s'_1, can **player 2** increase his utility by playing a strategy $s_2 \neq s'_2$?

- If *no* to both 1 & 2, S' is a fairness eq.
- If *yes* to 1 and/or 2, S' is not a fairness eq.

Example: Prisoners' dilemma

	Cooperate	Defect
Cooperate	**4**,4	-2,5
Defect	5,-2	1,1

Fairness eq.: correct beliefs

$U_i = x_i + \alpha_i k_{ij} \tilde{k}_{ji}$ Assume $\alpha_1 = \alpha_2 = 1$.

1's kindness towards *2*:

$k_{12} = x_2(s_1, b_{12}) - \frac{1}{2}[x_2^{max}(b_{12}) + x_j^{min}(b_{12})]$

Assume that 1 believes that 2 will play C.

If 1 plays C too, his kindness towards 2 is

$k_{12} = x_2(C, C) - \frac{1}{2}[x_2^{max}(C) + x_2^{min}(C)]$

=

2's believed kindness towards 1: Symmetry, so $\tilde{k}_{ji} = 3$

1's **utility**: $U_1 = x_1 + \alpha_1 k_{12} \tilde{k}_{21} =$

Example: Prisoners' dilemma (cont.)

	Cooperate	Defect
Cooperate	4,4	-2,5
Defect	**5**,-2	1,1

(C,C) fairness eq. if no-one gains by changing to s_i=D, **given all beliefs.**

$\tilde{k}_{ji}$ depends on i's beliefs – not s_i. Hence $\tilde{k}_{ji}$=3 as before.

$k_{12} = x_2(s_1, b_{12}) - ½ [x_2^{max}(b_{12}) + x_2^{min}(b_{12})]$

$= x_2(D, C) - ½ [x_2^{max}(C) + x_2^{min}(C)]$

$= -2 - ½ [4 + (-2)] = -2 - ½ (2) = -3$

1's utility if he deviates from (C,C), beliefs fixed:

$$U_1 = x_1 + \alpha_1 k_{12} \tilde{k}_{12} = 5 + (-3)(3) = 5-9 = -4$$

Example: Prisoners' dilemma (cont.2)

	Cooperate	Defect
Cooperate	4,4	-2,5
Defect	5,-2	1,1

Since -4 < 13, Player 1 prefers s_1=C. By symmetry, the same holds for Player 2.

Even if 1's material payoff is higher if he plays D, he will feel bad by repaying kindness from player 2 by meanness.

(C,C) is a fairness equilibrium: If both play C, and believe the other will play C, no player has reason to change his strategy or beliefs.

Reciprocity in a marital investment game

- Consider the following psychological payoffs:

$$u_H = x_H + \alpha_H k_{HW} \tilde{k}_{WH}$$

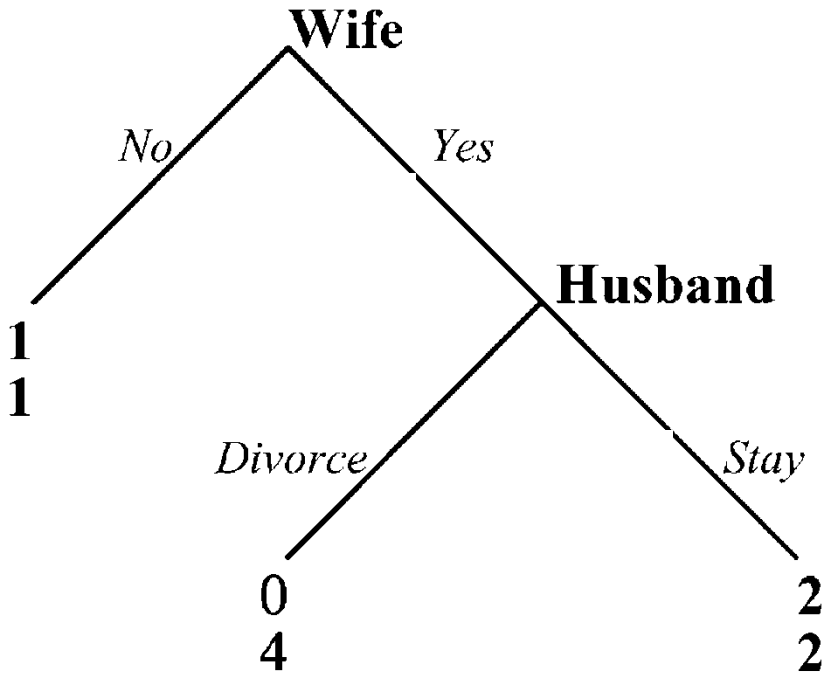
$$u_W = x_W + \alpha_W k_{WH} \tilde{k}_{HW}$$

Material payoff

Reciprocity sensitivity

Wife's kindness

Wife's belief about the husband's kindness



(Example is from Dufwenberg (2002), copied from a lecture by Geir Asheim)

The cost of control

- ”Kindness”: About more than *i* and *j*’s material payoff?
- Falk and Kosfeld (AER 2006):
  - Two-stage principal-agent game (one-shot)
  - Agent gets initial endowment =120, chooses costly effort level x between 0 and 120
  - Agent’s payoff: 120 –x
  - Principal’s payoff: 2x
  - Principal’s choice: Before agent chooses x, principal decides whether to use a control option $\underline{x}>0$, forcing the agent to exert an effort of at least $\underline{x}$.
  - Self-interest prediction: Always optimal for *A* to use control. Agent will exert effort $\underline{x}$.
  - Inequity aversion-predicion: Agent may choose $x > \underline{x}$, but if so, his effort is independent of whether principal chose to use control

The costs of control, cont.

- Results, Falk and Kosfeld:
  - Majority of agents exerted less effort when control was used
  - Most principals chose *not* to use control
  - Principals not using control earned *more* than those using the control, due to higher efforts from workers
- Kindness:
  - Principals not using control give agents autonomy?
  - Trust: Principals not using control are taken to believe that the agent is a good person?

Some examples

- Labor market relations:
  - Limited observability/verifiability, incomplete contracts: If workers feel manager is unkind, they may reduce «voluntary» effort
  - Management based on assumption that workers are (not) trustworthy: self-fulfilling prophecy?
- Politics:
  - Perceived intentions may impact negotiators' ability to reach mutually beneficial agreements
  - E.g.: Does the labor union leader believe that the leader of the employers' association really wants to cooperate?
  - Climate treaties

Summary

- The preference to repay kindness with kindness and meanness with meanness seems very common
- PD game (in material payoffs) may be transformed into coordination game (in reciprocal utilities): each prefers to behave like the other
- In models of reciprocity, a player's utility depends on others' intentions and/or beliefs
  - more complex than models of inequity aversion

Next time: Altruism

Nyborg, K. and M. Rege, 2003: Does Public Policy Crowd Out Private Contributions to Public Goods? *Public Choice* 115 (3): 397-418.

Brekke, K.A., S. Kverndokk, K. Nyborg, 2003: An Economic Model of Moral Motivation, Journal of Public Economics 87 (9-10), 1967-1983.

Sobel, 2005: Section 3.3.

Andreoni (1989): Giving with Impure Altruism: Applications to Charity and Ricardian Equivalence, *Journal of Political Economy* **97** (6), 1447-1458.

Frey, B. (1992). Pricing and Regulating Affect Environmental Ethics, *Environmental and Resource Economics* **2**, 399-414.