Econ 2230: Public Economics

Lecture 19: Fundraising: Signaling

Today

- Sequential giving may be successful because it serves as a signal
  1. Signal on quality of the public good
  2. Signal on norm
  3. Field experiments
     a. Response to information on others (effect on followers)
        - List and Lucking-Reiley
        - Frey and Meier
        - Martin and Randal
        - Shang and Croson
     b. Institution (effect on leader and follower)
        - Soetevent (2005)
  4. Social image and prestige
     - Benabou and Tirole (2005)

1: Signaling quality of public good

- Common assumption is that the quality of the non-profit is well-known. Donors are fully informed on the quality of the public good
- Foundations and charity agencies may be seen as evidence that the return from the public good is uncertain
- Non-profit cannot credibly reveal its type
- Announcements allows high qualities to send a credible signal on quality

1: Signaling quality of public good

- Two signaling models that help explain sequential moves

A: Full revelation (Vesterlund, 2003)

- Announcements causes donors to become informed and fully reveal the information through a sufficiently high signal.

B: Partial revelation and pooling (Potters et al 2005,2007)

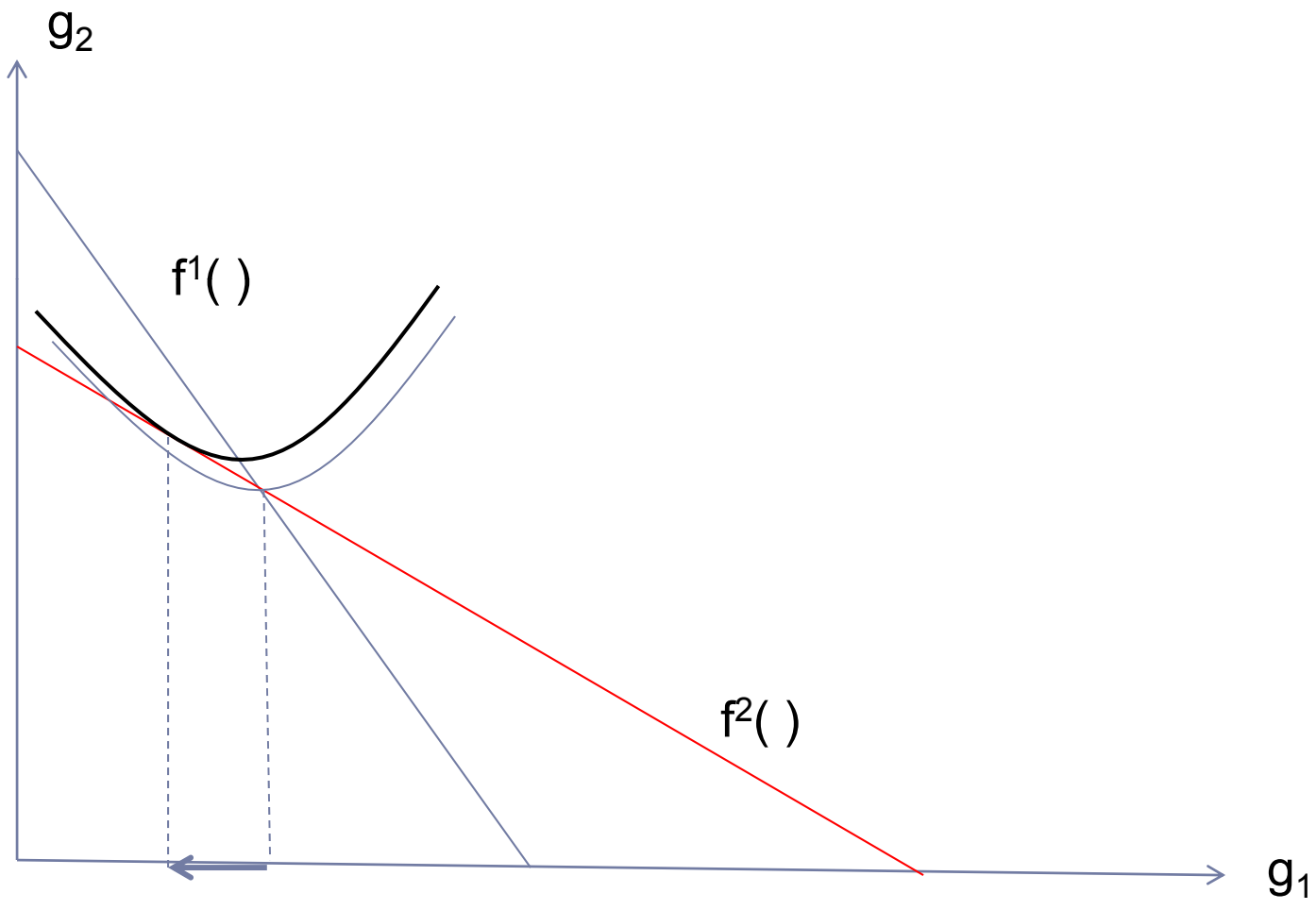
- Announcements allow fully informed donors to send a partially revealing signal, enables pooling across non-profits and secures giving to efficiency enhancing non-profits

1. A Full revelation

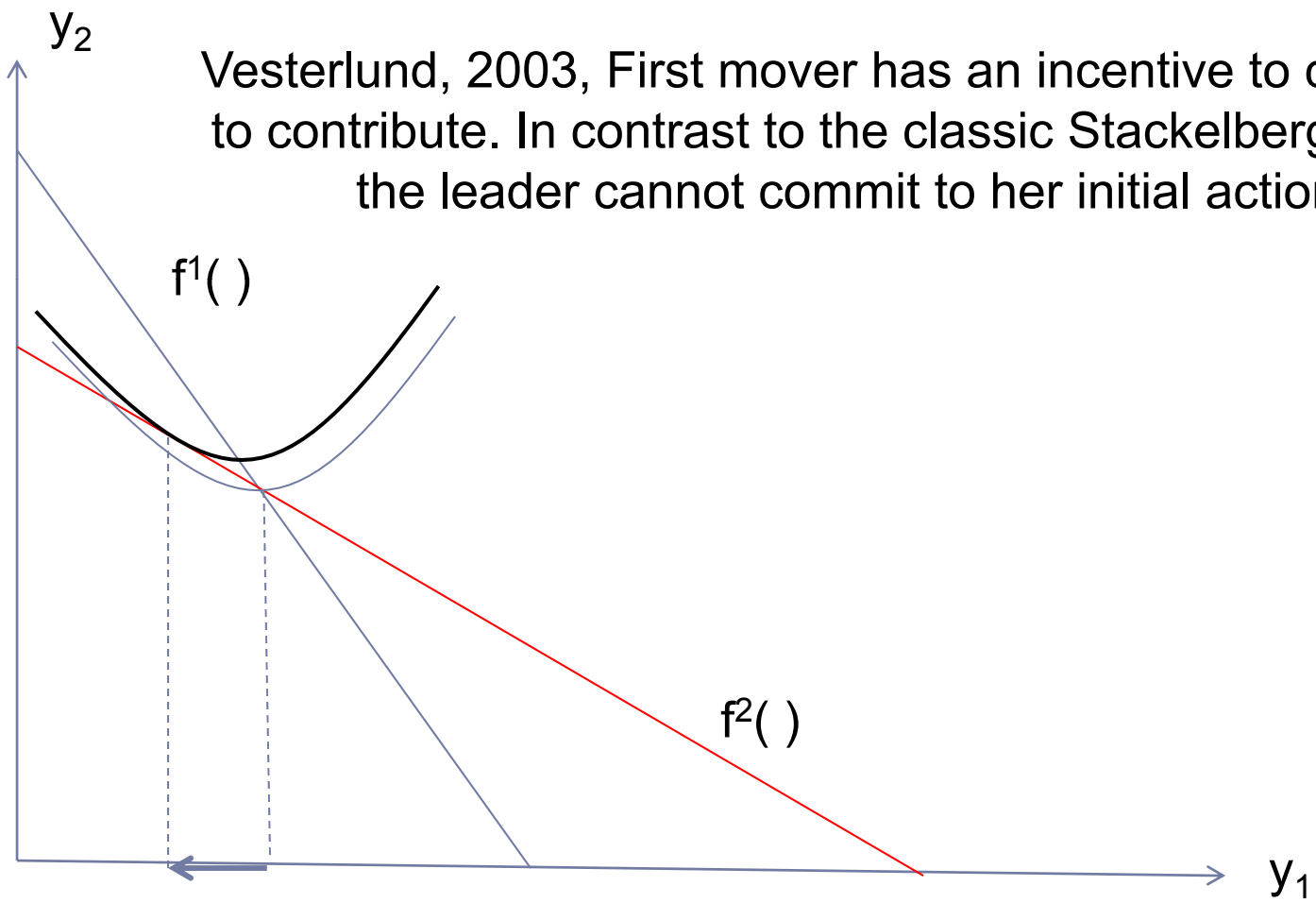
- Vesterlund, 2003
- Uncertainty about the quality of the public good and uninformed donors
- Sequential moves provides the leaders with an incentive to investigate the charity and reveal this information through a large initial contribution
- This causes a donation maximizing fundraisers who represent high quality charities to opt for announcements

- Treatment of sequential moves in the public good game needs to be modified

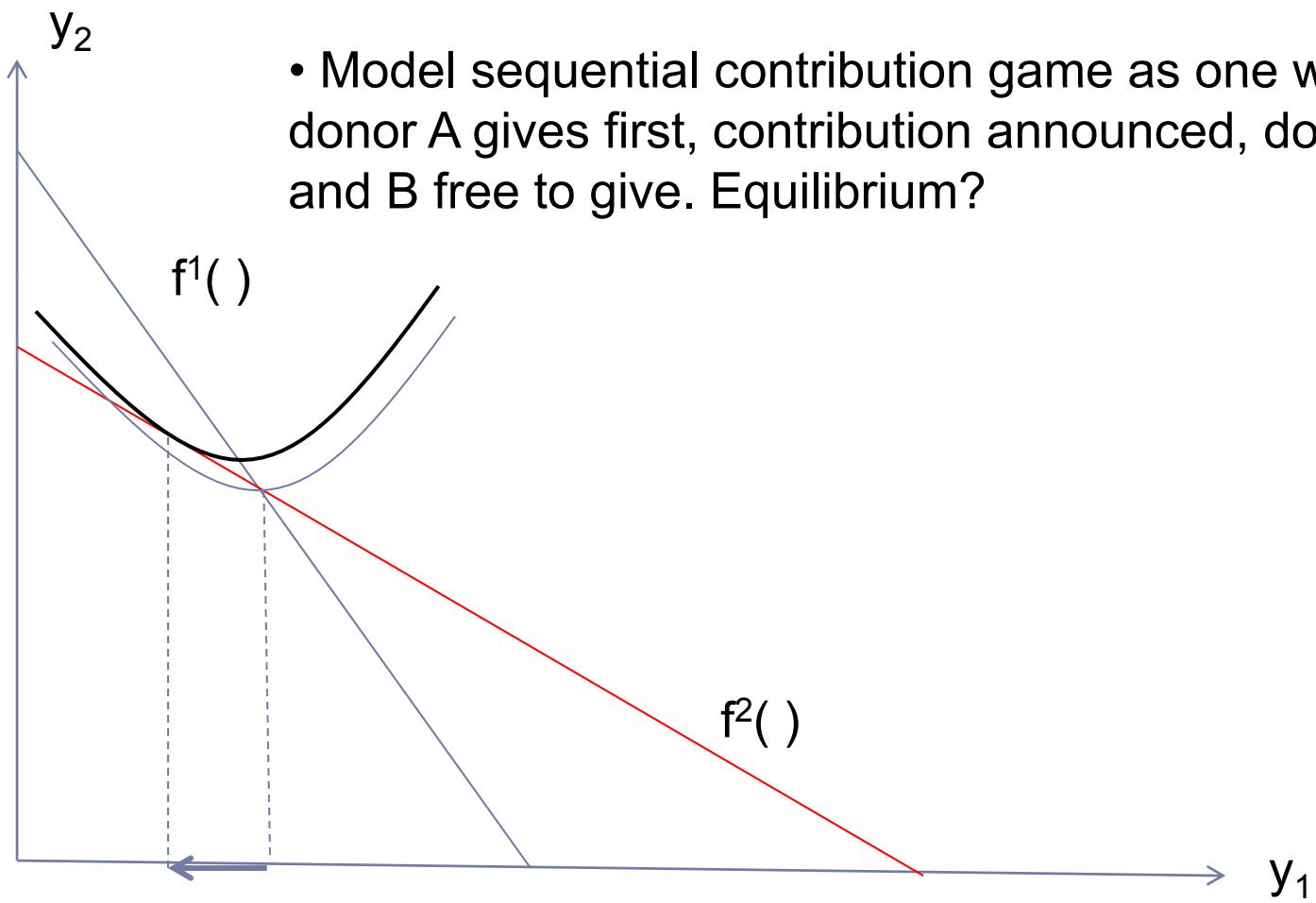
Varian, 1992, contributions decrease with sequential moves



Vesterlund, 2003, First mover has an incentive to continue to contribute. In contrast to the classic Stackelberg model the leader cannot commit to her initial action

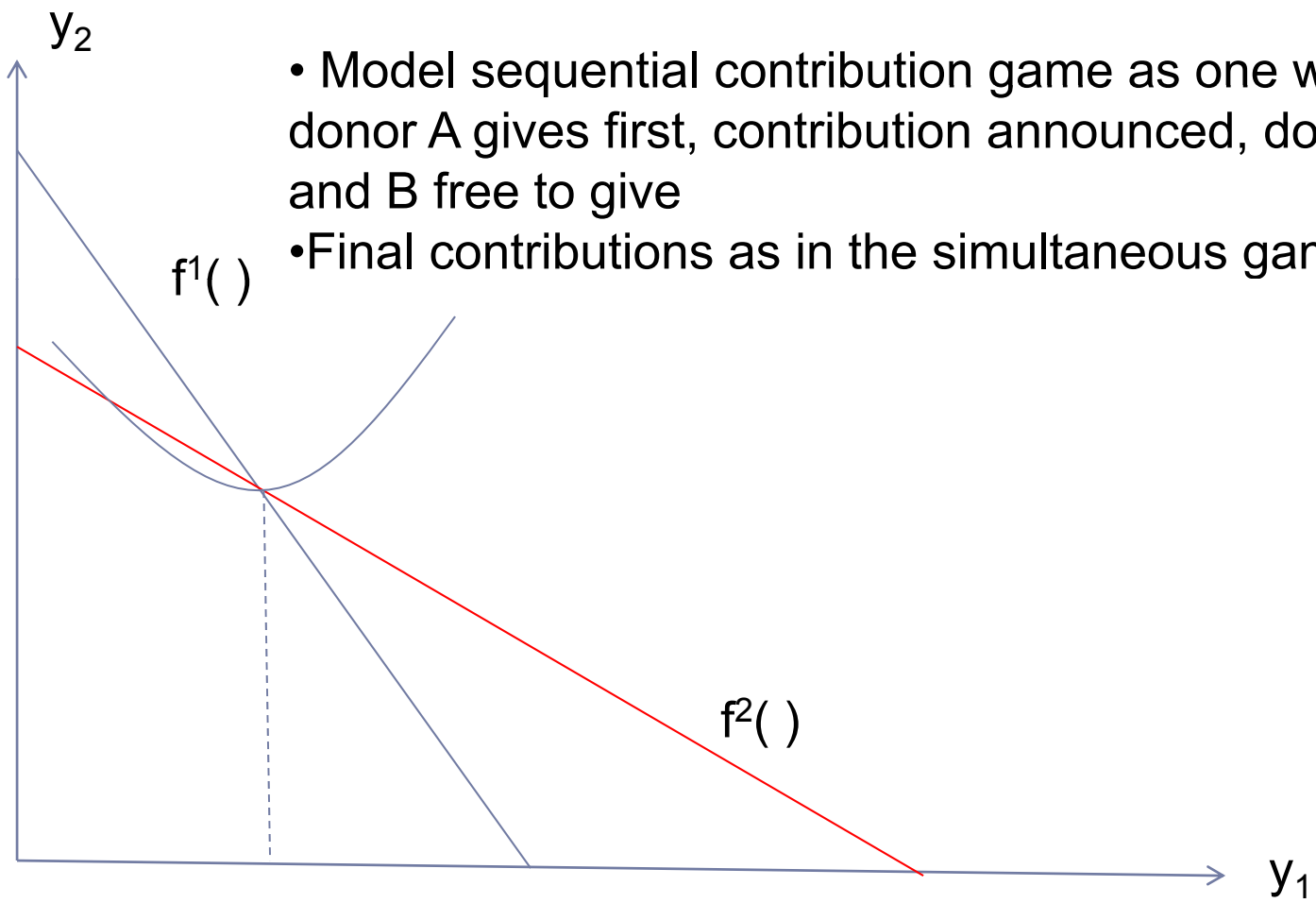


Vesterlund, 2003



- Model sequential contribution game as one where donor A gives first, contribution announced, donor A and B free to give. Equilibrium?

Vesterlund, 2003



- Model sequential contribution game as one where donor A gives first, contribution announced, donor A and B free to give
- Final contributions as in the simultaneous game

Signaling model

- Two donors, j = A, B,
- Two types of non-profit, i = H, L
  - i=H: $U_j = \ln x_j + \ln G$
  - i = L: $U_j = \ln x_j$

- Donors identical with the exception that only A can purchase information about the quality of charity
  - $I_A = 0$
  - $I_A = 1$, pays c and receive s = H, L
  - s and I_A are private information

Signaling model

1. Nature selects charity type i = {H, L}
2. Charity of type i selects sequential or simultaneous moves: $z_i = 0$ don't announce, $z_i = 1$ announce leader's contribution
3. Donors observe z, update ρ_0 , ρ_1 prior given z
4. A picks $I_A(z) = 0,1$, pays c receives s, $t_A = \{l, u, h\}$
5. z=0: $g_A(z=0, t_A)$ and $g_B(z=0)$ chosen simultaneously
6. z=1:
   1. $g^0_A(z=1, t_A)$
   2. B observes $g^0_A(z=1, t_A)$ and updates $\mu_B(i=H \mid g^0_A)$
   3. $g^1_A(z=1, t_A)$ and $g^1_B(z=1, g^0_A)$ chosen simultaneously

No announcement subgame, z=0

- No Announcement (z=0):
  - $I_A(z=0) = \{0,1\}$ pays c receives s, $t_A = \{l, u, h\}$
  - $g_A(z=0, t_A)$ and $g_B(z=0)$ chosen simultaneously

- B knows cost of information, thus will know whether A bought information
- Enables B to free ride off A being informed
- Reduces A's incentive to buy information as B's contribution decreases when A is informed.
- E.g., with simultaneous moves and prior of $\rho_0 = 0.5$ (prior that nonprofit is high type given that it doesn't announce) A does not have an incentive to purchase information
  - When z=0:
    - $I_A(z=0) = 0$
    - $g_A(z=0, t_A=u) = g_B(z=0)$ (=m/5)

Announcement sub game (z=1)

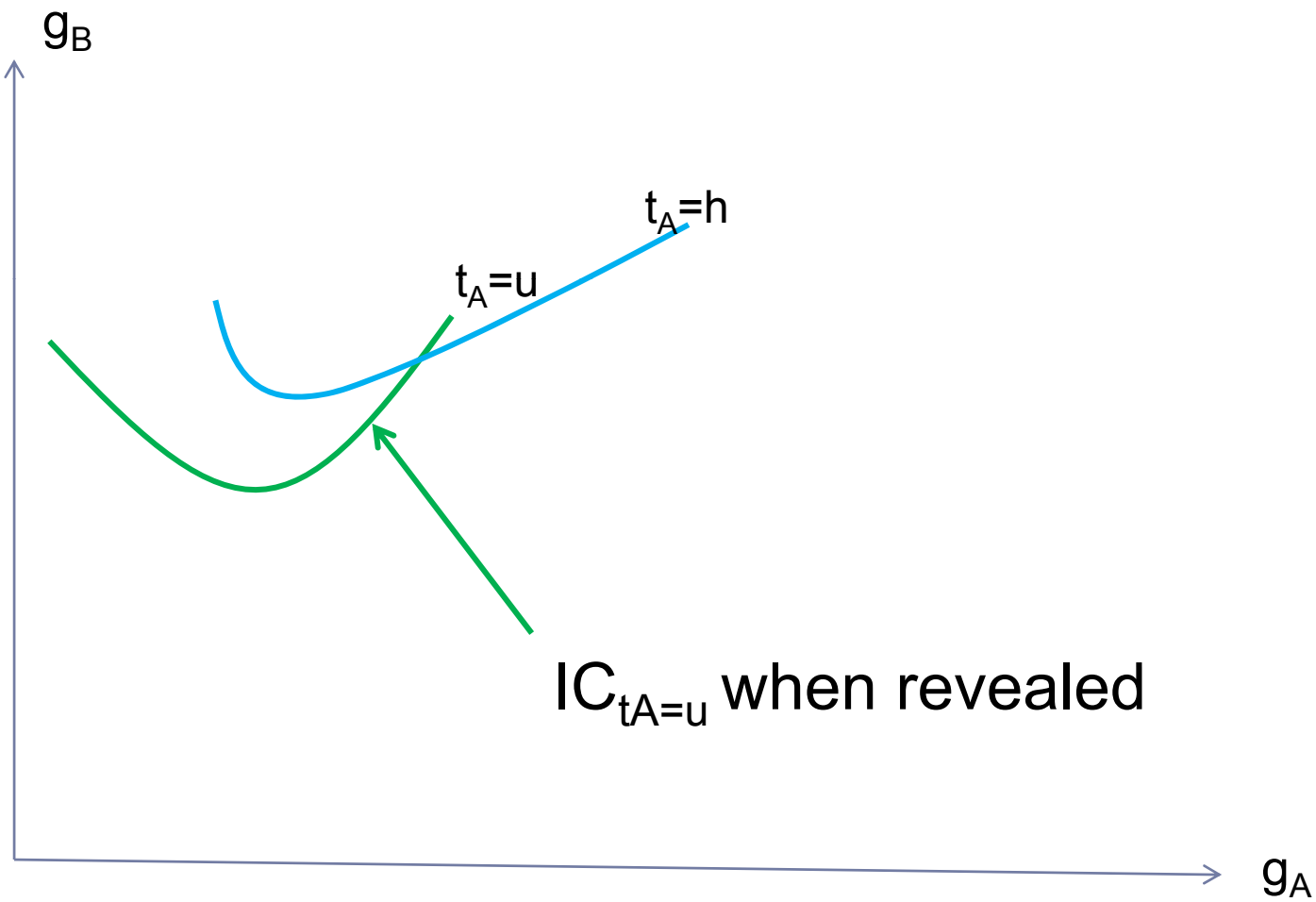
1. A picks $I_A(z) = 0,1$, pays c receives s, $t_A = \{l, u, h\}$
2. $g^0_A(z=1, t_A)$
3. B observes $g^0_A(z=1, t_A)$ and updates $\mu_B(i=H \mid g^0_A)$
4. $g^1_A(z=1, t_A)$ and $g^1_B(z=1, g^0_A)$ chosen simultaneously

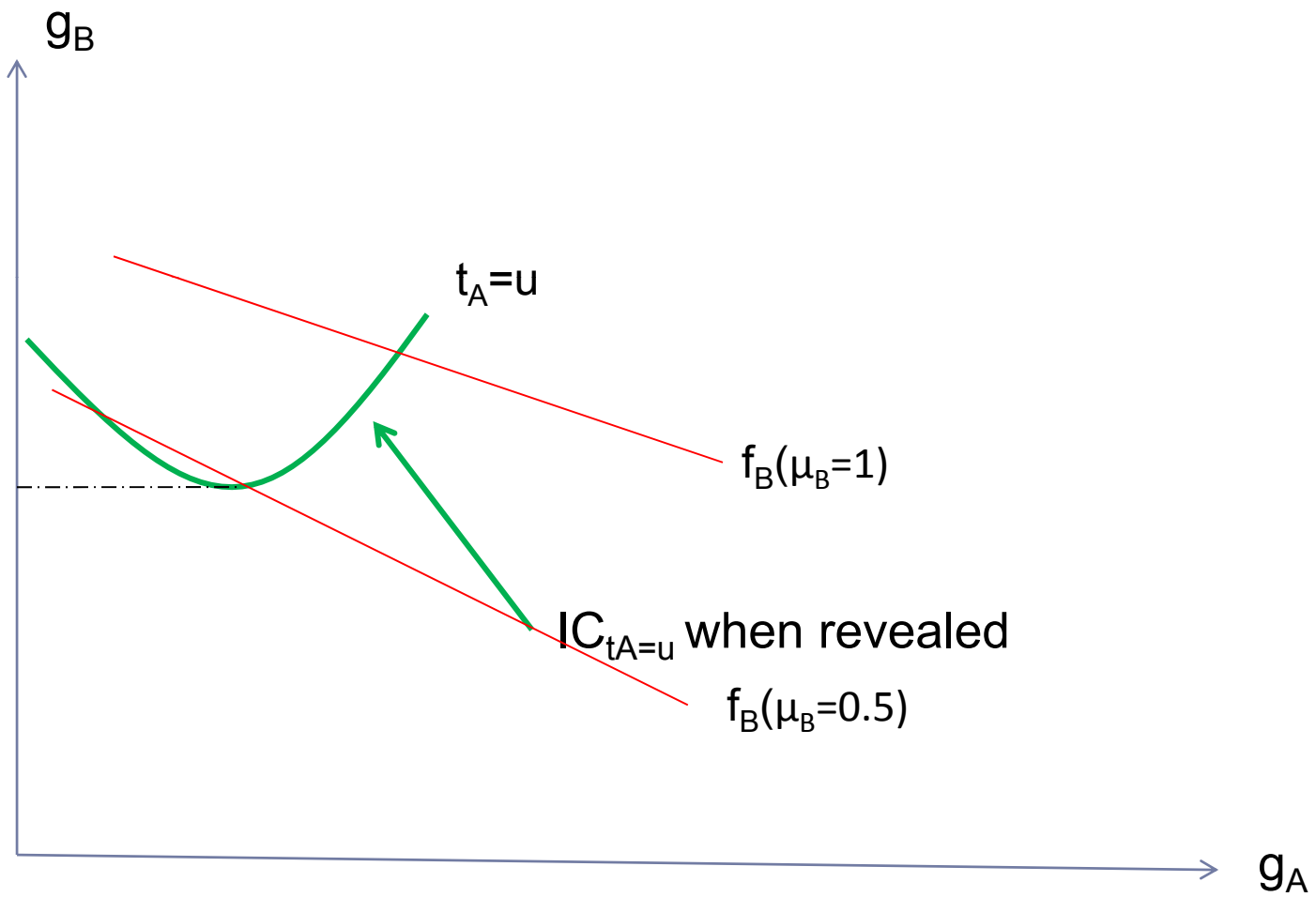
- Look for PBE: strategies optimal given beliefs, beliefs obtained from equilibrium strategies and observed actions using Bayes rule
- With no restrictions on beliefs off the equilibrium path many pooling, semi-separating and separating equilibria
- Focus on separating equilibria where inferring $\mu_B(i=H \mid g^0_A)$ is equivalent to inferring $t_A = \{l, u, h\}$.

Separating equilibria

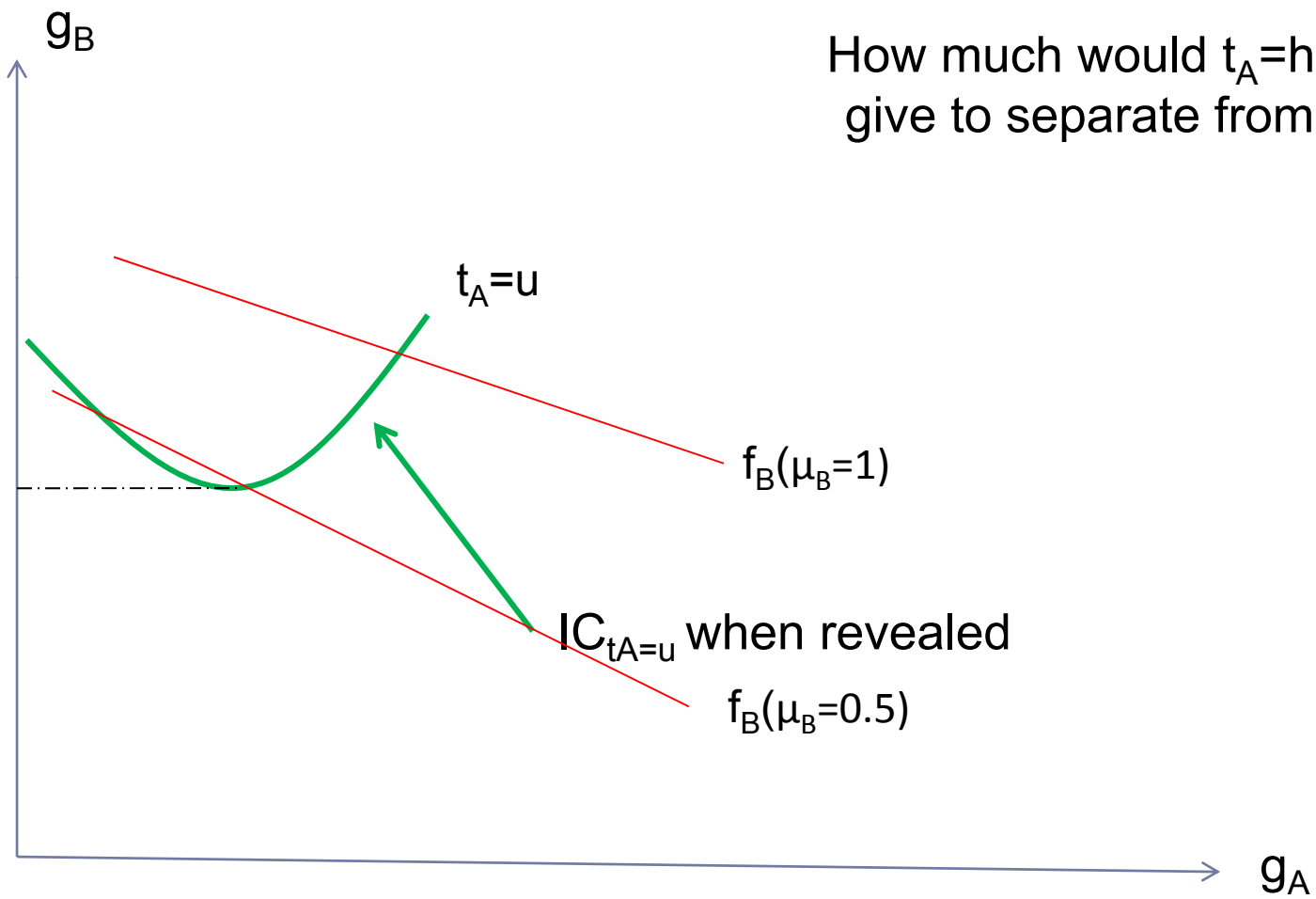
- In a separating equilibrium:
  - $\mu_B(i=H \mid g^0_A(t_A = l)) = 0$
  - $\mu_B(i=H \mid g^0_A(t_A = u)) = \rho_1$
  - $\mu_B(i=H \mid g^0_A(t_A = h)) = 1$

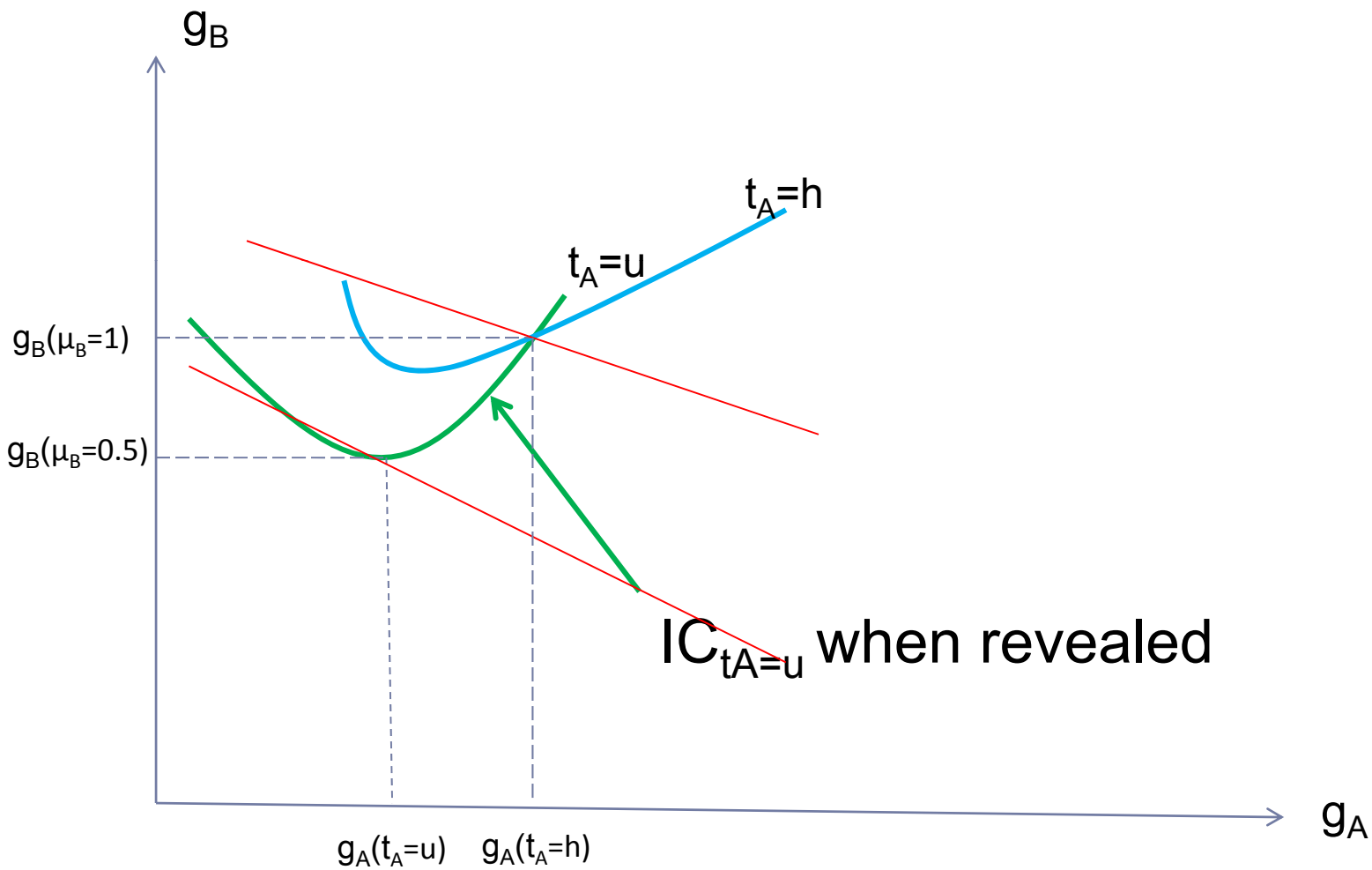
- Note $t_A = u$ wants to mimic $t_A = h$ (doesn't have to pay c and gets higher g_B)
- Is it possible for $t_A = h$ to separate from $t_A = u$?
  - Yes because it is more costly for $t_A = u$ to give as he cares less about the public good than does $t_A = h$
  - It is more costly for $t_A = u$ to deviate than it is for $t_A = h$.
  - Single crossing property holds – there exists a separating equilibrium


g_B
t_A=h
t_A=u
$IC_{tA=u}$ when revealed
g_A


g_B
t_A=u
$f_B(\mu_B=1)$
$IC_{tA=u}$ when revealed
$f_B(\mu_B=0.5)$
g_A

How much would t_A=h have to give to separate from t_A = u?

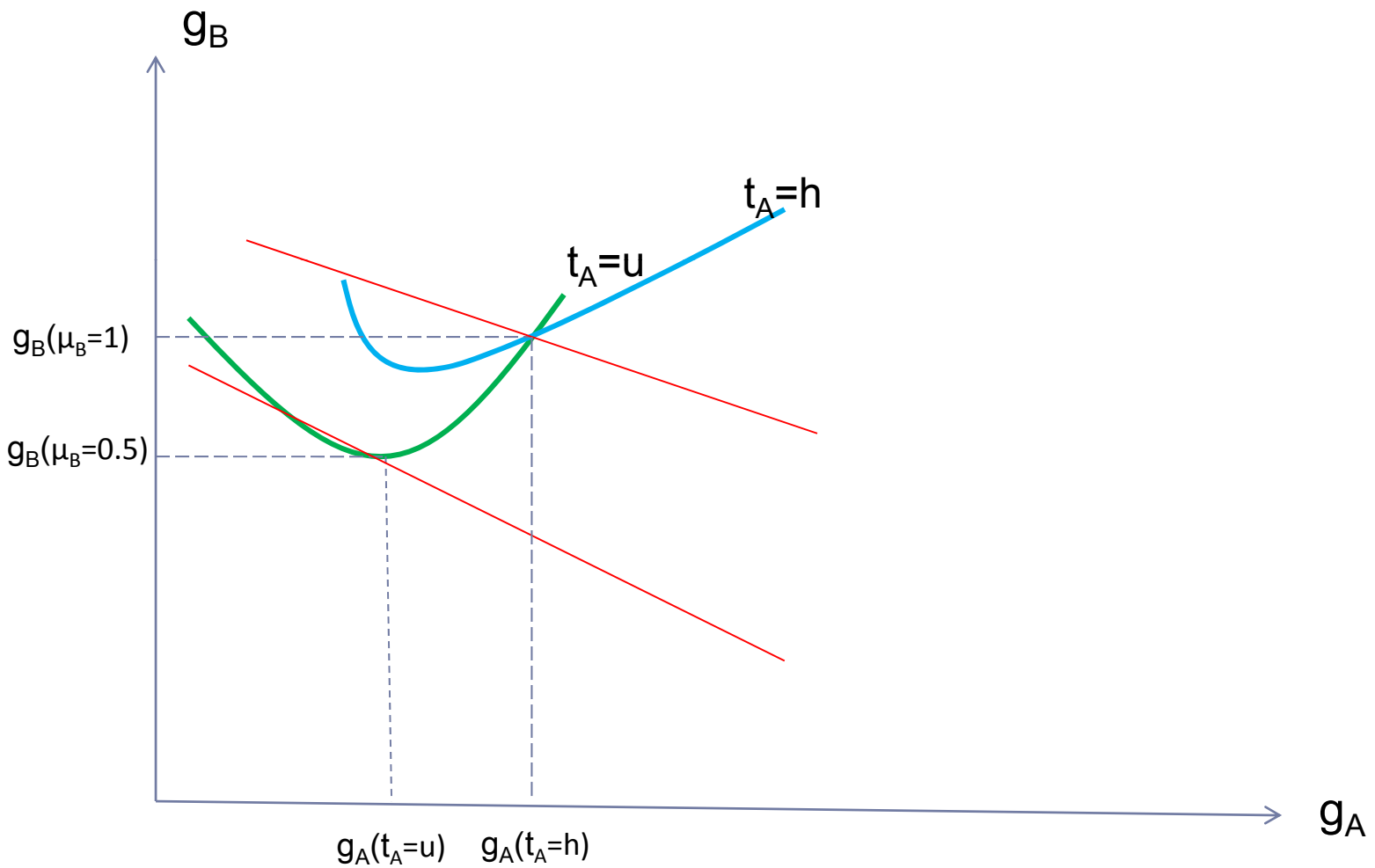



g_B
t_A=h
t_A=u
$g_B(\mu_B=1)$
$g_B(\mu_B=0.5)$
$IC_{tA=u}$ when revealed
g_A
$g_A(t_A=u)$
$g_A(t_A=h)$

- The separating equilibrium is just one of many equilibria
- Reduce set of equilibria by limiting the beliefs off the equilibrium path
- Refinement
  - Intuitive criterion: probability of deviating allocated only to types that have an incentive to deviate

- Cho and Kreps (1987)
  - If 2 types then Riley outcome is the only outcome that survives the intuitive criterion
- Riley (1979)
  - The mimicker picks action that maximizes utility
  - The high type picks action that maximizes utility subject to constraint that uninformed does not mimic

Riley outcome



Announcement sub game (z=1)

1. A picks $I_A(z) = 0,1$, pays c receives s, $t_A = \{l, u, h\}$
2. $g^0_A(z=1, t_A)$
3. B observes $g^0_A(z=1, t_A)$ and updates $\mu_B(i=H| g^0_A)$
4. $g^1_A(z=1, t_A)$ and $g^1_B(z=1,g^0_A)$ chosen simultaneously

- Note to separate herself from $t_A=u$, $t_A=h$ will contribute as much as she needs to in the first round that is $g^1_A(z=1, t_A = h) = 0$ and $g^0_A(z=1, t_A=h)$ will be large enough to separate.
- Leader benefits from sequential moves because she can encourage follower to give more (with simultaneous move uninformed free rides off the information)
- This provides the leader with an incentive to purchase information
- From the high quality (contribution maximizing) fundraiser there are two benefits to moving sequentially. His type is revealed and in revealing type contributions are greater than what they would have been in the simultaneous game with complete information

Vesterlund, 2003

- Fundraiser's choice of z:
  - Let $G_i(z)$ denote total contributions to fundraiser i when choosing z
- Equilibria where $I_A(z=0) = I_A(z=1) = 1$?
  - Only an equilibrium if $0<\rho_0<1$ and $0<\rho_1<1$
  - But at $I_A(z=0) = I_A(z=1) = 1$:
    - $G_H(z=1) > G_H(z=0)$
    - $G_L(z=1) = 0 \leq G_L(z=0) \quad \rightarrow \quad \rho_0 = 0$
    - $I_A(z=0) = I_A(z=1) = 1$ not part of any equilibrium

Vesterlund, 2003

- Equilibria where $I_A(z=0) = 1$ and $I_A(z=1) = 0$?
  - $G_H(z=0) > G_L(z=0)$
  - $G_H(z=1) = G_L(z=1)$
- If $I_A(z=0) = 1$ then $0<\rho_0 <1$
  - That requires that z_H and z_L equals 0 with positive probability or
  - $G_H(z=0) > G_H(z=1)$
  - $G_L(z=0) \geq G_L(z=1)$
  - $\rho_1 = 0$ and $\rho_0 >1/2$
  - Not possible for $I_A(z=0) = 1$ and $I_A(z=1) = 0$ in equilibrium

Vesterlund, 2003

- Equilibria where $I_A(z=0) = I_A(z=1) = 0$?
  - $G_H(z) = G_L(z)$ then $\rho_1 = \rho_0 = 1/2$
  - $I_A(z=0) = 0$ when $\rho_0 = 1/2$ independent of cost of information
  - $I_A(z=1) = 0$ when $\rho_1 = 1/2$ provided cost of information $c>K(=0.17m)$

- Equilibria where $I_A(z=0) = 0$ and $I_A(z=1) = 1$?
  - $G_H(z=0) < G_H(z=1) \rightarrow z_H = 1$
  - $G_L(z=0) = G_L(z=1) \rightarrow z_L = 1$ with probability γ
  - $\rho_0 = 0$ and $\rho_1 = 1/(1+\gamma)$
  - $I_A(z=0) = 0$ and $I_A(z=1) = 1$ for sufficiently low c
  - Characteristic of equilibria
    - Contributions are announced
    - Quality revealed by first mover

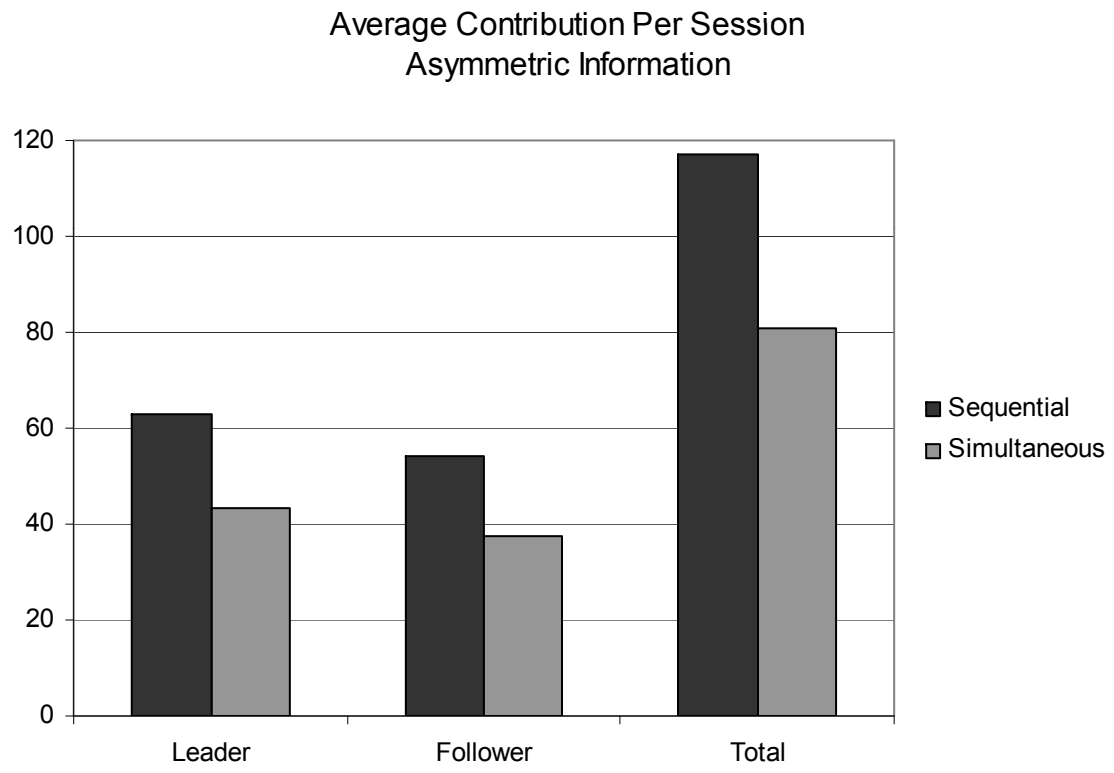
Optimal solicitation ordering

- Optimal for the fundraiser to first ask donor with the greatest willingness to pay
  - Willing to pay cost
  - Must increase donation more to separate herself from an uninformed version of herself
- Contributions only arise if the optimal solicitation ordering is followed

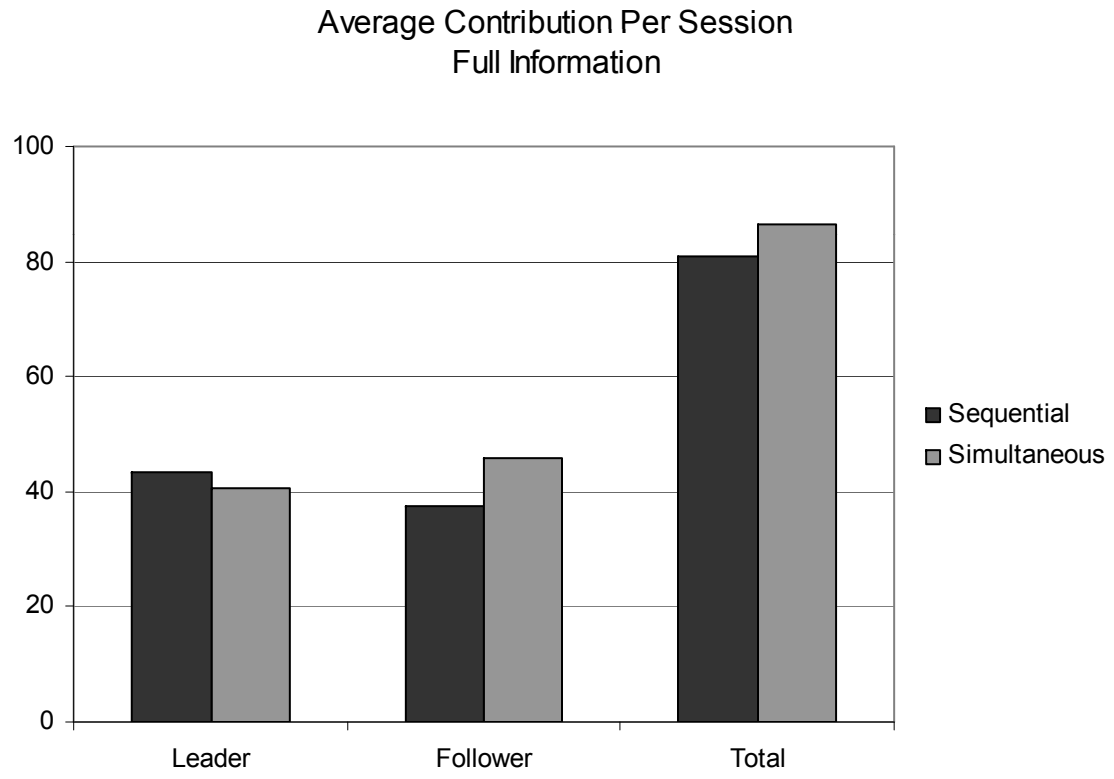
1.B Partial revelation and pooling

- Potters, Sefton & Vesterlund, (2006, 2007)
- Allocate one chip between group and private account
  - $g_i = 0$ or $g_i = 1$, $i = 1, 2$
- Payoffs: $\pi_i = 1 - g_i + m(g_A + g_B)$
- m= 0, 0.75, or 1.5
- Information: A knows m, B only knows distribution
- Simultaneous giving:
  - g_A=1 when m=1.5, g_i = 0 otherwise
- Sequential giving (A first):
  - g_B =1 & g_A=1 when m=1.5 and 0.75
  - g_B =0 & g_A=0 when m=0

Announcements increase contributions when there is asymmetric information



Reciprocity cannot account for announcement effect



1: Signaling quality of public good

A: Full revelation (Vesterlund, 2003)

- Announcements causes donors to become informed and fully reveal the information through a sufficiently high contribution. Causes high quality fundraisers to prefer announcements and low quality fundraisers to mimic.

B: Partial revelation and pooling (Potters et al 2005,2007)

- Announcements allow fully informed donors to send a partially revealing signal which enables pooling across non-profits and secures giving to efficiency enhancing non-profits

2. Signal on norm

- By moving sequentially it may be possible to coordinate on a norm of giving
- Sequential moves may trigger cooperation
- E.g. Sugden (1984)
  - proposes that individuals subscribe to a principle of reciprocity where by they contribute when everyone else in their reference group contributes
  - Specifically, if the donor's preferred contribution level by the other members of the group is no smaller than the current minimum contribution, then the donor must contribute an amount which is at least as large as the minimum contribution in the reference group.
  - Individuals maximize subject to the constraint that $g_i^* \geq \min \{g_{j \neq i}\}$
  - Suppose individuals are identical – how much does the leader contribute?

2. Signal on norm

- Sugden (1984)
  - While in the simultaneous move game people who abide by the principle of reciprocity may contribute a socially optimal amount, they may just as well provide less than the optimal level.
  - With homogenous donors and sequential moves the socially optimal amount is provided
  - In contrast to both the classical model and that of the Kantian rule, this model predicts that an increase in the donation of others will positively affect the individual's contribution provided they are personally meaningful referents.
  - The individual's reference group is any group of individuals who benefit from provision of the same public good.

3. Field experiments

- Signaling of public good quality or norms would both give rise to greater giving with sequential moves
- Two questions
  - Do people respond to the information on others? (effect on followers)
  - Do both leaders and followers respond? (effect of institution)

3 A: Do people respond to the information on others? (effect on followers)

- List and Lucking-Reiley
  - Saw contributions increase in seed for a discrete public good
  - Effect seen both with and without refund suggest not solely coordination
- Frey and Meier (*AER* 2004)
  - Mail fundraising campaign to show that social information influences participation rates in fundraising campaigns
  - Asked to contribute to one or two charitable funds
    - No contribution, Contribute CHF7 to one fund, Contribute CHF5 to another fund, Contribute CHF12 to both funds
  - Information provided to donors:
    - 64% already contributed (truthful for data previous year)
    - 46% already contributed (truthful for data last 10 years)

Frey and Meier (*AER* 2004)

- Findings:
  - 64% info: 77% contribute to at least one fund
  - 46% info: 74.7% contribute to at least one fund
- Difference not significant
- Controlling for past behavior find greater giving in 64% info treatment

- Conclude: information on other giving increases contributions – but <u>mostly for those who have not previously made a contribution decision</u>

Aside: Time inconsistent preferences & fundraising

- Frey and Meier (2004)
  - Time inconsistent preferences and fundraising
  - Before 1998: students received two separate invoices, one billing them for their tuition plus their donation, one just for their tuition, and they chose which invoice to return (i.e. with or without the donation).
  - After 1998: students ticked boxes indicating their willingness to contribute, but didn't pay immediately; one month later, they received an invoice billing them for their donation

  - Prediction?
  - The percentage of contributors went from 44 to 62 percent after this change. Deciding to pay today and paying today is harder for us than deciding to pay today and paying in a month.

Aside: Time inconsistent preferences and fundraising

- Anna Breman, 2009
  - field experiments to explore inter-temporal choices in charitable giving by varying the timing of commitment and payment.
  - Build on Benartzi and Thaler (2004) "Save More Tomorrow"
  - Design
    - Monthly donors were asked to increase their contributions
      - immediately
      - in one month
      - in two months
  - Findings
    - mean increases in donations are significantly higher when donors are asked to pre-commit to future donations (32% in one month, 11% in two month).
    - follow-up data shows that the treatment effect is persistent, making the strategy highly profitable to the charity

Shang and Croson (2008)

- Inform on amount given (treatments: control, $75, $180, $300)
- Design:
  - “We had another member, they contributed X”
  - “How much would you like to pledge today?”
- Findings:
  - $300: mean giving = 119.70
  - Control: mean giving = 106.72
  - i.e., 12% increase in giving
  - ($75 no different, $180 in some specifications significant)
  - Effect only significant for **new members** – not for renewing members
  - Year later effect: new donors more likely to give in subsequent year if given information, and when they give they give more.
- Conclude: Evidence of conformity theory
- Shang and Croson as well as Frey and Meier – find result for “new” donors… perhaps more sensitive to conformity…or….signaling☺

Next

- Martin and Randall, 2008
- Soetevent, 2005
- Benabou and Tirole, 2006