Econ 219B
Psychology and Economics: Applications (Lecture 8)

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Outline

1. Gift Exchange: Workplace II
2. Gift Exchange: Charitable Giving
3. Social Preferences Wave IV: Social Pressure, Signaling, Social Norms, Honesty
4. Social Pressure: Various
5. Social Pressure: Charitable Giving
6. Social Signaling

Section 1

Workplace: Gift Exchange II

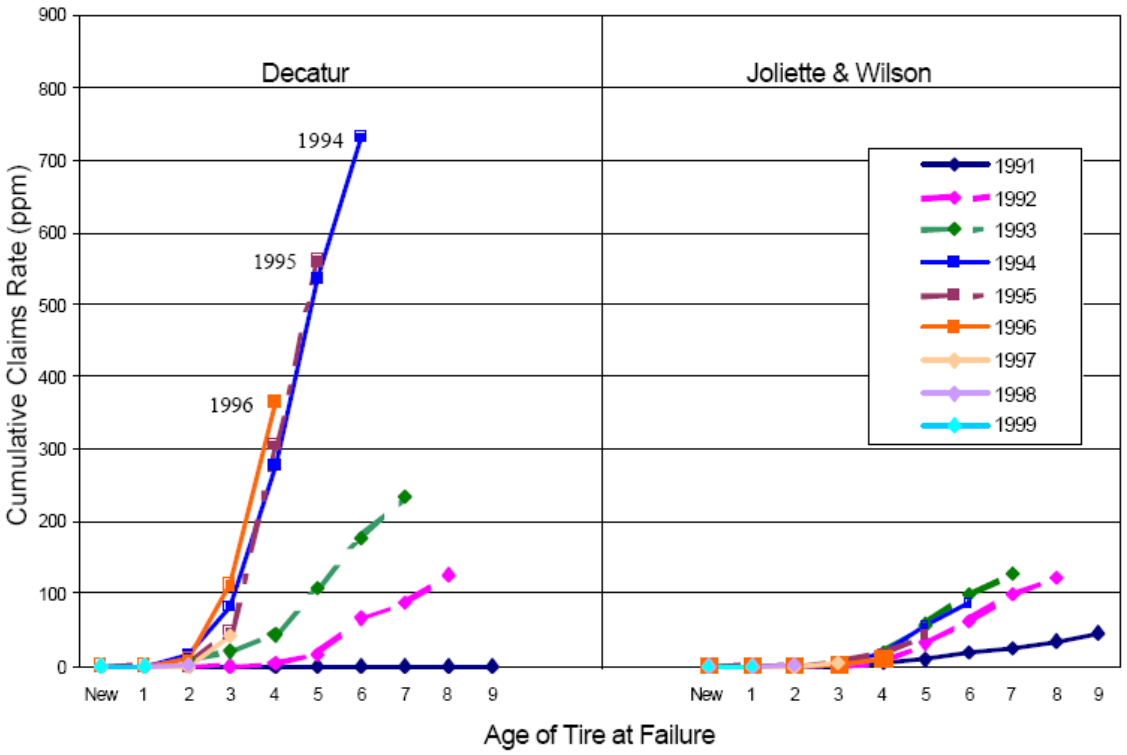
Negative Reciprocity: Sabotage?

- Is there evidence in a workplace of negative reciprocity towards unkind employer leading to sabotage?

- **Krueger-Mas (JPE, 2004).**
- Setting:
  - Unionized Bridgestone-Firestone plant
  - Workers went on strike in July 1994
  - Replaced by replacement workers
  - Union workers gradually reintegrated in the plant in May 1995 after the union, running out of funds, accepted the demands of the company
  - Agreement not reached until December 1996

Sabotage?

- Do workers sabotage production at firm?
  - Examine claims per million tires produced in plants affected
  - Compare to plant not affected by strike (Joliette & Wilson)

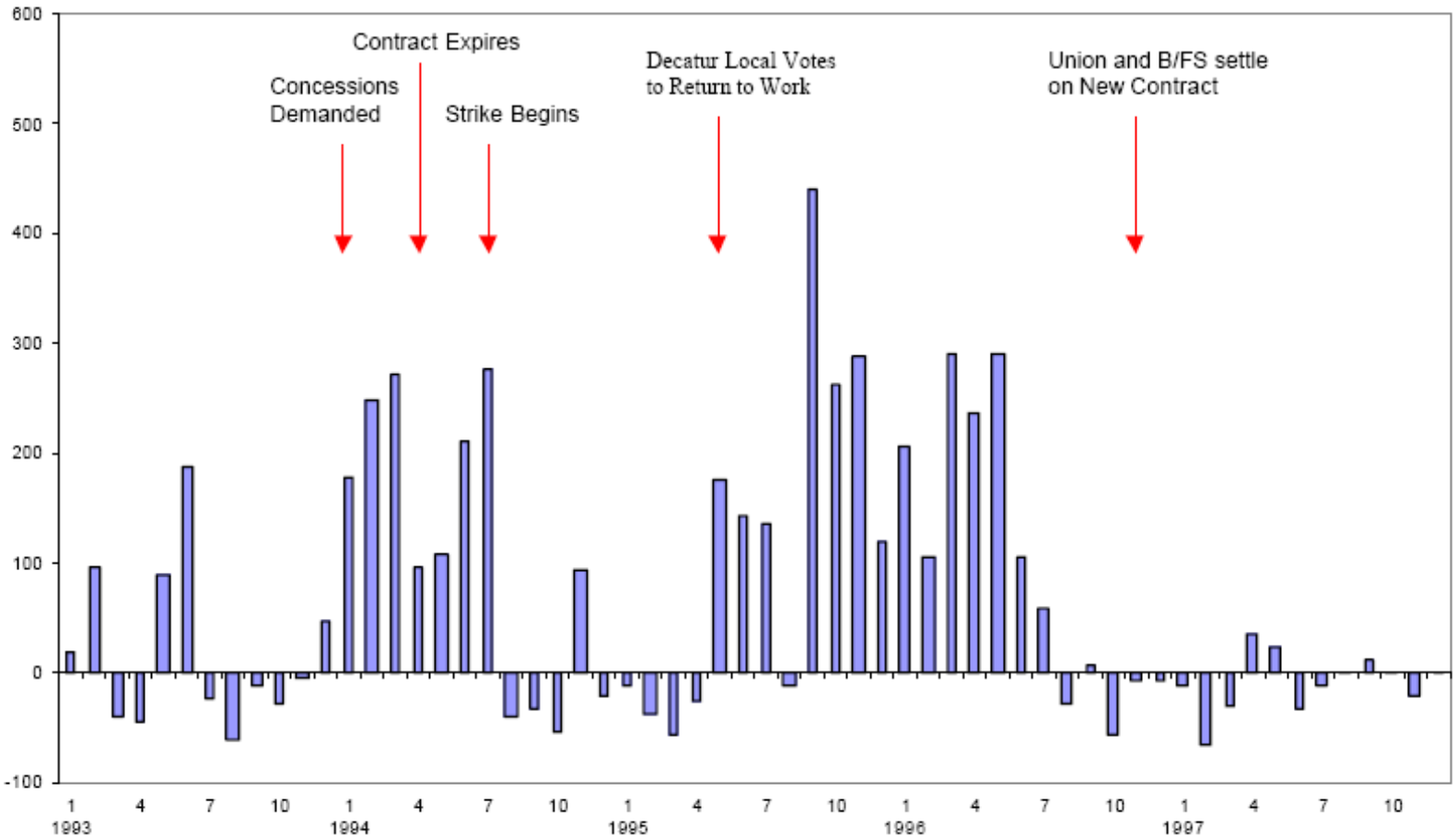


Sabotage?

- Ten-fold increase in number of claims
- Similar pattern for accidents with fatalities
- Possible explanations:
  - Lower quality of replacement workers
  - Boycotting / negative reciprocity by unionized workers
- Examine the timing of the claims

Claims Timing

Figure 8: Difference in the Number of Complaints per million Tires Produced by Month: Decatur Plant minus Joliette and Wilson Plants.



Source: Authors' calculations based on NHTSA complaints data. Records with missing data are excluded.

Claims Timing

- Two time periods with peak of claims:
  - Beginning of Negotiation Period
  - Overlap between Replacement and Union Workers
- Quality not lower during period with replacement workers
- Quality crisis due to Boycotts by union workers
- Claims back to normal after new contract settled

- Suggestive of extreme importance of good employer-worker relations

Section 2

Charitable Giving: Gift Exchange

Fund-raising

- **Falk (EMA, 2008)** — field experiment in fund-raising
  - 9,846 solicitation letters in Zurich (Switzerland) for Christmas
  - Target: Schools for street children in Dhaka (Bangladesh)
  - 1/3 no gift, 1/3 small gift, 1/3 large gift
  - Gift consists in postcards drawn by kids
  - Do gifts trigger higher generosity?

Example Postcard

Appendix: An example of the included postcards

Short-Run Donation Probability

- Short-Run effect: Donations within 3 months

TABLE 1: DONATION PATTERNS IN ALL TREATMENT CONDITIONS

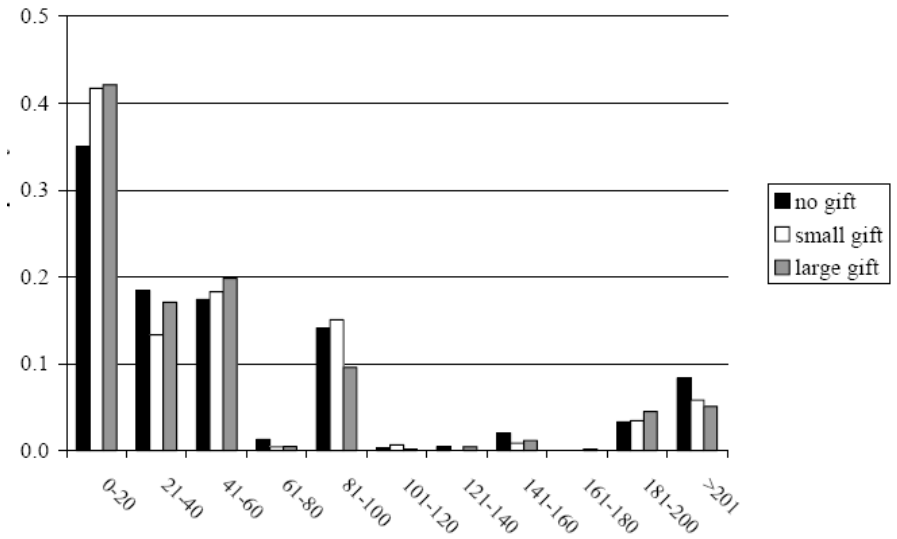
	No gift	Small gift	Large gift
Number of solicitation letters	3,262	3,237	3,347
Number of donations	397	465	691
Relative frequency of donations	0.12	0.14	0.21

- Large gift leads to doubling of donation probability
- Effect does not depend on previous donation pattern (donation in previous mailing)
- Note: High donation levels, not typical for US

Donation Amount

- Small decrease in average donation, conditional on donation (Marginal donors adversely selected, as in 401(k) Active choice paper)

FIGURE 1: HISTOGRAMS OF DONATIONS FOR EACH TREATMENT



- Limited intertemporal substitution. February 2002 mailing with no gift. Percent donation is 9.6 (control), 8.9 (small gift), and 8.6 (large gift) (differences not significant)

Section 3

Social Pref. Wave IV: Social Pressure, Signaling, and Norms

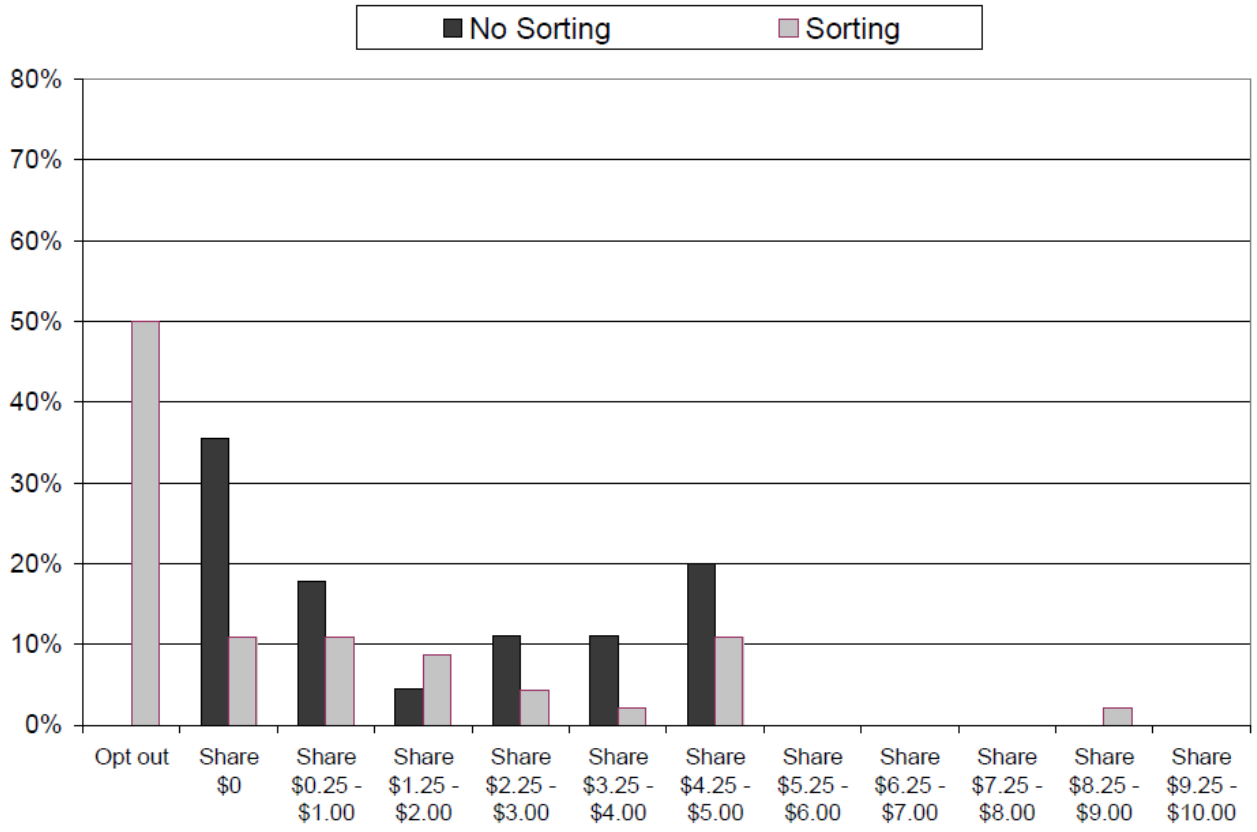
Introduction

- Last 15 years: Evidence to suggest that altruism/warm glow/inequity aversion/reciprocity only part of story
- Dictator games with sorting (**Dana, Cain, and Dawes, 2007**; **Lazear, Malmendier, and Weber, AEJ Applied 2012**):
  - Subject can play dictator game ($10 to share)
  - OR can sort out and have privately $10
- Predictions of models of altruism/warm glow/inequity aversion/reciprocity:
  - Individuals who offer 0 still would offer 0 or sort out
  - Individuals who give to other would stay in and give

Results?

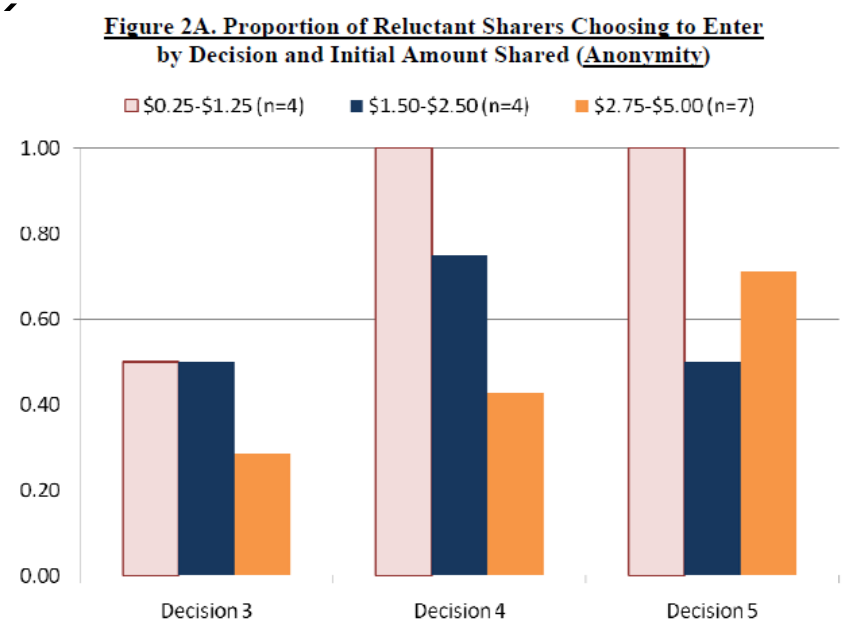
- From Lazear, Malmendier, and Weber (2012)

Figure 1A. Distributions of Amounts Shared
(Experiment 1, Berkeley)



Results?

- More than half of positive givers sort out instead!
- Need to increase dictator game payout to $12 (Decision 5) to lure givers back



- Further evidence: Dictator games with moral wriggle room (**Dana, Weber, and Kuang, 2007**)
  - Avoid (free) information to justify not sharing

Social Pressure

- **DellaVigna, List, and Malmendier (QJE 2012)**
  - Pay a disutility cost $S > 0$ if do not give when asked
  - No disutility cost if can avoid to meet the solicitor or recipient
  - Give mostly *because asked*
- Can explain:
  - Sort out in dictator game with sorting
  - Wanting to ignore information
  - Give small amount to charities, no crowd out of giving
  - Also: Give more in higher social pressure environments
- Key prediction specific to Social Pressure model:
  - *Altruism/Glow*: Agent seeks giving occasions to get warm glow
  - *Social Pressure*: Agents avoids giving occasions to avoid social pressure
- Drawback of model
  - Social Pressure cost is reduced form

Social Signaling

- **Benabou and Tirole (2003):**

$$U = u(x_s) + \alpha u(x_o) + \lambda_\alpha E(\alpha | x_s)$$

- Individuals have an altruism weight α
  - Individuals 'forget' their altruism α
  - They infer α from their own behavior in a signaling game
  - They care about the inferred α with social signaling weight λ_α
  - Behave generously to convince one self (and others)
- Can explain:
  - People behave generously when observed, less so when no one sees (dictator with exit)
  - Small donations to signal generosity to others
  - Can generate crowd out of generosity with incentives (see below)
- Drawback: Can be hard to solve and estimate

Social Norms

- **Akerlof and Kranton (2003); Krupka and Weber (JEEA, 2013)**
- Utility is

$$U = u(x_s) - \gamma (x_s - \bar{x})^2$$

  where $\bar{x}$ is a prescribed social norm
- The individual pays a disutility cost from deviating from norm
  - E.g., equal sharing in dictator game (Krupka and Weber, 2013)
  - E.g., a behavior prescribed by one's identity (Akerlof and Kranton, 2003)
- Can explain:
  - People are generous in some settings, not others, if social norms prescribes so
- Drawback:
  - Need to explain where social norm comes from

Section 4

Social Pressure: Various

Introduction: Milgram Experiment

- Early experiments: *Milgram experiment* post-WWII
- Motivation: Do Germans yield to pressure more than others?
  - Subjects: Adult males in US
  - Recruitment: experiment on punishment and memory
  - Teacher asks questions, administers shock for each wrong answer
  - Initial shock: 15V
  - Increase amount up to 450V (not deadly, but very painful)
  - Learner visible through glass (or audible)
  - Learner visibly suffers and complains

Results

1. 62% subjects reach 450V
2. Subjects regret what they did ex post
3. When people asked to predict behavior, almost no one predicts escalation to 450V

- It's not the Germans. *Most* people yield to social pressure
- Furthermore, naivete' — Do not anticipate giving in to social pressure
- Social Pressure likely to be important in organization and public events

Asch (1951)

- Second classical psychology experiment: **Asch (1951)**
  - Subjects are shown two large white cards with lines drawn on them
    - First card has three lines of substantially differing length on them
    - Second card has only one line.
  - Subjects are asked which of the lines in the first card is closest in length to the line in the second card
- Control treatment: subjects perform the task in isolation $\rightarrow$ 98 percent accuracy
- High social-pressure treatment: subjects choose after 4 to 8 subjects (confederates) unanimously choose the wrong answer $\rightarrow$ Over a third of subjects give wrong answer

Interpretations

- Social Pressure Interpretation:
  - Avoid disagreeing with unanimous judgment of the other participants
  - Result disappears if confederates are not unanimous
- Alternative interpretation: Social learning about the rules of the experiment
- Limitation: subjects not paid for accuracy

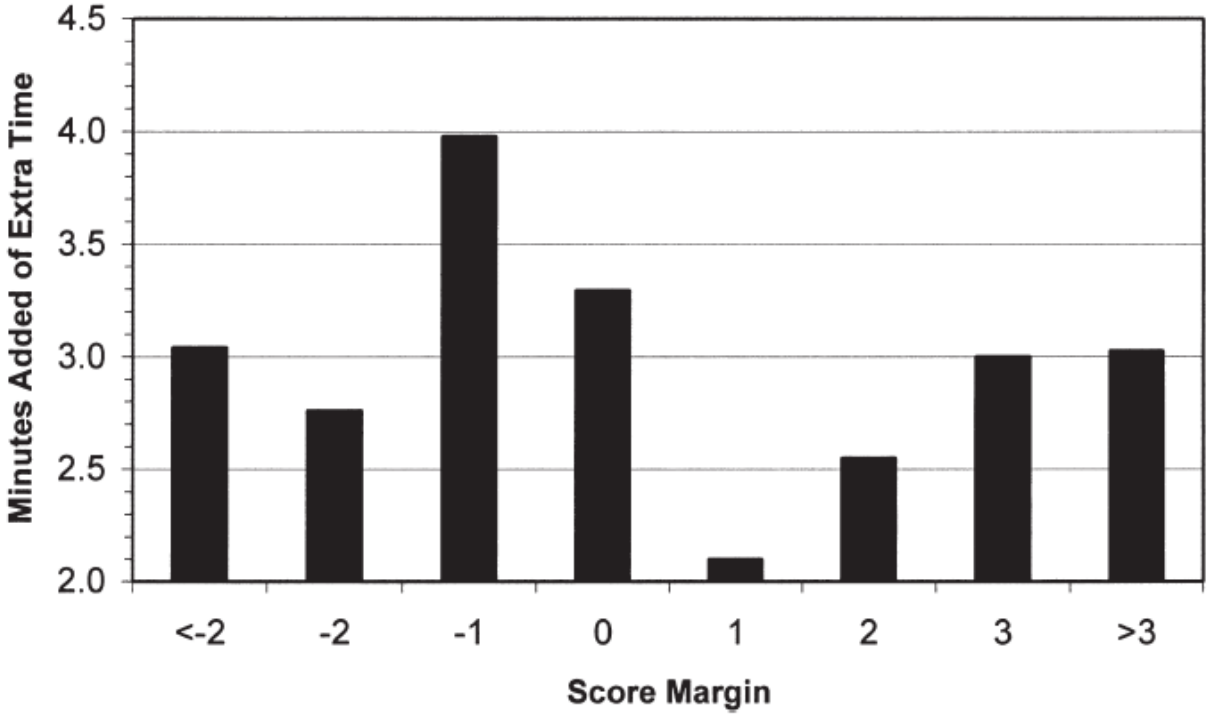
A more recent example

- An example of social pressure in a public event
- **Garicano, Palacios-Huerta, and Prendergast (REStat, 2006)**
  - Soccer games in Spanish league
  - Injury time at end of each game (0 to 5 min.)
  - Make up for interruptions of game
  - Injury time: last chance to change results for teams
- Social Pressure Hypothesis: Do referees provide more injury time when it benefits more the home team?
  - Yielding to social pressure of public
  - No social learning plausible
  - Note: referees professionals, are paid to be independent

Results I

- Figure 1 – Clear pattern, very large effects

FIGURE 1.—INJURY TIME AWARDED BY SCORE MARGIN



Number of minutes awarded by referees as a function of the margin in favor of the home team at the end of the match. Score margin = (goals scored by home team) − (goals scored by visiting team). Note: 3.3% of the matches ended with score differences smaller than −2; 5.2%, with score differences greater than 3.

Results II

- Table 6. Response to social pressure: size of audience

TABLE 6.—EFFECT OF THE SIZE AND COMPOSITION OF THE CROWD ON REFEREE BI

Statistic	[1]	[2]
Constant	3.23**	2.94**
	(0.18)	(0.20)
Score Difference	**−0.93****	**−0.96****
	(0.20)	**(0.21)**
Year Effect	0.36**	0.33**
	(0.11)	(0.11)
Attendance	0.00	0.00
	(0.00)	(0.00)
Attendance × Score Difference	**−0.02****	**−0.02****
	(0.00)	**(0.00)**
Yellow Cards		0.07**
		(0.02)
Budget Home		

Social Pressure in the Workplace

- **Mas-Moretti (AER 2009).** Evidence of response to social pressure in the workplace
  - Workplace setting $\rightarrow$ Large retail chain
  - Very accurate measure of productivity, scanning rate at check-out counter
  - Examine what happens to productivity (no. of items scanned per second) in response to entry of faster/slower coworkers
  - Data for 2 years in 6 stores
  - Schedule determined 2 weeks in advance
  - Social Pressure: Are others observing the employer?
- Slides courtesy of Enrico

What is the relationship between individual effort and co-worker permanent productivity?

- First we measure the *permanent* component of productivity of each worker

$$y_{itcs} = \theta_i + \Sigma_{j \neq i} \pi_j W_{jtcs} + \psi X_{itcs} + \gamma_{dhs} + \lambda_{cs} + e_{itcs.}$$

  For each worker *i*, 10 minute period and store, we average the permanent productivity of all the co-workers (excluding *i*) who are active in that period: $\Delta\overline{\theta}_{-ist}$

- Second, we regress ten minutes *changes* in individual productivity on *changes* in average permanent productivity of co-workers

Finding 1: There is a positive association between changes in co-worker permanent productivity and changes in individual effort

	(1)	(2)
Δ Co-worker permanent Productivity	0.176	0.159
	(0.023)	(0.023)
Controls	No	Yes

$$\Delta y_{itcs} = \beta \Delta \bar{\theta}_{-ist} + \gamma_{tds} + \psi \Delta X_{tcs} + e_{itcs}$$

i = individual
t = 10 minute time interval
c = calendar date
s = store

Finding 2: The magnitude of the spillover effect varies dramatically depending on the skill level

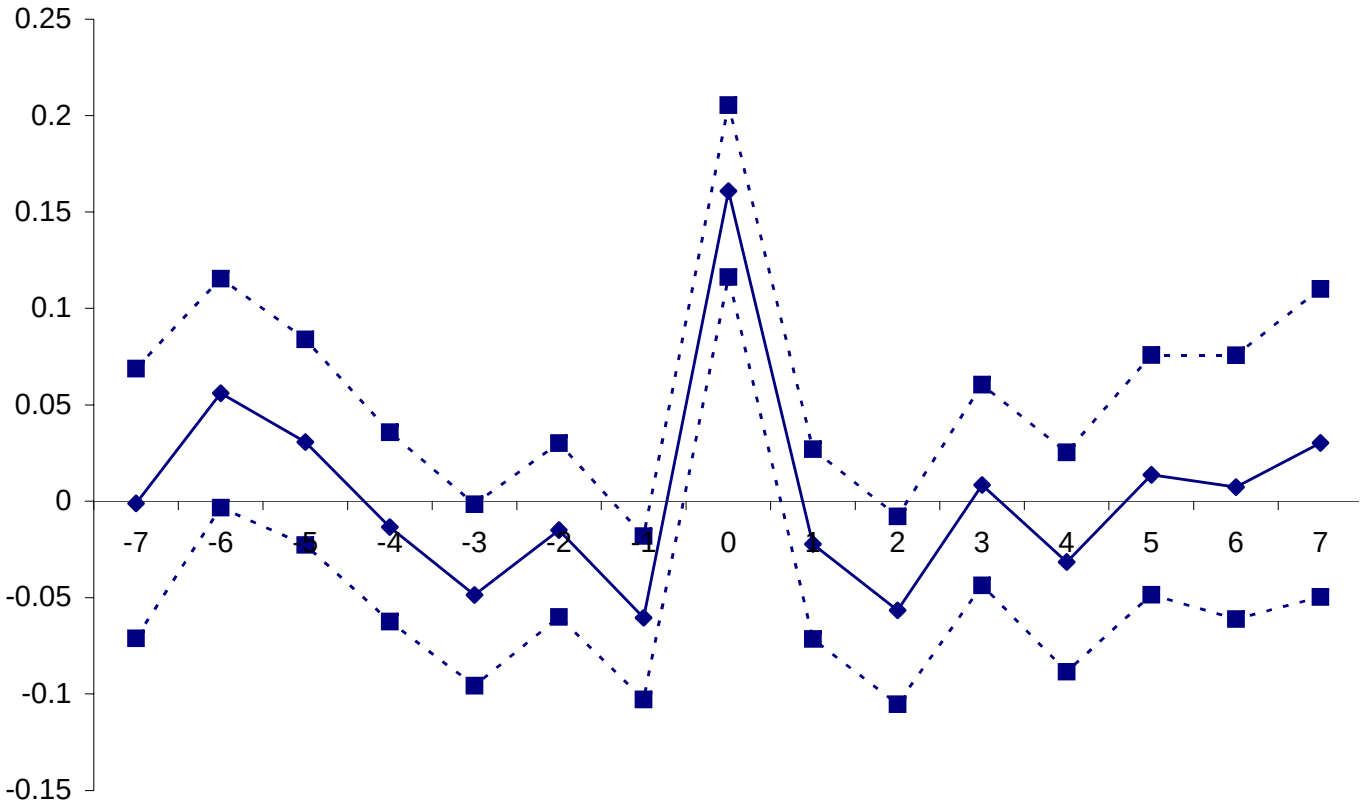
	(2)	(3)
Δ Co-worker permanent productivity	0.159 (0.023)	0.261 (0.033)
Δ Co-worker permanent prod. × Above average worker		-0.214 (0.046)
Observations	1,734,140	1,734,140
Controls	Yes	Yes

$$\Delta y_{itcs} = \beta \Delta \bar{\theta}_{-ist} + \gamma_{tds} + \psi \Delta X_{tcs} + e_{itcs}$$

What Determines Variation in Co-Workers Quality?

- Shifts are pre-determined
- Management has no role in selecting specific workers for shifts
- We measure co-workers productivity using permanent productivity (not current)
- Our models are in first differences: We use variation within a day and within a worker

The lags and leads for the effect of changes of average co-worker productivity on reference worker productivity



$$\Delta y_{itcs} = \beta_{-7}\Delta\bar{\theta}_{-i(t-7)cs} + \beta_{-6}\Delta\bar{\theta}_{-i(t-6)cs} + \beta_{-5}\Delta\bar{\theta}_{-i(t-5)cs} + \beta_{-4}\Delta\bar{\theta}_{-i(t-4)cs} + \beta_{-3}\Delta\bar{\theta}_{-i(t-3)cs} + \beta_{-2}\Delta\bar{\theta}_{-i(t-2)cs}$$
$$+ \beta_{-1}\Delta\bar{\theta}_{-i(t-1)cs} + \beta_{0}\Delta\bar{\theta}_{-i(t)cs} + \beta_{1}\Delta\bar{\theta}_{-i(t+1)cs} + \beta_{2}\Delta\bar{\theta}_{-i(t+2)cs} + \beta_{3}\Delta\bar{\theta}_{-i(t+3)cs} + \beta_{4}\Delta\bar{\theta}_{-i(t+4)cs} + \beta_{5}\Delta\bar{\theta}_{-i(t+5)cs}$$
$$+ \beta_{6}\Delta\bar{\theta}_{-i(t+6)cs} + \beta_{7}\Delta\bar{\theta}_{-i(t+7)cs} + \zeta\mathbf{M} + e_{itcs},$$

What explains spillovers?

- There are at least two possible explanations (Kendal and Lazear, 1992)
  - Guilt / Contagious enthusiasm
  - Social pressure ("I care what my co-workers think about me")
- We use the spatial distribution of register to help distinguish between mechanisms

  - Guilt / Contagious enthusiasm implies that the spillover generate by the entry of a new worker should be larger for those workers who can observe the entering worker

  - Social pressure implies that the spillover generate by the entry of a new worker should be larger for those workers who who are observed by the new worker

Table 5: Models by spatial orientation and proximity

	(1)	(3)
Δ Co-worker permanent productivity behind	0.233 (0.019)	
Δ Co-worker permanent productivity in front	0.007 (0.018)	
Δ Co-worker permanent productivity behind & closer		0.162 (0.016)
Δ Co-worker permanent productivity in front & closer		0.016 (0.015)
Δ Co-worker permanent productivity behind & farther		0.100 (0.018)
Δ Co-worker permanent productivity in front & farther		0.003 (0.018)

Voter Turnout

- Final Example: Effect of Social Pressure on Voting
  - Large literature of field experiments to impact voter turnout
  - Typical design: Day before (local) election reach treatment household and encourage them to vote
  - Some classical examples

Paper	Treatment (1)	Election type or question (2)	Variable t (3)	Year (4)	Place (5)	Sample size (6)	Control group t_T (7)	Treatment group t_C (8)	Exposure rate $e_T - e_C$ (9)	Persuasion rate (10)
Field Experiments										
Gerber and Green [2000]	Door-to-door canvassing	Federal elect.	Turnout	1998	New Haven	N = 14,473	0.422	0.463	0.270	0.263
	Canvassing + mail + calls	Federal elect.	Turnout	1998	New Haven	N = 14,850	0.422	0.448	0.270	0.167
Green, Gerber, and Nickerson [2003]	Door-to-door canvassing	Local elect.	Turnout	2001	6 cities	N = 18,933	0.286	0.310	0.293	0.118
Green and Gerber [2001]	Phone calls by youth vote	General elect.	Turnout	2000	4 cities	N = 4,377	0.660	0.711	0.737	0.205
	Phone calls 18–30-year-olds	General elect.	Turnout	2000	2 cities	N = 4,377	0.405	0.416	0.414	0.045

Example

- In these experiments, typically mailings are the cheapest, but also the least effective get-out-the-vote treatment
- **Gerber, Green, and Larimer (APSR, 2008):** Add social pressure to these treatments
- Setting:
  - August 2006, Michigan
  - Primary election for statewide offices
  - Voter turnout 17.7% registered voters
- Experimental sample: 180,000 households on Voter File
- Mailing sent 11 days prior to election

Experimental Design

- Control households get no mail (N=100,000)
- *Civic Duty Treatment.* 'DO YOUR CIVIC DUTY—VOTE!"'

Civic Duty mailing

30426-2 ||| || || || | XXX

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Dear Registered Voter:

DO YOUR CIVIC DUTY AND VOTE!

Why do so many people fail to vote? We've been talking about this problem for years, but it only seems to get worse.

The whole point of democracy is that citizens are active participants in government; that we have a voice in government. Your voice starts with your vote. On August 8, remember your rights and responsibilities as a citizen. Remember to vote.

DO YOUR CIVIC DUTY — VOTE!

Experimental Design

- *Hawthorne Treatment.* Information that voters' turnout records are being studied

Dear Registered Voter:

YOU ARE BEING STUDIED!

Why do so many people fail to vote? We've been talking about this problem for years, but it only seems to get worse.

This year, we're trying to figure out why people do or do not vote. We'll be studying voter turnout in the August 8 primary election.

Our analysis will be based on public records, so you will not be contacted again or disturbed in any way. Anything we learn about your voting or not voting will remain confidential and will not be disclosed to anyone else.

DO YOUR CIVIC DUTY — VOTE!

Experimental Design

- *Self-Information Treatment.* Give information on own voting record

Dear Registered Voter:

WHO VOTES IS PUBLIC INFORMATION!

Why do so many people fail to vote? We've been talking about the problem for years, but it only seems to get worse.

This year, we're taking a different approach. We are reminding people that who votes is a matter of public record.

The chart shows your name from the list of registered voters, showing past votes, as well as an empty box which we will fill in to show whether you vote in the August 8 primary election. We intend to mail you an updated chart when we have that information.

We will leave the box blank if you do not vote.

DO YOUR CIVIC DUTY—VOTE!

OAK ST	Aug 04	Nov 04	Aug 06
9999 ROBERT WAYNE		Voted	_____
9999 LAURA WAYNE	Voted	Voted	_____

Experimental Design

- *Other-Information Treatment.* Know if neighbors voted!

Dear Registered Voter:

WHAT IF YOUR NEIGHBORS KNEW WHETHER YOU VOTED?

Why do so many people fail to vote? We've been talking about the problem for years, but it only seems to get worse. This year, we're taking a new approach. We're sending this mailing to you and your neighbors to publicize who does and does not vote.

The chart shows the names of some of your neighbors, showing which have voted in the past. After the August 8 election, we intend to mail an updated chart. You and your neighbors will all know who voted and who did not.

DO YOUR CIVIC DUTY — VOTE!

MAPLE DR	Aug 04	Nov 04	Aug 06
9995 JOSEPH JAMES SMITH	Voted	Voted	_____
9995 JENNIFER KAY SMITH		Voted	_____
9997 RICHARD B JACKSON		Voted	_____

Results

- Substantial impacts especially when neighbors get to see
- All the results are highly statistically significant
- Results huge given that 1/3 of recipients probably never opened the mailer

TABLE 2. Effects of Four Mail Treatments on Voter Turnout in the August 2006 Primary Election

	Experimental Group				
	Control	Civic Duty	Hawthorne	Self	Neighbors
Percentage Voting	29.7%	31.5%	32.2%	34.5%	37.8%
N of Individuals	191,243	38,218	38,204	38,218	38,201

- Replication in competitive elections: Smaller impact, but replicates

Results

- Are effects persistent? **Davenport, Gerber, Green, Larimer, Mann, Papagopoulos (PB, 2010)**

Table 1 Voter turnout in a series of elections before and after treatment, by 2006 experimental group, Gerber et al. (2008) study (percent turnout)

	Control	Civic duty	Hawthorne	Self	Neighbors
Aug 2000[a]	25.2	25.4	25	25.1	25.1
Nov 2000[a]	84.3	84.2	84.4	84	84.2
Aug 2002[a]	38.9	38.9	39.4	39.2	38.7
Nov 2002[a]	81.1	81.1	81.3	81.1	81.1
Aug 2004[a]	40	39.9	40.3	40.2	40.7*
August 2006[b]	29.7	31.5**	32.2**	34.5**	37.8**
Nov 2006	84.5	84.3	84.6	84.8	85.5**
Jan 2008	34.8	35.1	35.1	35.4*	36.0**
Aug 2008	31.7	31.5	32	32.5**	32.7**
Nov 2008	81.1	80.7	81	81	81.1
N	191,236	38,216	38,199	38,214	38,199

Note: Only registered voters who voted in November 2004 were selected for this experiment

[a] Election prior to treatment

[b] The treatment immediately preceded this election

** $p < .01$; * $p < .05$, one-tailed

- Persistence of about 15% of effect

Section 5

Social Pressure: Charitable Giving

DellaVigna, List, and Malmendier (2012)

- Test of prediction of social pressure model: Avoidance of fund-raiser
  - Consumer may receive advance notice of fundraiser
  - Consumer can avoid (or seek) fundraiser at a cost
  - Consumer decides whether to give (if at home)
- Field experiment: door-to-door fundraiser
  - Control group: standard fundraiser
  - Flyer Treatment: flyer on doorknob on day before provides advance notice about hour of visit
  - Opt-Out Flyer Treatment: flyer with box "do not disturb"

Flyer Layout with and without Opt-Out

LA RABIDA
CHILDREN'S HOSPITAL

Fundraising Campaign for La Rabida Children's Hospital

Fundraisers will visit this address tomorrow (/) between and to raise funds for La Rabida Children's Hospital.

☐ Check this box if you **Do not want to be disturbed.**

LA RABIDA
CHILDREN'S HOSPITAL

Fundraising Campaign for La Rabida Children's Hospital

Fundraisers will visit this address tomorrow (/) between and to raise funds for La Rabida Children's Hospital.

- **Model**

- Giving game with giver and fund-raiser. Timing:
  - *Stage 1*:
    - No Flyer: Giver at home with probability $h = h_0$
    - Flyer:
      - Giver sees flyer with probability r
      - Can alter probability of being at home h from baseline h_0 at cost $c(h)$, with $c(h_0) = 0$, $c'(h_0) = 0$, and $c''(\cdot) > 0$
  - *Stage 2*:
    - Fund-raiser visits home of giver:
      - If giver at home (w/ prob. h), in-person donation $g^* \geq 0$

- Utility function of giver:

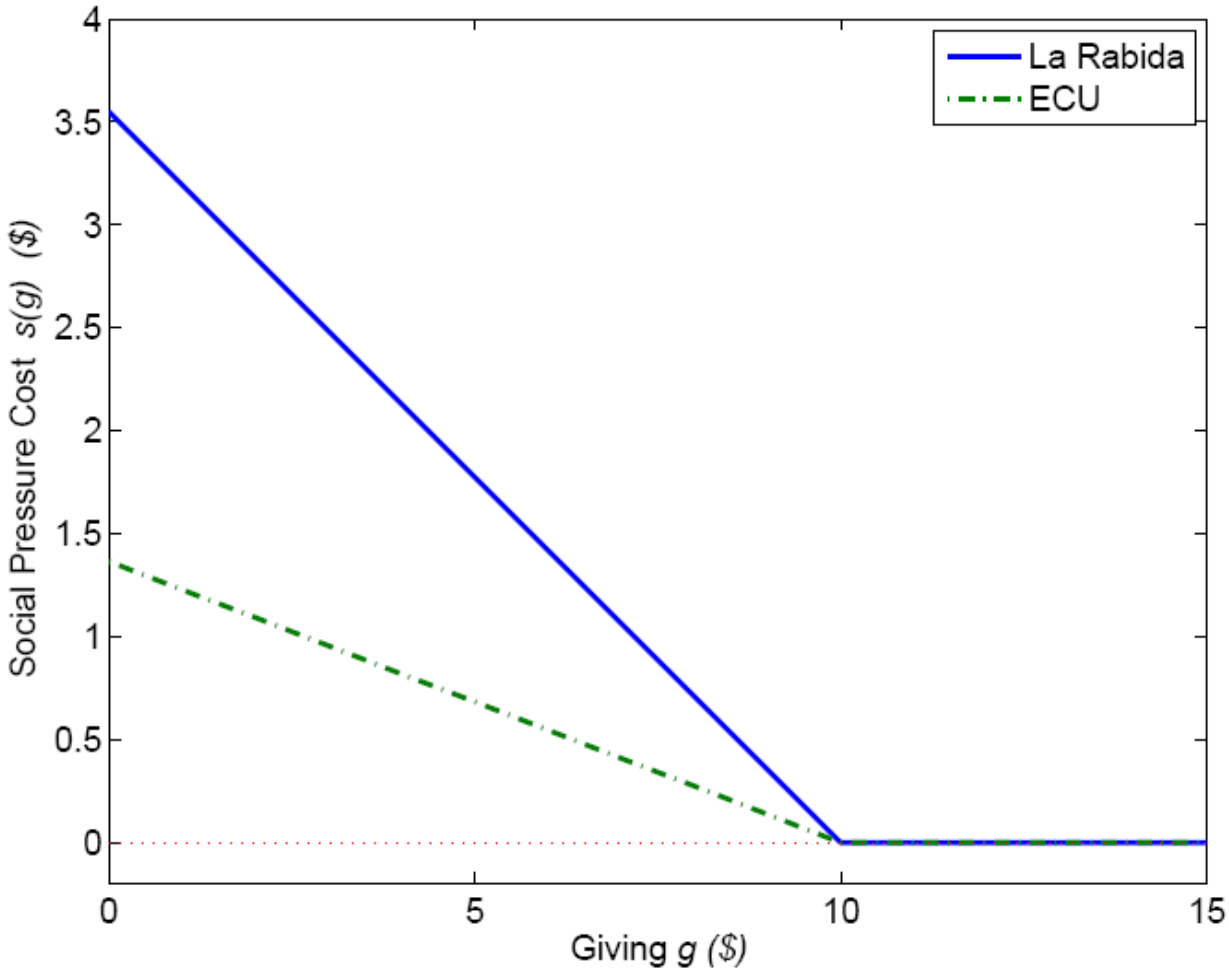
$$U(g) = u(W - g) + av(g, G_{-i}) - s(g)$$

- Agent cares about:
  - Private consumption $u(W - g)$, with $u'(\cdot) > 0$ and $u''(\cdot) \leq 0$
  - Giving to charity $av(\cdot, G_{-i})$, with $v'_g(\cdot, \cdot) > 0$, $v''_{g,g}(\cdot, \cdot) < 0$, $\lim_{g \to \infty} v'_g(g, \cdot) = 0$, and $v(0, G_{-i}) = 0$.

- Social Pressure $s(g) = S(g^s - g) \cdot \mathbf{1}_{g < g^s} \geq 0$
  - Social pressure $s = 0$ if not at home or if giving $g \geq g^s$ (socially acceptable amount)
  - Social pressure $s > 0$ for giving $g < g^s$, decreasing in g

- Captures identity (Akerlof and Kranton, 2000), social norms, or self-signalling (Bodner and Prelec, 2002; Grossman, 2007)

Figure. Social Pressure Cost At Estimated Parameters

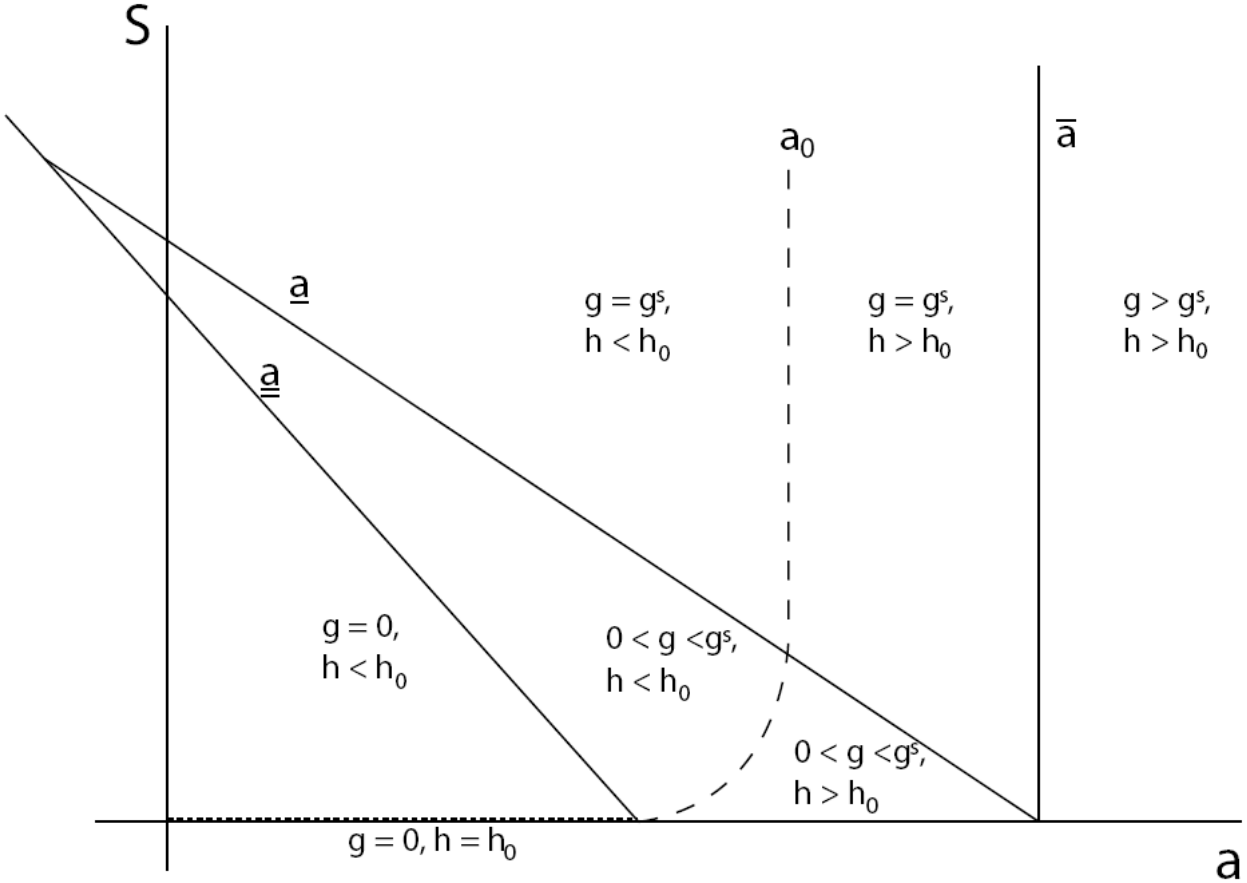


- **Lemma 1a. (Conditional Giving In Person).** *There is a unique optimal donation $g^*(a, S)$ (conditional on being at home), which is weakly increasing in a and takes the form: (i) $g^*(a, S) = 0$ for $a \leq \underline{\underline{a}}$; (ii) $0 < g^*(a, S) < g^s$ for $\underline{\underline{a}} < a < \underline{a}$; (iii) $g^*(a, S) = g^s$ for $\underline{a} \leq a \leq \bar{a}$; (iv) $g^*(a, S) > g^s$ for $a > \bar{a}$.*

- **Lemma 2 (Presence at Home).** *There is a unique optimal probability of being at home $h^*(a, S)$;* (i) *For $S = 0$ (no social pressure), $h^*(a, 0) = h_0$ for $a \leq \underline{\underline{a}}$ and $h^*(a, 0) > h_0$. (ii) For $S > 0$ (social pressure), $h^*(a, S) < h_0$ for $a \leq \underline{\underline{a}}$; there is unique $a_0(S) \in (\underline{\underline{a}}, \bar{a})$ such that $h^*(a_0(S)) = h_0$.*

- **Lemma 3 (Opt-Out Decision).** *For $S = 0$ (no social pressure), the agent never opts out for any a. For $S > 0$ (social pressure), the agent opts out for sufficiently low altruism, $a < a_0(S)$.*

Figure 1. Giving g and Probability of Home Presence h as Function of Parameters



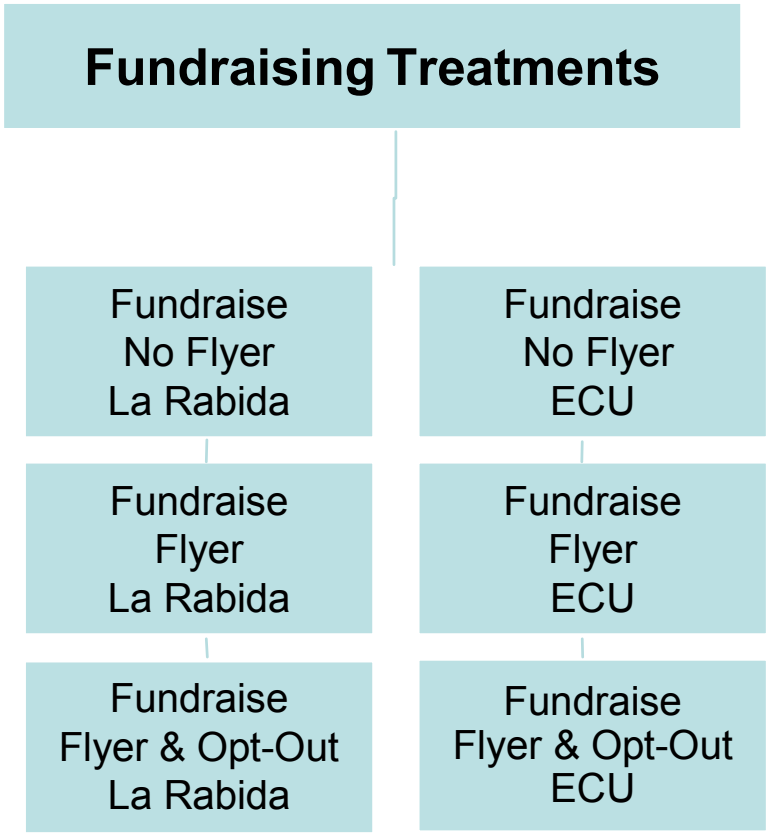
Notes: The Figure indicates the different regions for giving (no giving–g=0, small giving–$0<g<g^s$, giving equal to g^s, and large giving–$g> g^s$) and for probability of being at home (avoidance of solicitor--$h<h_0$, seeking solicitor–$h> h_0$). The regions are a function of the altruism parameter *a* and of the social pressure parameter *S*.

- Allow for heterogeneity in altruism a, with $a \sim F$

- Two special cases:
  - *Altruism and No Social Pressure* (*A-NoS*, $S = 0$ and $F\left(\underline{\underline{a}}\right) < 1$)
  - *Social Pressure and Limited Altruism* (*S-NoA*, $S > 0$ and $F\left(\underline{\underline{a}}\right) = 1$)

- **Proposition 1.** *The probability* $P(H)$ *of home presence is*
  - *A-NoS:* $P(H)_F = P(H)_{OO} > P(H)_{NF}$
  - *S-NoA:* $P(H)_{NF} > P(H)_F > P(H)_{OO}$

- **Proposition 2.** *The unconditional probability* $P(G)$ *of giving is*
  - *A-NoS:* $P(G)_F = P(G)_{OO} > P(G)_{NF}$
  - *S-NoA:* $P(G)_{NF} > P(G)_F > P(G)_{OO}$


Fundraising Treatments
Fundraise
No Flyer
La Rabida
Fundraise
No Flyer
ECU
Fundraise
Flyer
La Rabida
Fundraise
Flyer
ECU
Fundraise
Flyer & Opt-Out
La Rabida
Fundraise
Flyer & Opt-Out
ECU

Experimental Design

- Recruitment and Training: 48 solicitors and surveyors
  - undergraduate students at the University of Chicago, UIC, and Chicago State University
  - Interviewed, trained at UoC
  - aware of different charities but not of treatment
- Time and Place:
  - Saturdays and Sundays between April, 2008 and October, 2008
  - Hours between 10am and 5pm
  - Towns around Chicago: Burr Ridge, Flossmoor, Kenilworth, Lemont, Libertyville, Oak Brook, Orland Park, Rolling Meadows, and Roselle
- Randomization
  - within a solicitor-day observations (4h/6h shifts per day) and
  - at the street level within a town
- Different treatments in different periods ➔ randomization is conditional on solicitor and day fixed effects

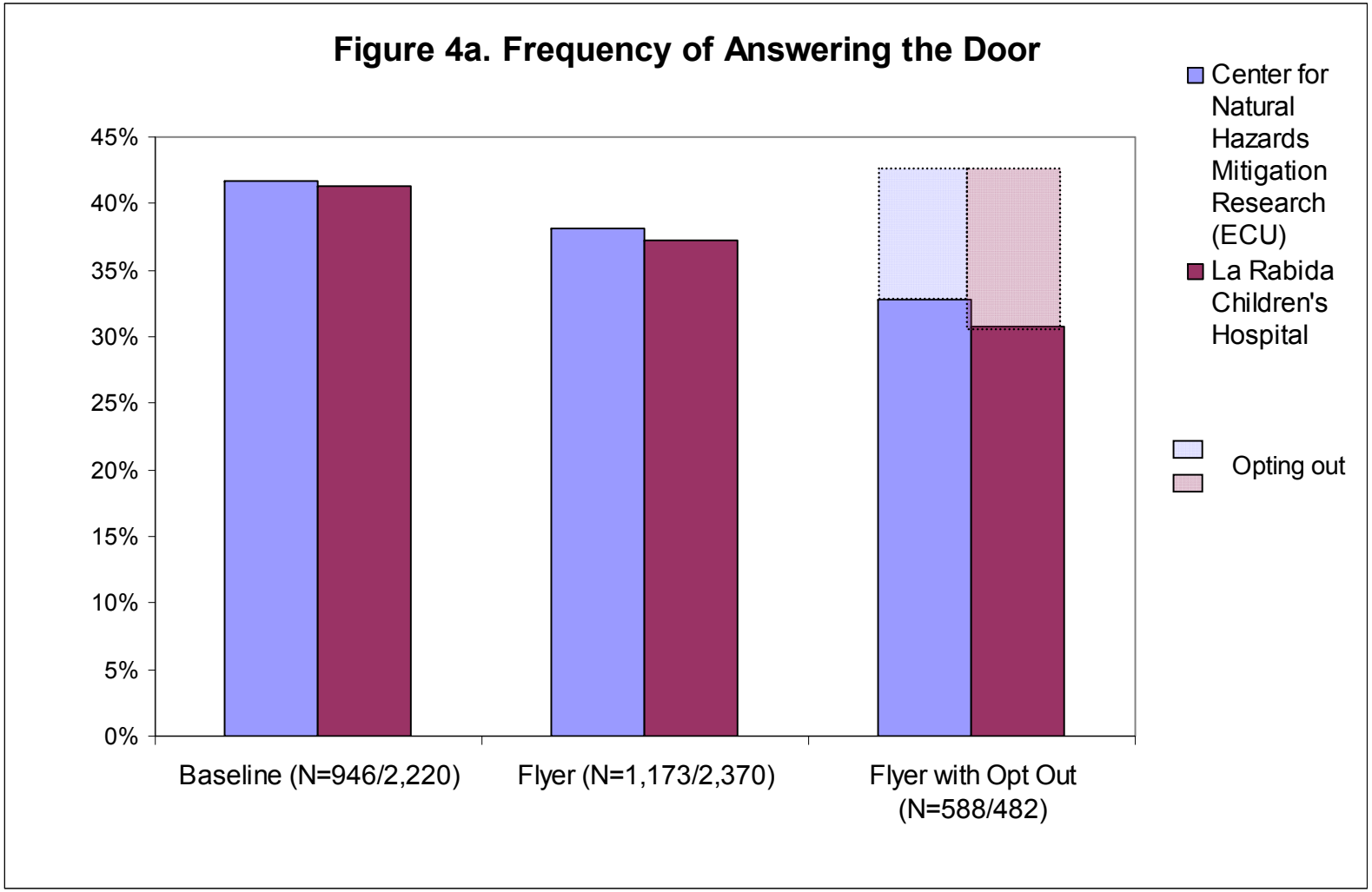


Figure 4a. Frequency of Answering the Door
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Baseline (N=946/2,220)
Flyer (N=1,173/2,370)
Flyer with Opt Out (N=588/482)
Center for Natural Hazards Mitigation Research (ECU)
La Rabida Children's Hospital
Opting out

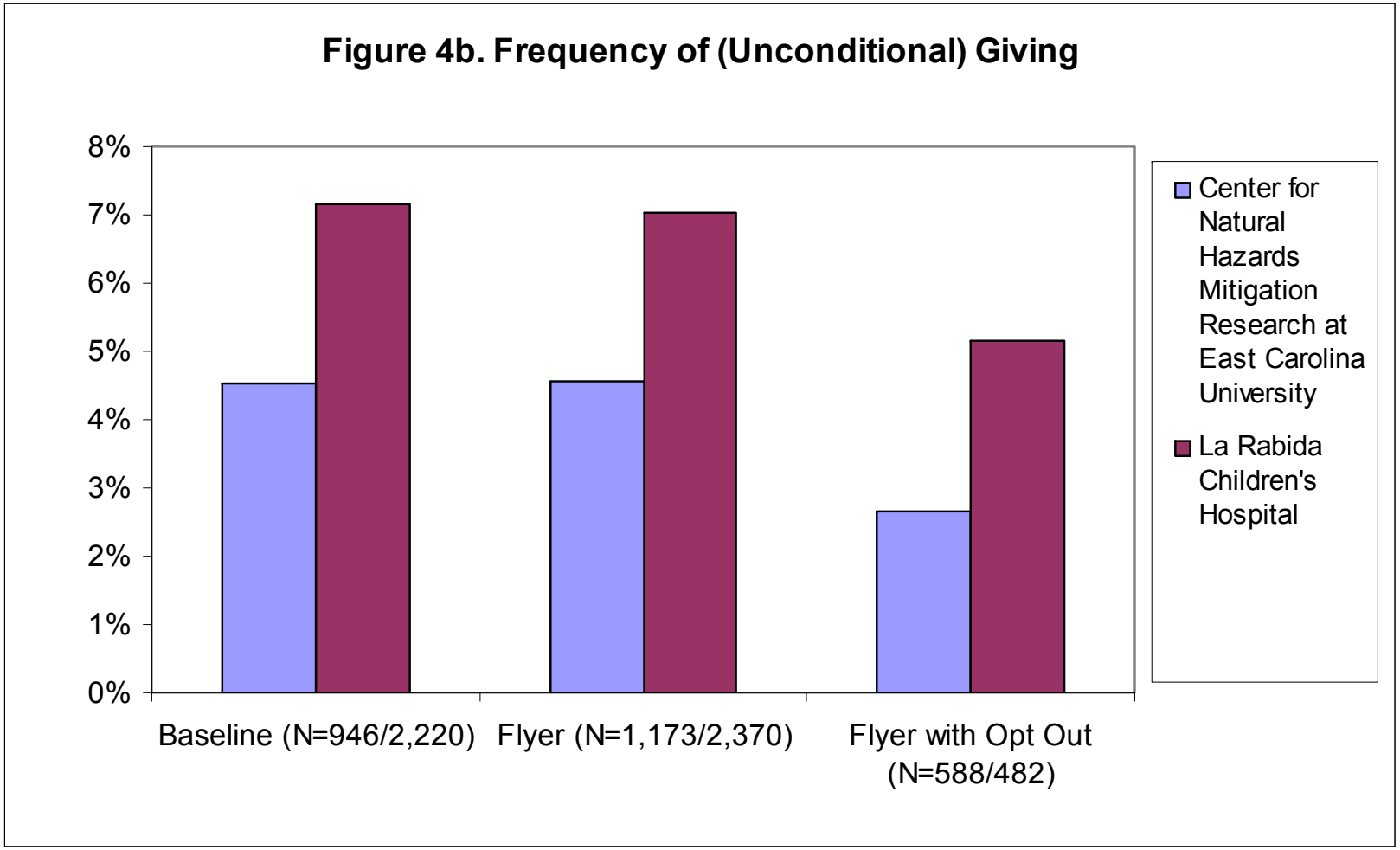


Figure 4b. Frequency of (Unconditional) Giving
8%
7%
6%
5%
4%
3%
2%
1%
0%
Baseline (N=946/2,220)
Flyer (N=1,173/2,370)
Flyer with Opt Out (N=588/482)
Center for Natural Hazards Mitigation Research at East Carolina University
La Rabida Children's Hospital

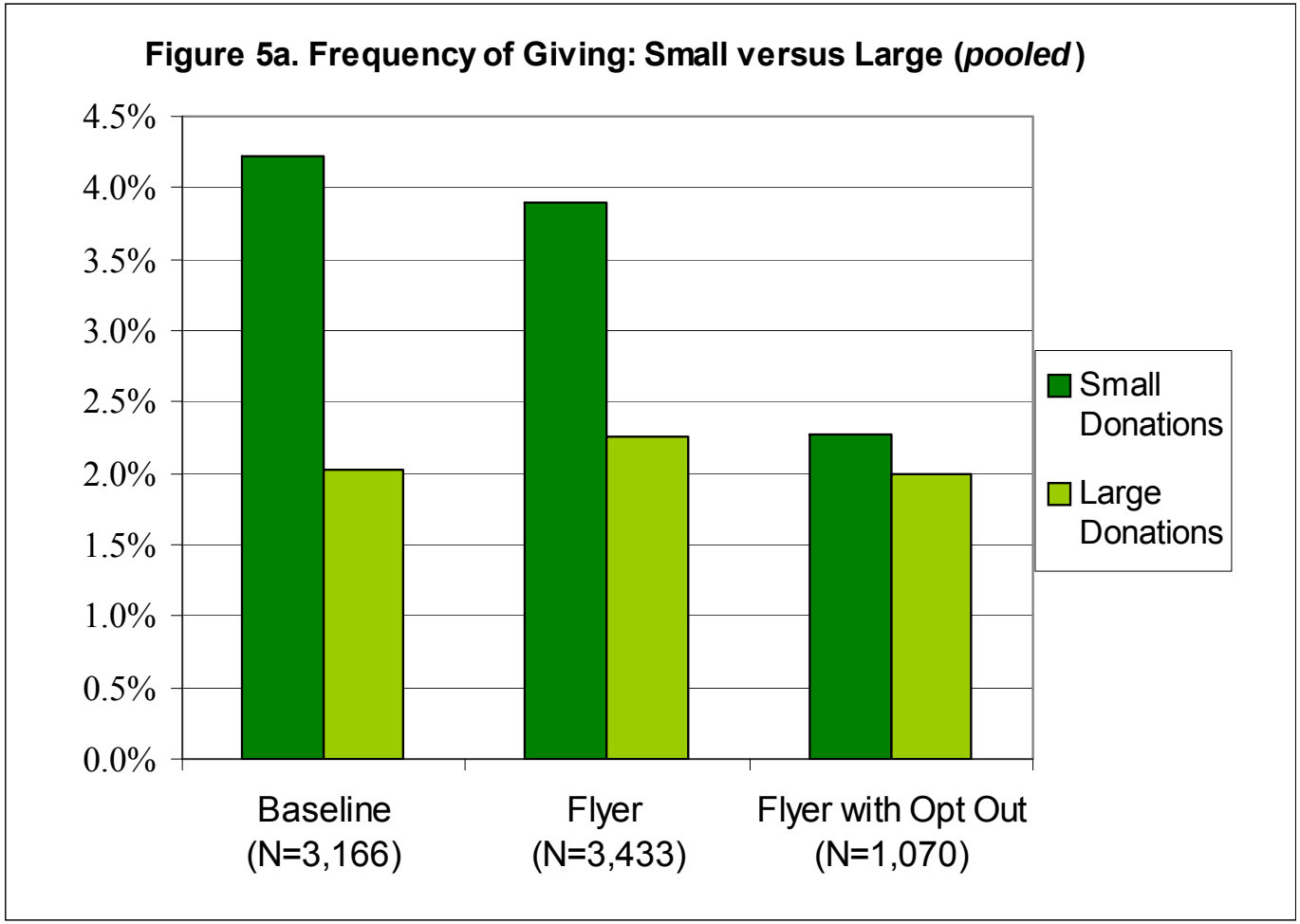
Table 2. Results for Fund-Raising Treatments

Specification:	OLS Regressions			
Dep. Var.:	Indicator for Answering the Door		Indicator for Giving	
	(1)	(2)	(3)	(4)
Flyer Treatment	-0.0388 (0.0137)***		-0.0009 (0.0062)	
Flyer with opt out Treatment	-0.0966 (0.0193)***		-0.0197 (0.0083)**	
Flyer Treatment * ECU Charity		-0.0365 (0.0313)		0.0006 (0.0094)
Flyer with opt out * ECU Charity		-0.089 (0.0271)***		-0.0183 (0.0100)*
Flyer Treatment * La Rabida Charity		-0.0396 (0.0144)***		-0.0019 (0.0078)
Flyer with opt out * La Rabida Charity		-0.106 (0.0319)***		-0.0202 (0.0132)
Indicator ECU Charity		0.0041 (0.0234)		-0.0263 (0.0085)***
Omitted Treatment	No-Flyer	No-Flyer, La Rabida	No-Flyer	No-Flyer, La Rabida
Mean of Dep. Var. for Omitted Treatment	0.4151	0.413	0.0629	0.0717
Fixed Effects for Solicitor, Date-Location, Hour, and Area Rating	X	X	X	X
N	N = 7668	N = 7668	N = 7668	N = 7668

•**Evidence by Donation Size:**

Social pressure more likely to yield small donations

Use median donation size ($10) as cut-off point



Survey Treatments

- Results of fundraiser do not easily allow the estimation of altruism and social pressure parameters
  - Unobserved cost of adjustment *c(h)*
- Solution: estimate elasticity with respect to monetary incentives
- Survey treatments with varying compensation and duration
- Treatments run in 2008 and 2009

Survey Flyers

THE UNIVERSITY OF
CHICAGO

University of Chicago Study

Researchers will
will visit this address
tomorrow (/)
between and
to conduct a
10 minute survey.

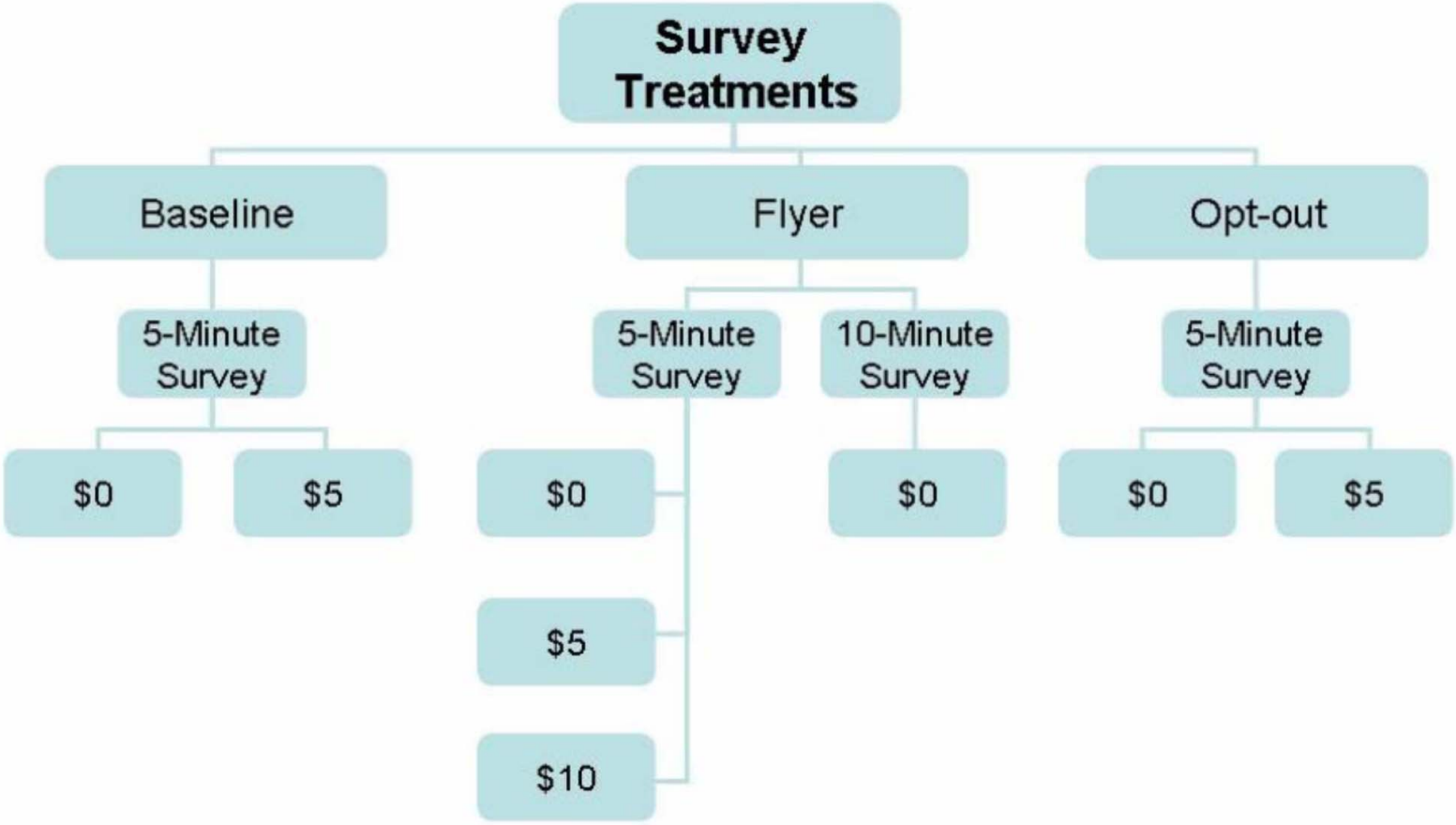
THE UNIVERSITY OF
CHICAGO

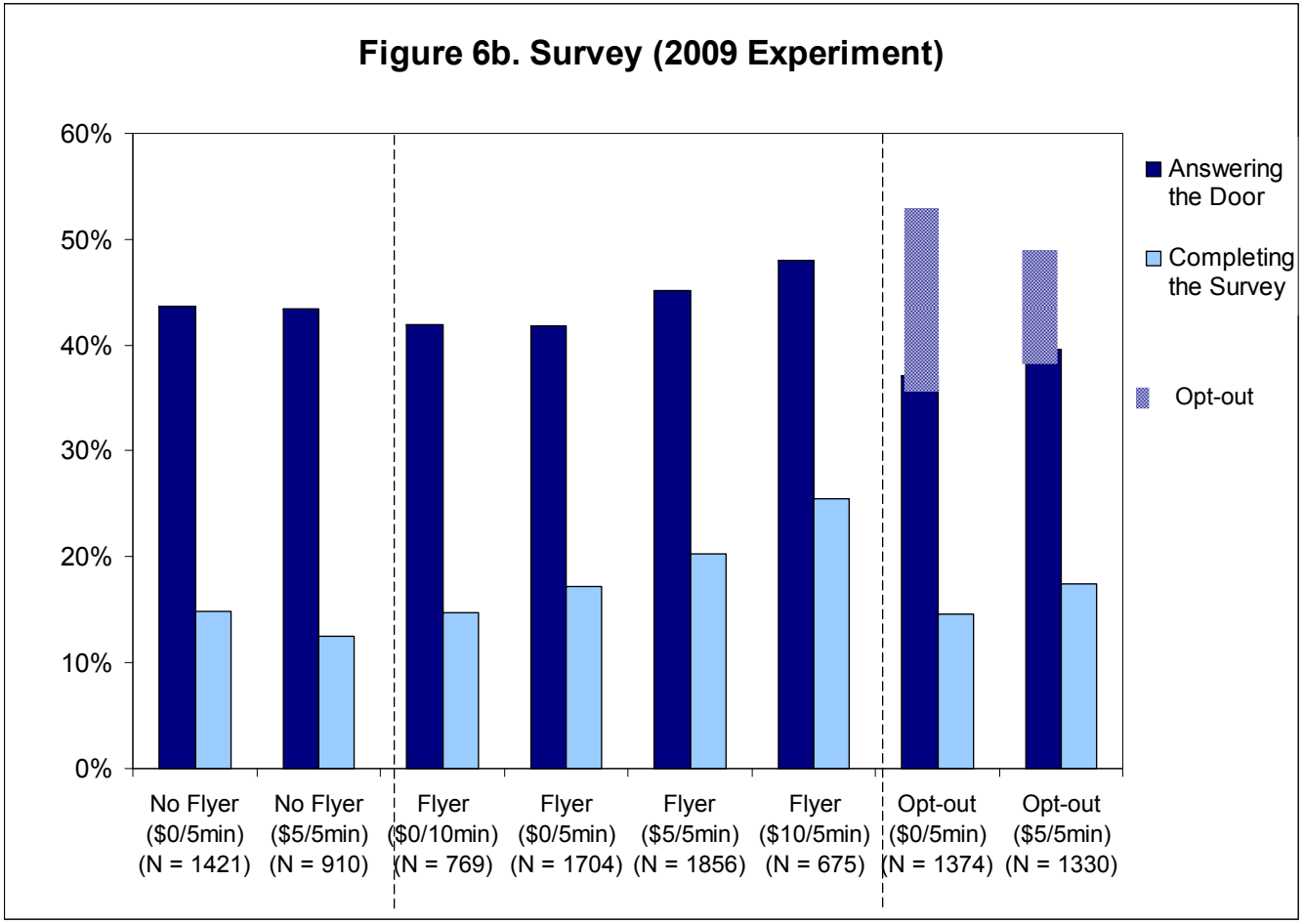
University of Chicago Study

Researchers will
visit this address
tomorrow (/)
between and
to conduct a
10 minute survey.

You will be paid $10
for your participation.

Figure 2b. Summary of Door-to-Door Experimental Treatments Run in 2009





- **Survey Results (2009, N = 10,032)**

Higher payment (lower duration)
 increases proportion at home monotonically
 increases survey completion monotonically (except in NF)

- **Structural estimates (Minimum-distance estimator)**

- Minimize distance between predicted moments $m(\vartheta)$ and observed ones $\hat{m}$:

$$\min_{\vartheta} (m(\vartheta) - \hat{m})' W (m(\vartheta) - \hat{m})$$

- Moments $m(\vartheta)$:
  1. Probability of opening the door $(P(H)_j^c,\ j = F, NF, OO,\ c = LaR, Ecu)$
  2. Probability of checking opt-out box $(P(OO)_{OO}^c,\ c = LaR, Ecu)$
  3. Probability of giving at all, and giving an amount range $(P(G)_j^c,\ j = F, NF, OO,\ c = LaR, Ecu)$
  4. Probability of opening door in survey $(P(H)_j^S)$
  5. Probability of filling survey $(P(S)_j^S)$

- Straightforward logic: All you are trying to do is to get model parameters ϑ to reproduce the graphical findings, with quadratic loss function

- Consider simplified case: $W = I$, minimization reduces to

$$\min_{\vartheta} \left[P(H)_{NF}((\vartheta)) - \widehat{P(H)}_{NF}\right]^2 + \left[P(H)_{F}((\vartheta)) - \widehat{P(H)}_{F}\right]^2 + \left[P(H)_{OO}((\vartheta)) - \widehat{P(H)}_{OO}\right]^2 + \left[P(G)_{NF}((\vartheta)) - \widehat{P(G)}_{NF}\right]^2 + \left[P(G)_{F}((\vartheta)) - \widehat{P(G)}_{F}\right]^2 + ...$$

- All moments $\hat{P}$ are probabilities, straight from Figures

- What is ϑ? Social pressure cost S, mean altruism μ, cost of sorting parameter, etc.

- Complication 1 *(Assumptions)*. Extra assumptions relative to model
  - On heterogeneity of altruism a we assume normality
  - Conduct as much robustness as possible

- Complication 2 *(Computations)*. Model may be hard to solve for given ϑ
  - Simplify whenever possible, i.e., no heterogeneity for social pressure
  - Sometimes, need to simulate model if cannot solve analytically

- Complication 3 (*Weighting*). Weight moments W
  - In theory weight, by inverse of variance-covariance matrix
  - In practice, often better to use only diagonal

- Complication 4 (*Optimization*).
  - Unlike in OLS, need to check that optimum is a global minimum
  - Use different starting points
  - Yet sometimes need to restrict parameters to meaningful economic values

- Weighting matrix W diagonal of inverse of variance-covariance matrix

- Parametric assumption to estimate the model:
  1. Consumption utility linear: $u(W-g) = W - g$
  2. Altruism function $av(g, G_{-i}) = a \log(G+g)$
  3. Altruism a is distributed $N(\mu, \sigma)$
  4. Acceptable donation $g^S = \$10$ (median)
  5. Cost function $c(h) = (h - h_0)^2 / 2\eta$
  6. No mail giving ($\theta = 0$)

- Marginal utility of giving: $a/(G+g) - 1$

- Parameters ϑ:
  1. h_0^{2008} and h_0^{2009}—probability of being at home in no-flyer conditions
  2. r—probability of observing and remembering the flyer
  3. η—responsiveness of the probability of being at home to the utility of being at home
  4. μ_a^c $(c = LaR, Ecu)$—mean of the distribution F of the altruism α
  5. σ_α^c $(c = LaR, Ecu)$—standard deviation of $F(\alpha)$
  6. G—curvature of altruism/warm glow function
  7. S^c $(c = LaR, Ecu)$—social pressure associated with not giving
  8. μ^S—mean of the distribution F^S from which the utility of the survey is drawn
  9. σ^S—standard deviation of F^S
  10. S^S—social pressure associated with saying no
  11. v^S—value of an hour of time completing a survey

- Identification:
  - Prob. being at home h_0 <– Control group
  - Prob. seeing flyer r <– Share opting out
  - Utility of doing survey μ^S and σ^S <– Share completing survey
  - Value of time v^S <– Comparison of effect of \$10 payment and 5 minute duration
  - Elasticity of home presence η <– Share opening door in survey for different payments + Giving in charity
  - Altruism parameters μ^c, σ^c, G <– Given η, share giving different amounts
  - Social pressure parameters S^i and S^S <– Share opening door and giving

Appendix Table 1. Empirical Moments and Estimated Moments

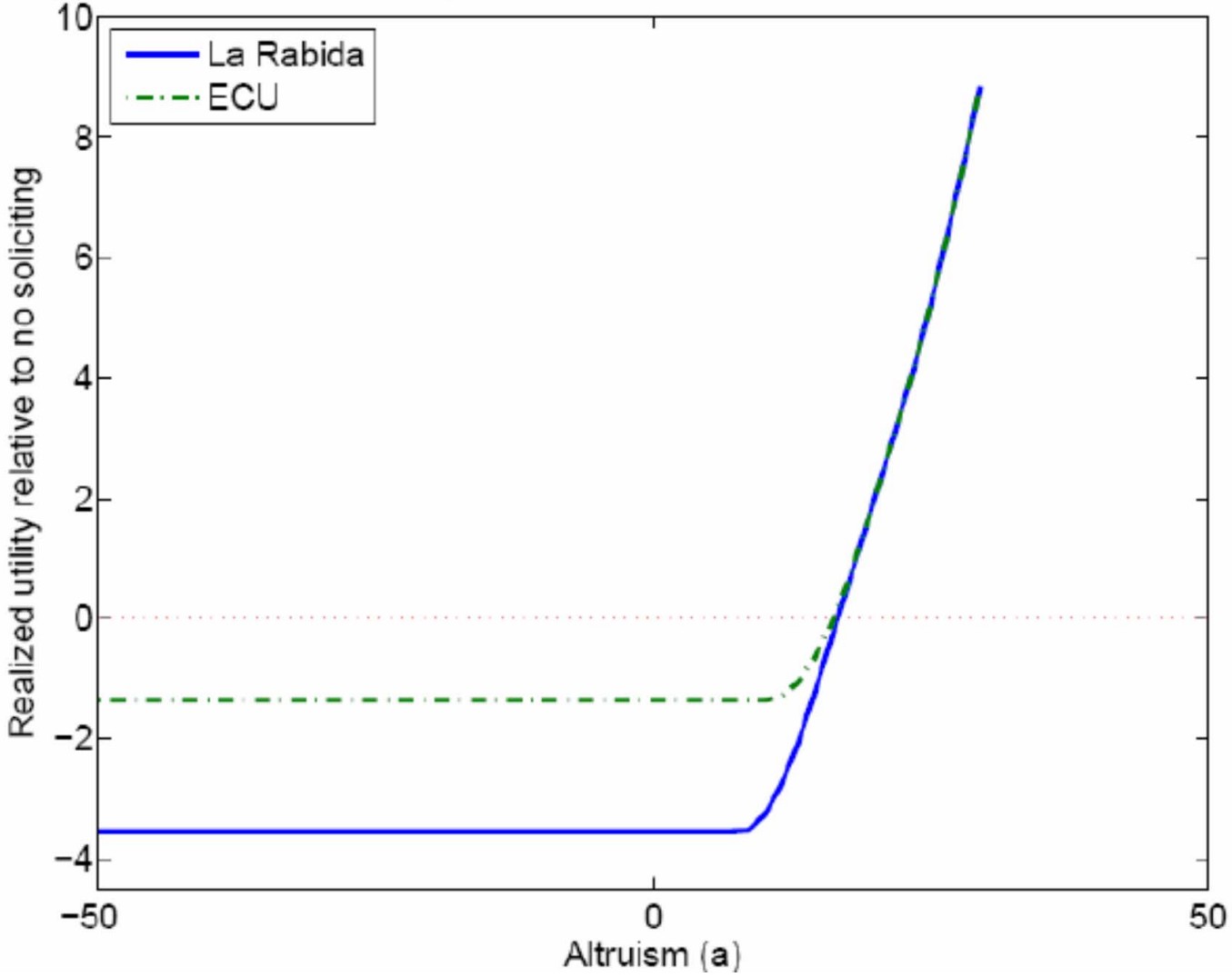
Specification:	Minimum-Distance Estimates			
Charity	La Rabida Charity		ECU Charity	
Moments for Charity	Empirical Moments	Estimated Moments	Empirical Moments	Estimated Moments
Moments	(1)	(2)	(3)	(4)
P(Home) No Flyer	0.4130	0.4142	0.4171	0.4142
P(Home) Flyer	0.3733	0.3735	0.3806	0.3983
P(Home) Opt-Out	0.3070	0.2989	0.3281	0.2911
P(Opt Out) Opt-Out	0.1202	0.1142	0.0988	0.1179
P(Giving) No Flyer	0.0717	0.0666	0.0455	0.0422
P(Giving) Flyer	0.0699	0.0710	0.0461	0.0449
P(Giving) Opt-Out	0.0515	0.0633	0.0272	0.0390
Additional Moments (not shown)				
P(0<Giving<10), P(Giving=10), P(10<Giving<=20), P(20<Giving<=50), P(Giving>50) in Treatments NF, F, OO	X	X	X	X
N	N = 4962	N = 4962	N = 2707	N = 2707

Table 4. Minimum-Distance Estimates: Benchmark Results

	Benchmark Estimates		Estimates with Identity Weighting Matrix	
Common Parameters	(1)		(2)	
Prob. Answering Door (h) - Year 2008	0.414		0.414	
	(0.004)		(0.006)	
Prob. Answering Door (h) - Year 2009	0.449		0.445	
	(0.007)		(0.008)	
Prob. Observing Flyer (r)	0.322		0.302	
	(0.011)		(0.012)	
Elasticity of Home Presence (eta)	0.047		0.060	
	(0.014)		(0.031)	
Implied Cost of Altering Prob. Home by 10 pp.	0.106		0.083	
Survey Parameters				
Mean Utility (in $) of Doing 10-Minute Survey	-26.865		-26.936	
	(4.233)		(5.509)	
Std. Dev. of Utility of Doing Survey	30.285		30.332	
	(5.208)		(6.303)	
Value of Time of One-Hour Survey	74.580		76.761	
	(22.901)		(26.130)	
Social Pressure Cost of Saying No to Survey	4.784		3.869	
	(1.285)		(1.918)	
Charity Parameters	La Rabida	ECU	La Rabida	ECU
Mean Weight on Altruism Function (mu)	-13.910	-10.637	-13.586	-15.109
	(3.250)	(4.273)	(9.481)	(10.919)
Std. Dev. of Weight on Altruism Function	21.935	16.620	19.832	19.832
	(1.335)	(1.832)	(3.885)	(3.998)
Curvature of Altruism Function (G)	12.133		12.224	
	(5.147)		(15.518)	
Social Pressure Cost of Giving 0 in Person	3.550	1.364	3.140	1.906
	(0.615)	(0.744)	(1.674)	(1.475)

Welfare: Does a fund-raiser increase utility for the giver?

Figure 7b. Overall Utility of Fund-Raiser as function of Altruism



Welfare

1. Low-altruism households pay social pressure cost
2. High-altruism households get benefit
3. Since the former dominate, on net negative welfare for solicitee

Panel C. Welfare	**La Rabida Charity**	**ECU Charity**
Welfare in Standard (No-Flyer) Fund-Raiser		
Welfare per Household Contacted (in $)	-1.077 (0.160)	-0.439 (0.286)
Money Raised per Household Contacted	0.722 (0.036)	0.332 (0.046)
Money Raised per Household, Net of Salary	0.247 (0.036)	-0.143 (0.046)

- Societal welfare effect can still be positive if money used very well
  But amount of money raised small (negative for ECU)

Flyer and opt-out treatment increase solicitee welfare

Can also raise charity welfare (i.e., net fund-raising)

Panel C. Welfare	**La Rabida Charity**	**ECU Charity**
Welfare in Standard (No-Flyer) Fund-Raiser		
Welfare per Household Contacted (in $)	-1.077 (0.160)	-0.439 (0.286)
Money Raised per Household Contacted	0.722 (0.036)	0.332 (0.046)
Money Raised per Household, Net of Salary	0.247 (0.036)	-0.143 (0.046)
Welfare in Fund-Raiser with Flier		
Welfare per Household Contacted (in $)	-0.924 (0.145)	-0.404 (0.273)
Money Raised per Household Contacted	0.859 (0.044)	0.333 (0.046)
Money Raised per Household, Net of Salary	0.248 (0.044)	-0.278 (0.046)
Welfare in Fund-Raiser with Opt-out		
Welfare per Household Contacted (in $)	-0.586 (0.085)	-0.248 (0.196)
Money Raised per Household Contacted	0.810 (0.045)	0.369 (0.055)
Money Raised per Household, Net of Salary	0.294 (0.036)	-0.147 (0.046)

Section 6

Social Signaling

Social Signaling

- **Benabou and Tirole (2003):**

$$U = u(x_s) + \alpha u(x_o) + \lambda_\alpha E(\alpha | x_s)$$

- Individuals have an altruism weight α
  - Individuals 'forget' their altruism α
  - They infer α from their own behavior in a signaling game
  - They care about the inferred α with social signaling weight λ_α
  - Behave generously to convince one self (and others)
- Can explain:
  - People behave generously when observed, less so when no one sees (dictator with exit)
  - Small donations to signal generosity to others
  - Can generate crowd out of generosity with incentives

Example

- Consider this in the context of **Dube, Luo, and Fang (Mktg Science, 2017)** paper on case-based marketing
  - Send 30,000 SMS messages in China offering to buy movie ticket for 3-D version of *X-Men: Days of Future Past*
  - Standard price: 100 RMB
  - Randomize price discount: 0, 20, 35, 50, 60, 75 RMB
  - Cross-randomize charitable giving bundled with movie ticker purchase: "If you purchase ticket, X RMB will go to charity': 0, 5, 10, 15 RMB
  - Follow-up survey on motivation

Sample sizes

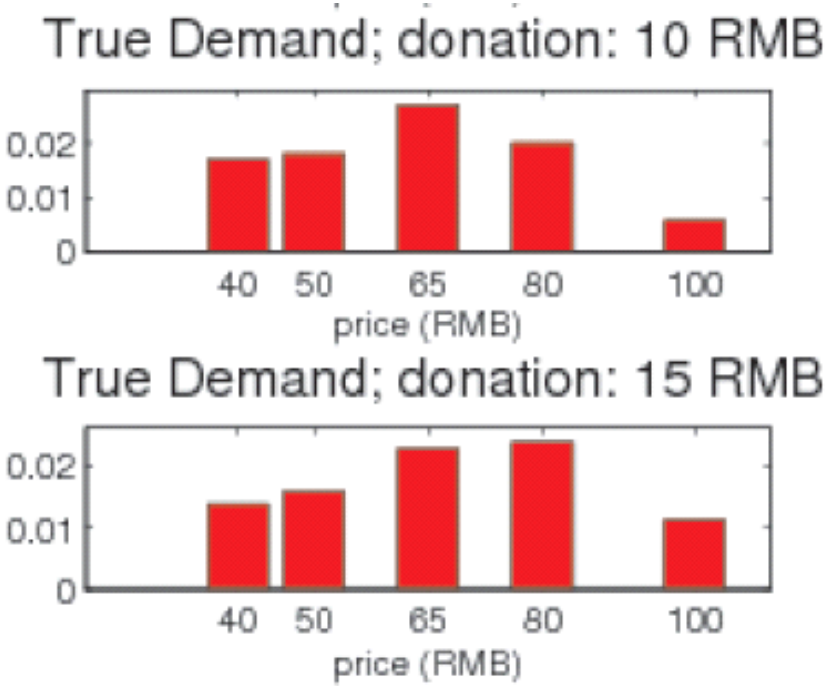
Variable	Donation (RMB)				
		0	5	10	15
discount (RMB)	0	700	700	700	700
	20	700	1,000	1,000	1,000
	35	700	1,000	3,000	3,000
	50	700	1,000	3,000	3,000
	60	700	1,000	3,000	3,000
	75	700	-	-	-

Results: Low Donation

- For low donation, monotonic effect of discount

Results: High Donation

- For high donation, non-monotonic effect of discount → Crowd-out of motivation



Striking result: Interpretation?

- Model adapted from Benabou-Tirole
- Part 1: Individual has consumption utility

$$V + \alpha p + \gamma a$$

  - V is utility from movie,
  - p is price of movie, α (<0) is price elasticity
  - a is donation, γ is (reduced-form) altruism
  - So far, standard model with altruism

Striking result: Interpretation?

- Part 2a: Ego utility on altruism:

$$\lambda_\gamma E\left(\gamma | a, p, y\right)$$

  - Individual derives utility from thinking of being altruistic (high a)
  - Weight on ego utility is λ_γ: for $\lambda_\gamma = 0$, back to pure altruism case
  - Individual solves a signaling game to infer γ given price p, discount a, and donation decision $y \in 0, 1$
  - Thus, donation ($y = 1$) has ego utility benefits, raising $E\gamma$

Striking result: Interpretation?

- This is not enough: need Part 2b in Ego utility:

$$\lambda_\alpha E\left(\alpha | a, p, y\right)$$

  - Individual derives utility from thinking of self as stingy – or not
  - Why this term? There needs to be a signal extraction problem: giving can signal high generosity or low price elasticity
  - Unattractive part of Benabou and Tirole model

- Decision: Give $(y = 1)$ if

$$\begin{aligned} U(1) &= V + \alpha p + \gamma a + \lambda_\alpha E\left(\alpha | a, p, 1\right) + \lambda_\gamma E\left(\gamma | a, p, 1\right) \geq \\ U\left(0\right) &= \lambda_\alpha E\left(\alpha | a, p, 0\right) + \lambda_\gamma E\left(\gamma | a, p, 0\right) \end{aligned}$$

or

$$V + \alpha p + \gamma a + \Delta\left(a, p\right) > 0$$

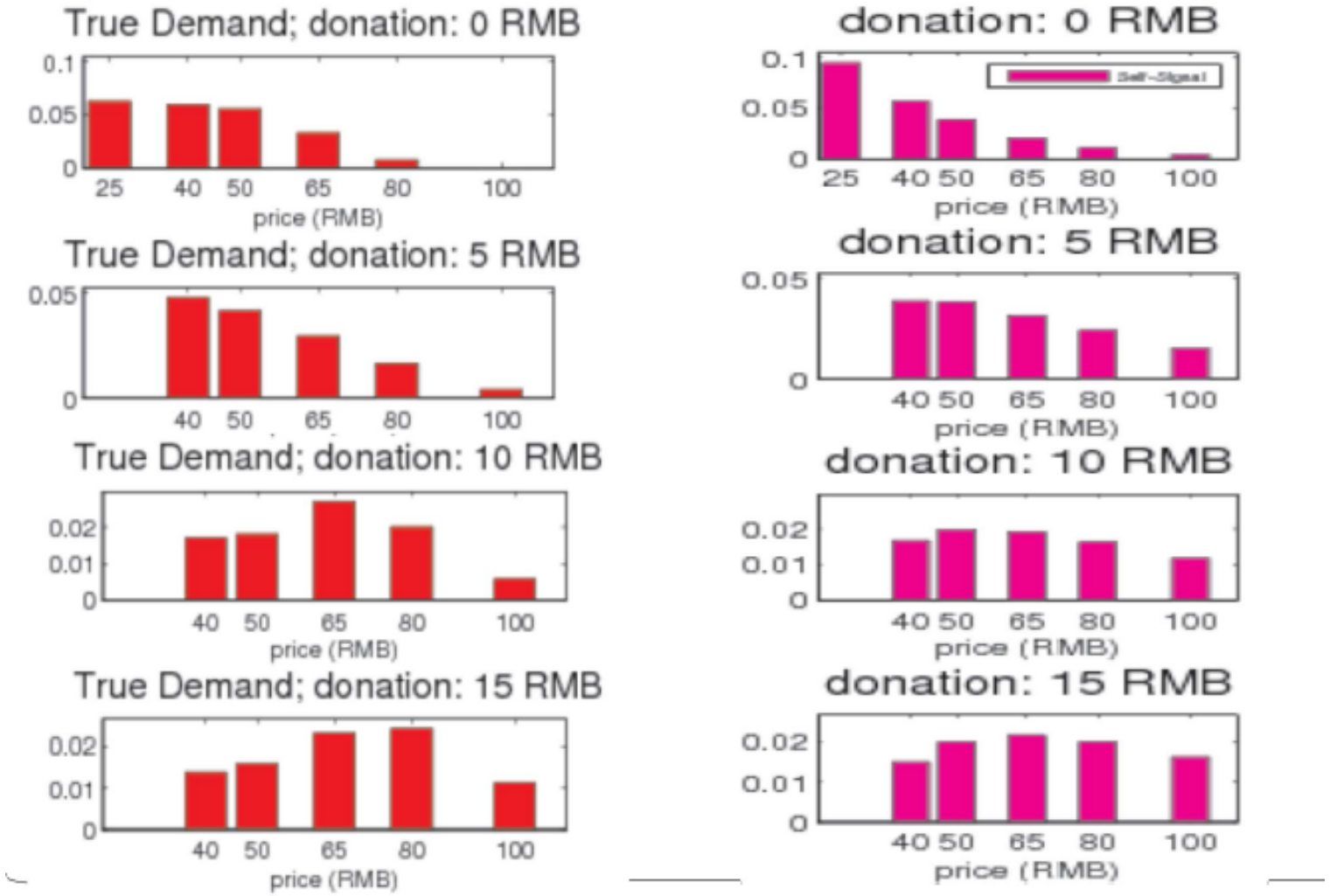
where Δ is net ego utility

- Updating on γ if purchase $(y = 1)$:

$$E\left(\gamma | \gamma > -\frac{V + \alpha p + \Delta\left(a, p\right)}{a}\right)$$

- Specify priors on parameters to derive separating equilibrium of signaling game

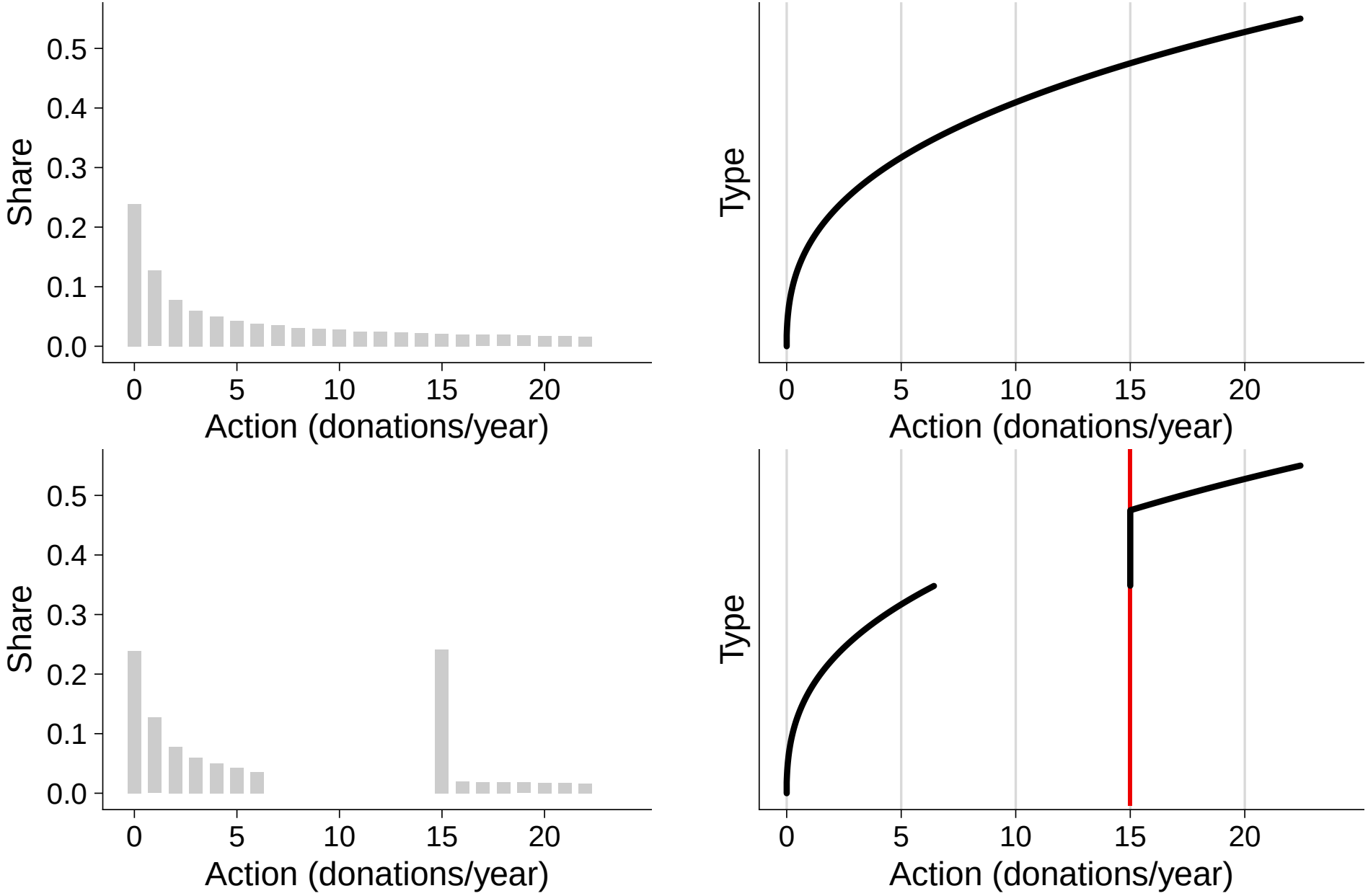
True Demand vs. Model



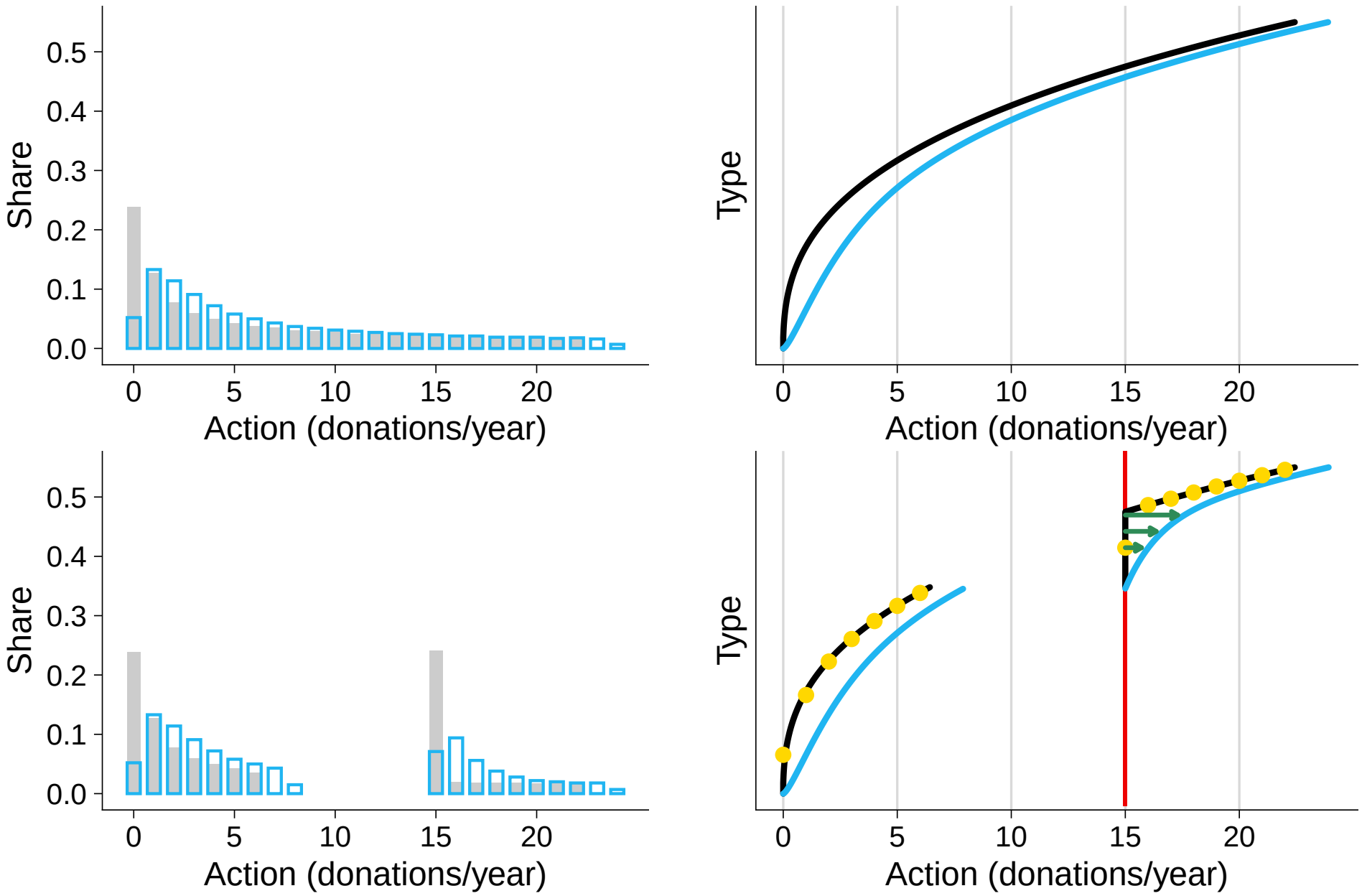
Birke (2020)

- **Birke (2018):** Study of precise predictions of crowd-out with effort task
  - Consider pro-social behavior, like coding for GitHub
  - Introduce a private incentive, say a payment for coding 1,000 lines
  - Standard model has bunching at threshold
  - Social signaling has anti-bunching instead, as people signal that they are not motivated by love of money, but more by pro-social mission

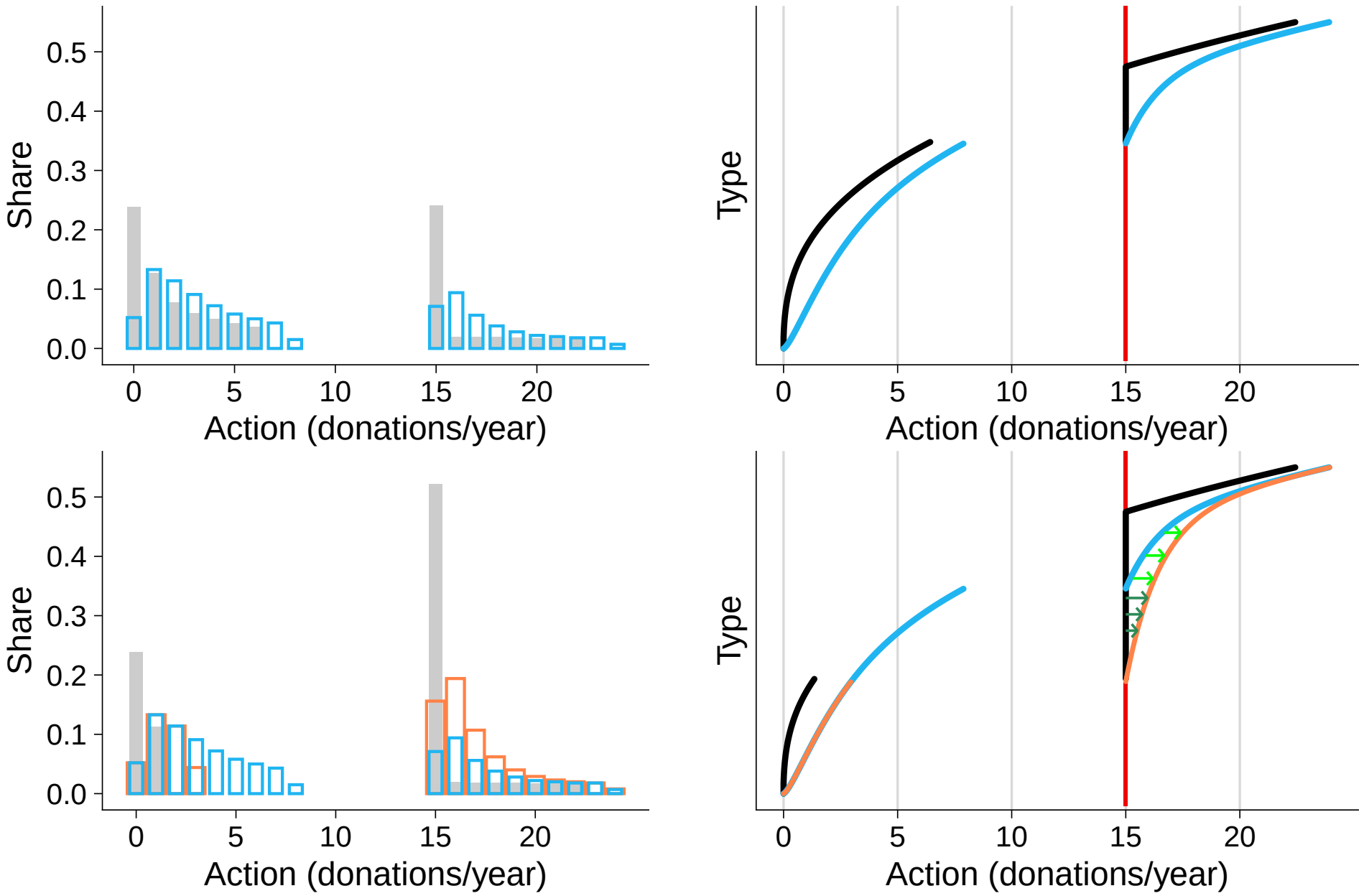
No signaling; No bonus vs. $50-bonus at 15



No signaling vs. Signaling; No bonus vs. $50-bonus at 15



No signaling vs. Signaling; $50-bonus vs. $100-bonus at 15



Model Setup

$$U(\theta, a) = \theta a - a^2/2 + \mu r(a) + b\,\mathbb{1}\{\mathrm{a} \geq \bar{\mathrm{a}}\}$$

- Intrinsic motivation $\theta \geq 0$
  - Unobserved, continuous, one-dimensional, heterogeneous
- Action a
  - Observed, continuous, one-dimensional
- Reputation incentive $\mu r(a)$
  - Homogeneous $\mu \geq 0$
- Bonus incentive $b \geq 0$ for reaching threshold $\bar{a}$
- D1-Equilibrium (a^*, r^*, β^*)
  - For all types $a^*(\theta) = \arg\max_{a \geq 0} U(\theta, a)$
  - On equilibrium a: Rational expectations $r^*(a) = \mathbb{E}_{\beta^*}[\theta|a]$
  - Off equilibrium a: D1 criterion $\rightarrow \beta^*(a)$ puts no weight on types who have a strictly lower incentive to deviate to a than other types

Theoretical Results

1. No bunching There does not exist a D1-equilibrium with any bunching.

Corollary: Anti-Bunching (compliers) Compliers do not stop at the bonus threshold, but go the extra mile.

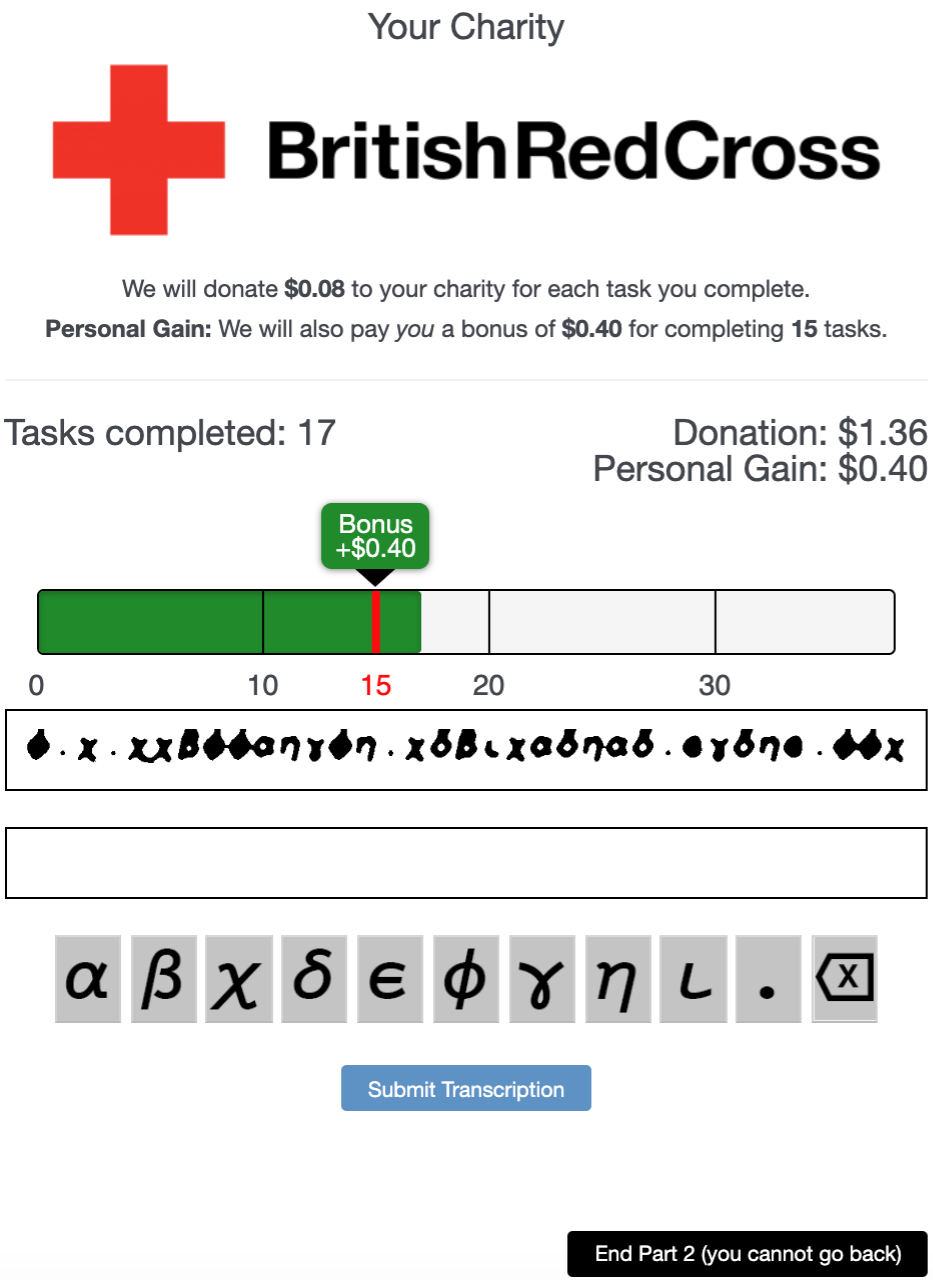
2. Existence & uniqueness There exists a unique fully separating D1-equilibrium.

3. Anti-Bunching (inframarginals) An increase in the bonus size b increases the equilibrium action for all types above $\overline{a}$.

Experimental Design: Overview

- Statistical power → Online experiment (Prolific, $1 for completion)
- Prosocial action
  - Real effort task, transcribe Greek letters, takes ∼50s/task
  - Raise 8c/task for charity
  - Choose from 0 to 38 tasks, stop any time
- Randomize bonus incentive (paid to participant)
  - No bonus
  - 40c-bonus for 15 tasks
  - $1.20-bonus for 15 tasks
- Randomize visibility
  - No badge: Effort remains private
  - Badge: Effort is shown to other participants
- Additional evidence
  - Elicit beliefs about generosity
  - Gift-exchange treatment

Experimental Design: No badge



Experimental Design: Badge

Your Charity

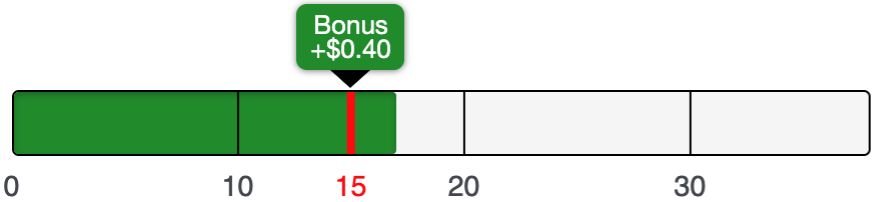
BritishRedCross

We will donate **$0.08** to your charity for each task you complete.

Personal Gain: We will also pay *you* a bonus of **$0.40** for completing **15** tasks.

Tasks completed: 17

Donation: $1.36
Personal Gain: $0.40

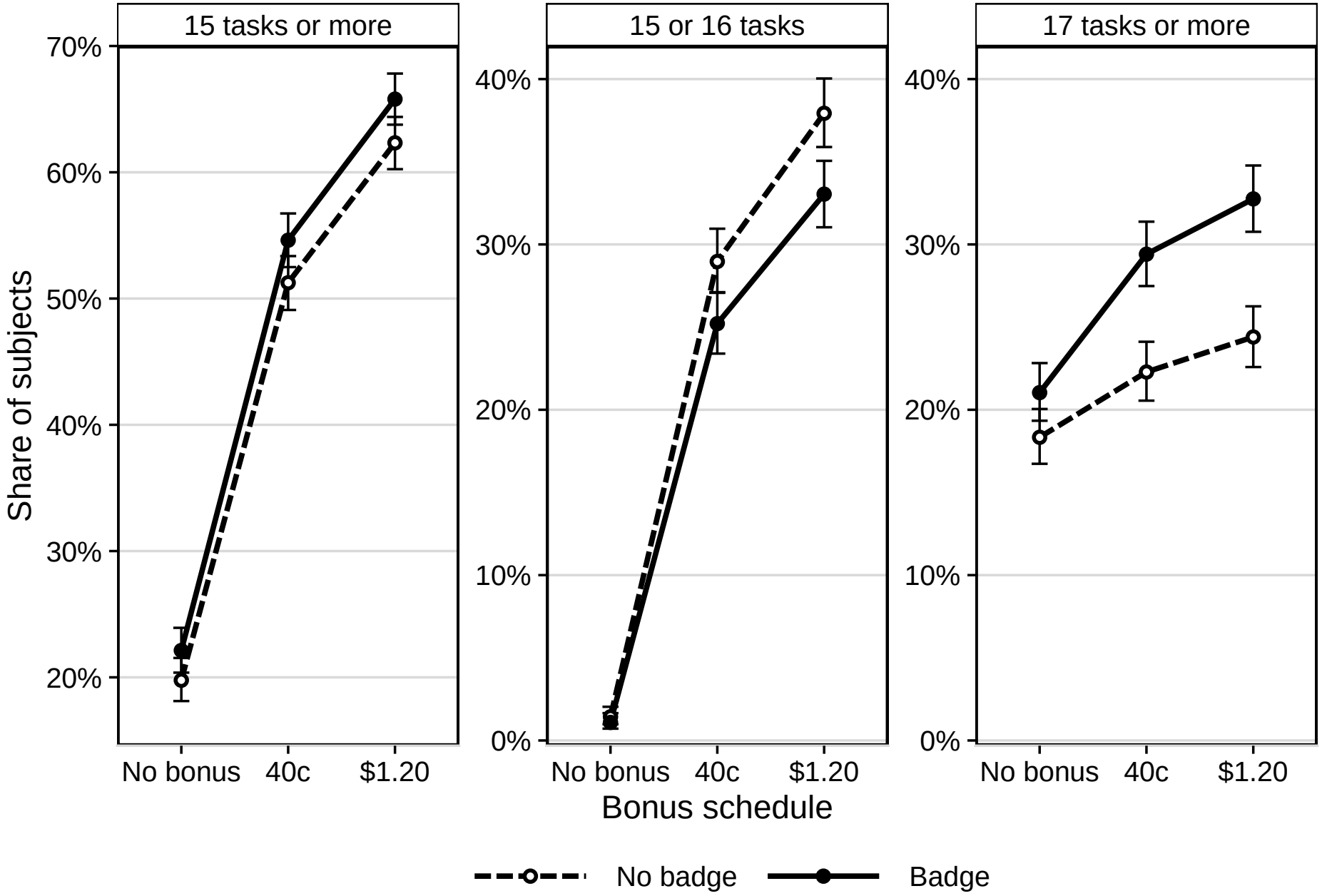


Submit Transcription

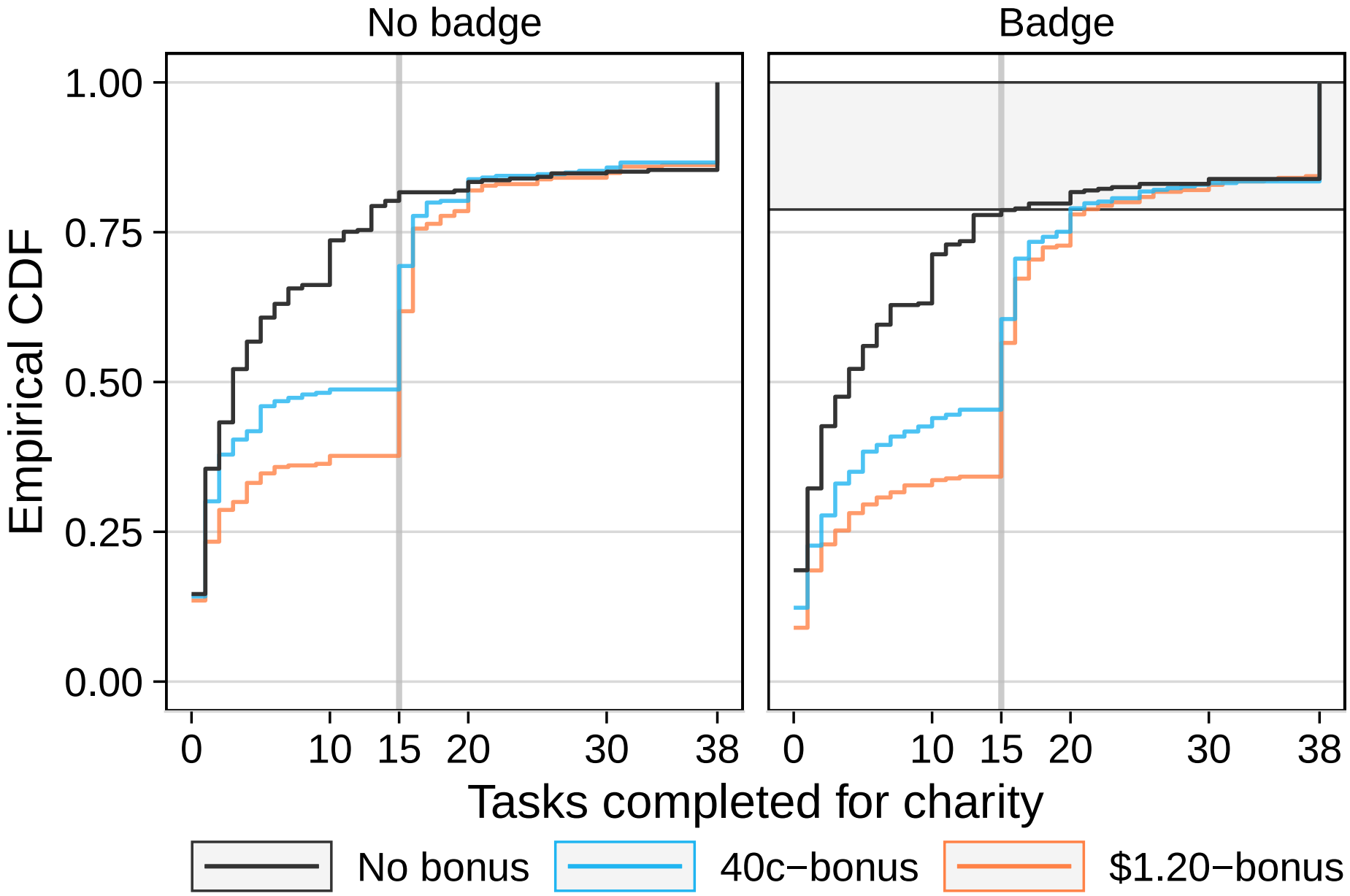
Other participants will see your badge

End Part 2 (you cannot go back)

Question 1: Do compliers go beyond $\overline{a} = 15$?



Question 2: Do inframarginals increase their effort?



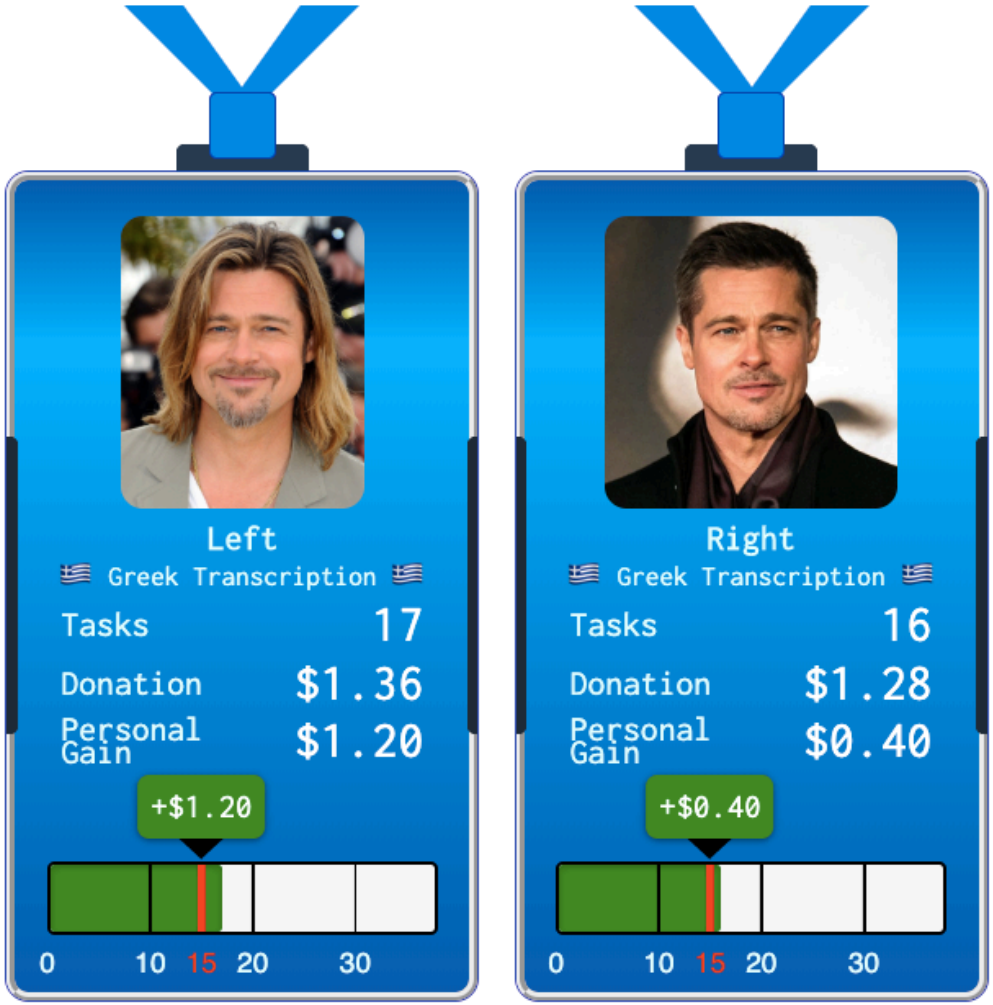
3 Questions for the Experimental Data

When introducing/increasing a bonus incentive . . .

1. Do compliers go beyond the bonus threshold $\overline{a} = 15$? Yes, 10.0pp
   - Is it stronger with a larger bonus? Yes, +3.3pp, but insignificant
   - Is it stronger when effort is visible? Yes, +5.0pp, but insignificant
   - Is it driven by gift-exchange? No, 7.3pp $<$ 10.0pp
2. Do inframarginals increase their effort? Yes, at least over [17,19)
3. **Do beliefs about what is seen as generous shift?**

Experimental Design: Judgement

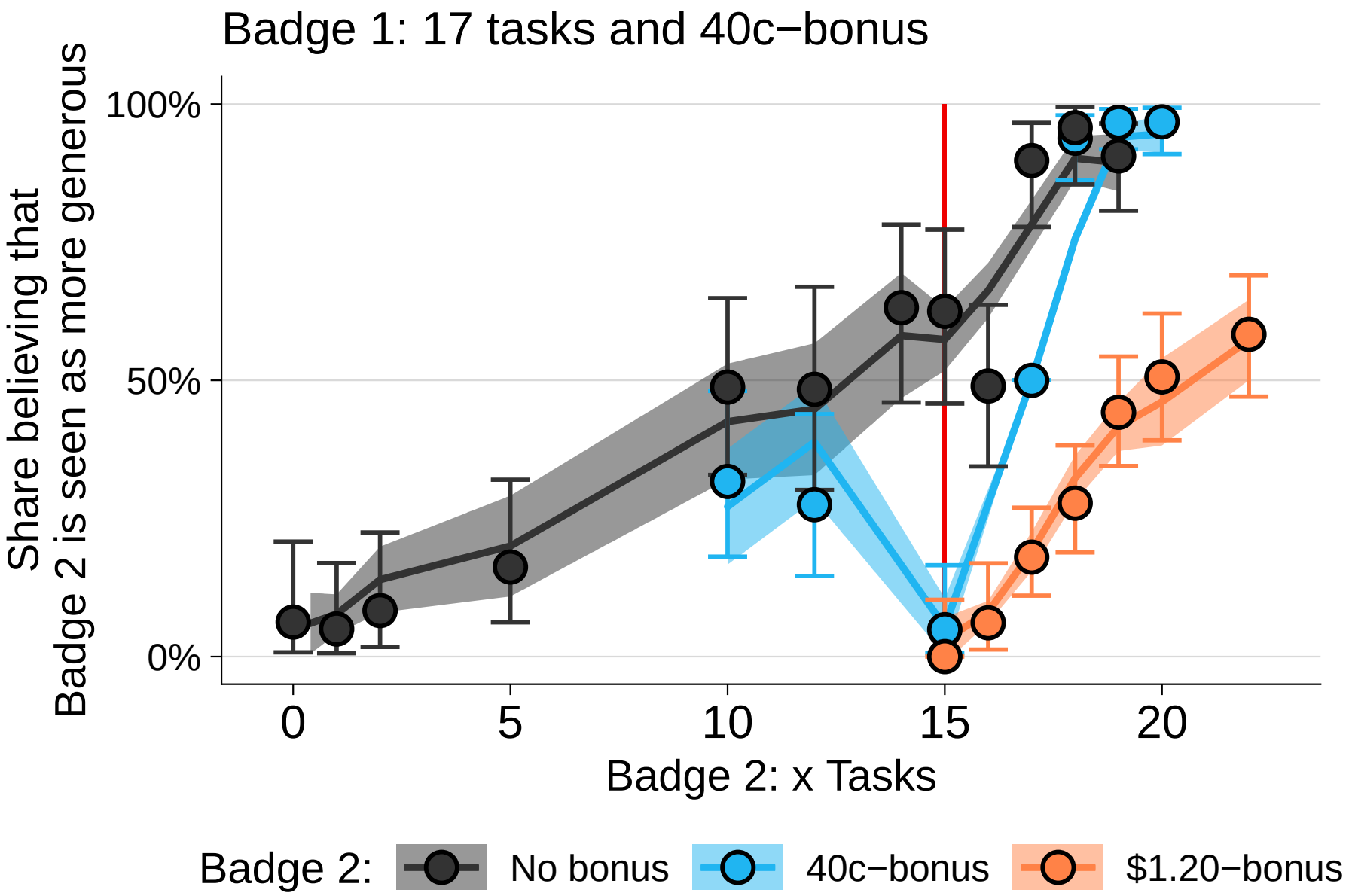
Please take around 20 seconds to compare the two badges carefully.



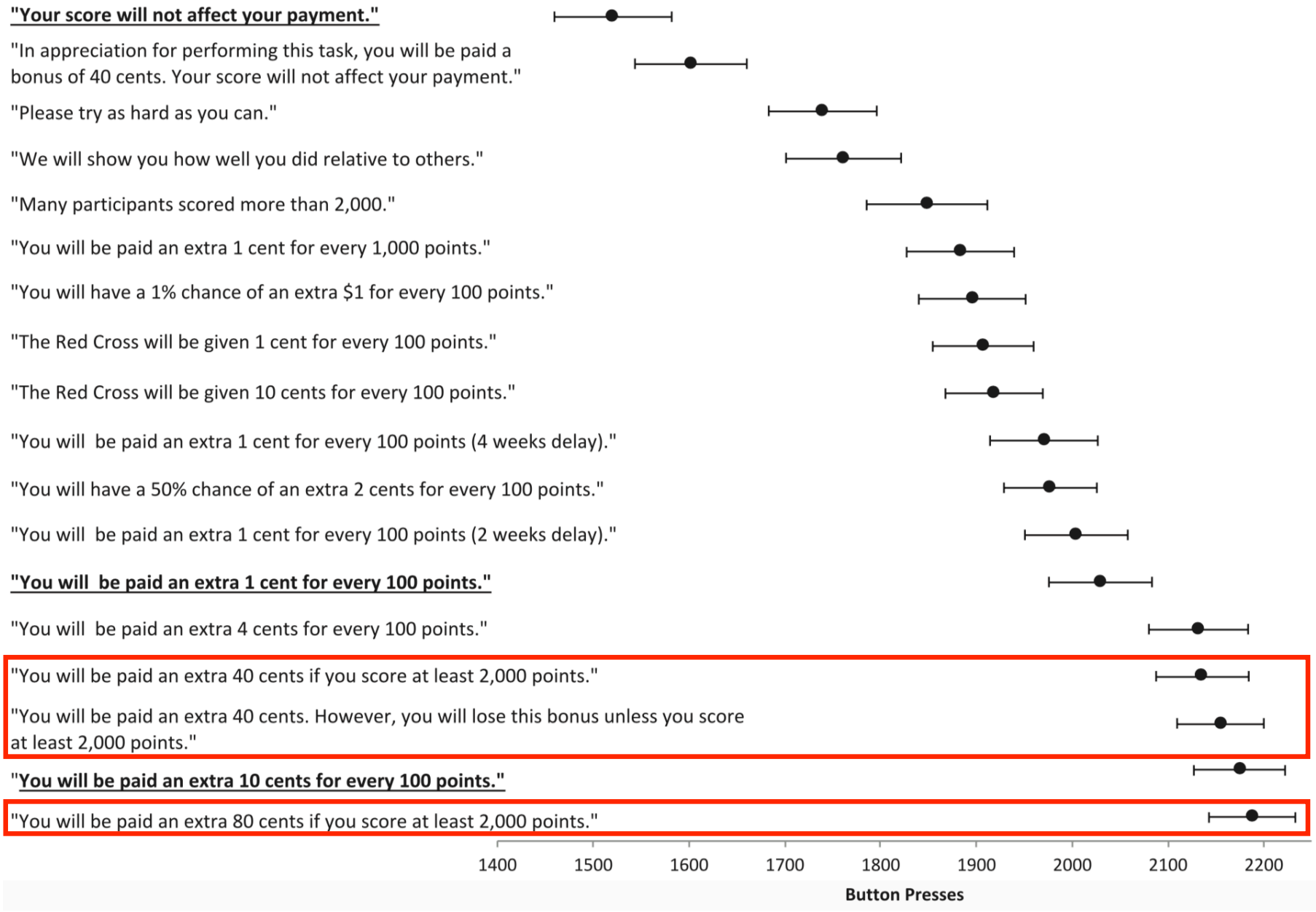
Who is more generous?

Left Right

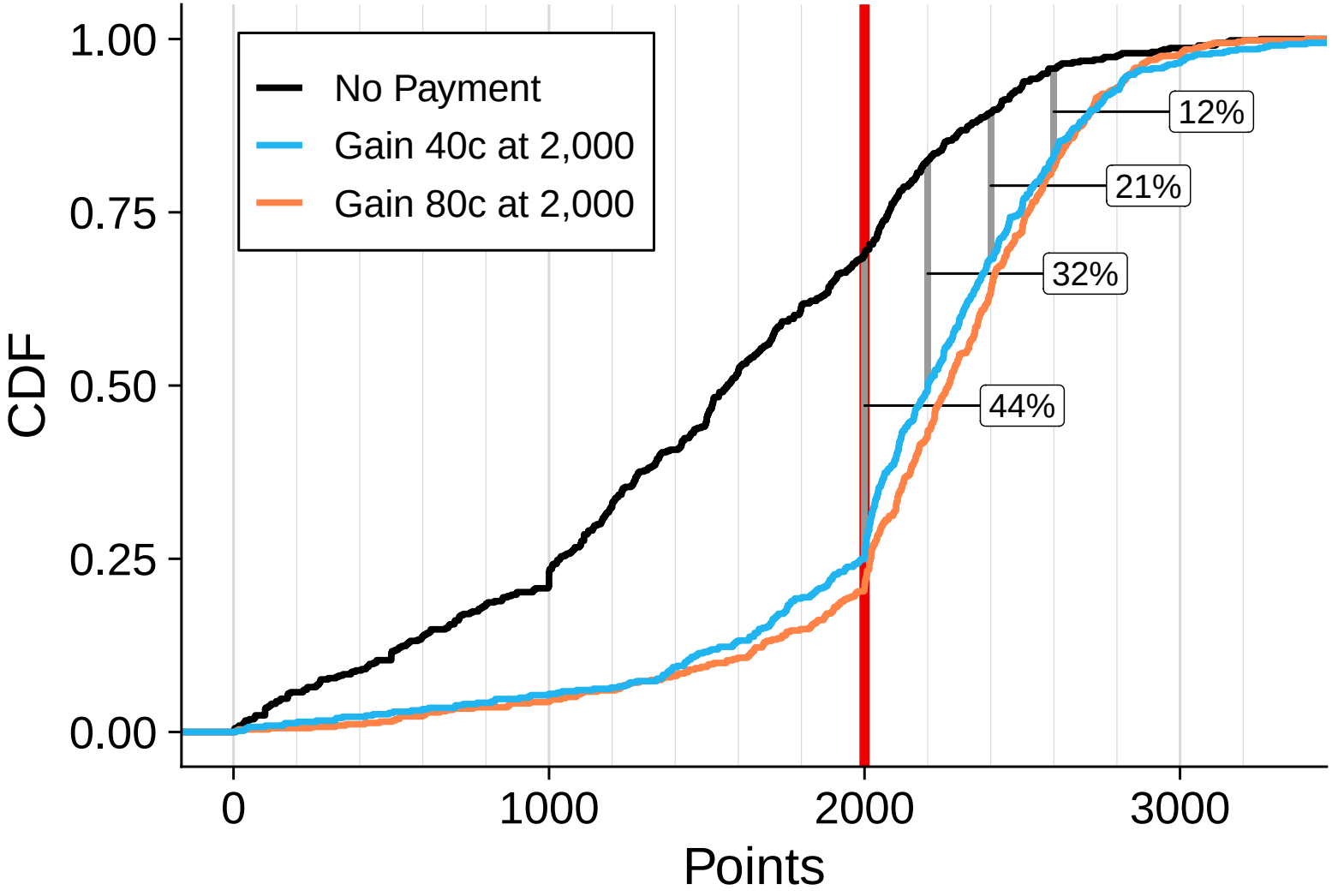
Question 3: Do beliefs about what is seen as generous shift?



Previous Studies: DellaVigna and Pope (2018)



Previous Studies: DellaVigna and Pope (2018)



Karing (2020)

- **Karing (2018)**: Introduce social signal for health choice
  - Bracelet for mothers to wear (in Sierra Leone) when child reached 3rd vaccination
  - Compare to control group that got object of similar private value, but with no signaling capacity
  - Does this motivate additional vaccination?

Empirical context

Children under the age of one should complete 5 vaccine visits,

- at birth: BCG
- at 1.5 months: DTP 1
- at 2.5 months: DTP 2
- at 3.5 months: DTP 3
- at 9 months: Measles

In Sierra Leone: Vaccinations are free at government clinics. Offered weekly (65%) or monthly (35%). 94% of communities know that children need 5 vaccinations and vaccines protect against diseases. 83% name "negligence of parents" as reason for delayed or missed vaccination.

Theoretical framework (Bénabou & Tirole 2011, 2006)

Individuals' preferences:

$$U(a_i; v_i, x, r, \lambda, \omega_r) = \underbrace{B(a_i; v_i) - C(a_i)}_{\text{Direct benefit}} + x\lambda\omega_r \begin{Bmatrix} E_{-i}(v|a_i \geq r) & \text{if } a_i \geq r \\ E_{-i}(v|a_i < r) & \text{if } a_i < r \end{Bmatrix}$$

- $a_i \in \{0, 1, 2, 3, 4, 5\}$ take child for zero, one, two... five vaccinations
- v_i intrinsic motivation to look after child's health $\equiv$ type
- $B(a_i; v_i, y)$ private benefit of immunization
- $C(a_i)$ cost of taking child for vaccination (distance to clinic)

Theoretical framework (Bénabou & Tirole 2011, 2006)

Individuals' preferences:

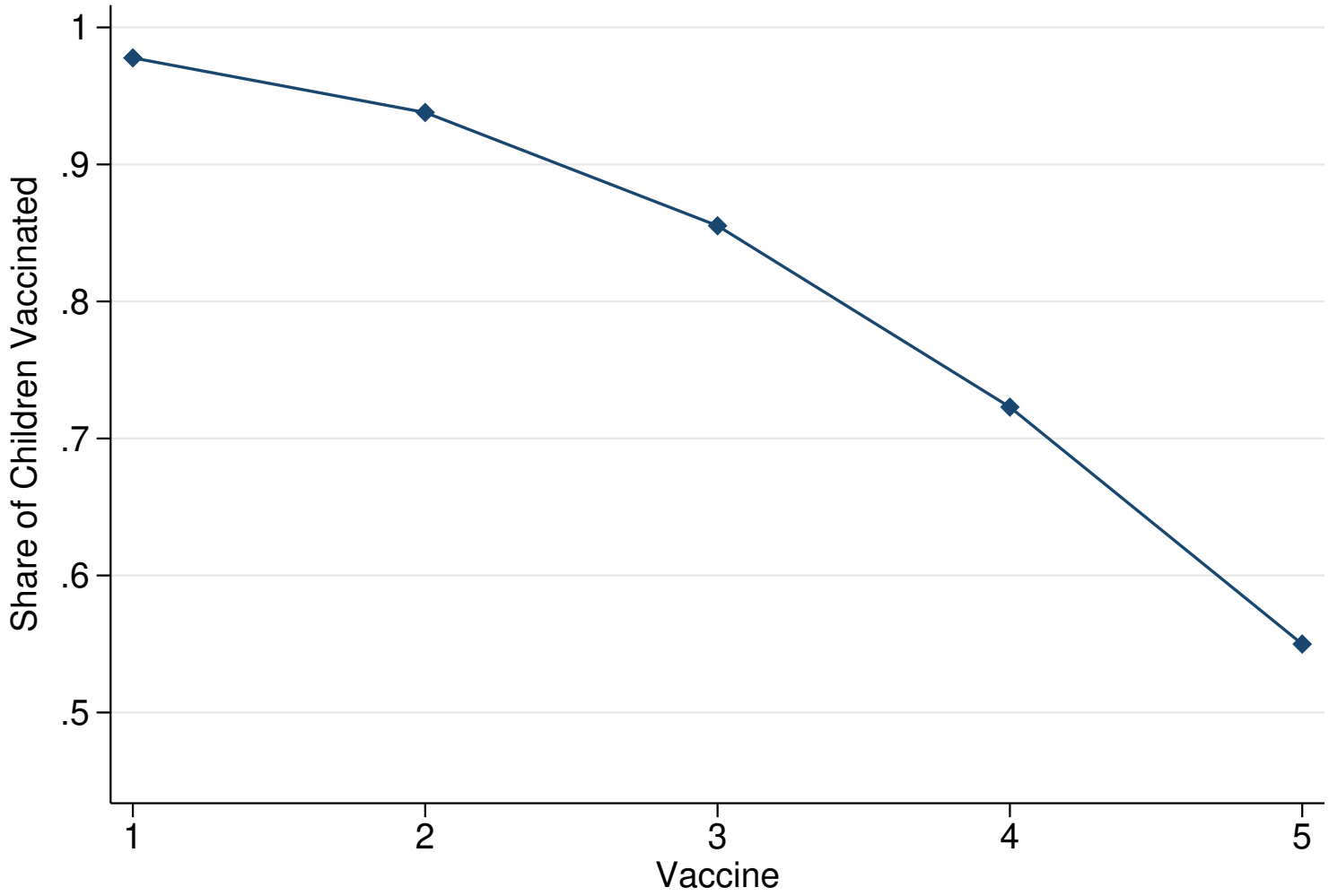
$$U(a_i; v_i, x, r, \lambda, \omega_r) = \underbrace{B(a_i; v_i) - C(a_i)}_{\text{Direct benefit}} + x\lambda\omega_r \left\{ \begin{array}{ll} E_{-i}(v|a_i \geq r) & \text{if } a_i \geq r \\ \underbrace{E_{-i}(v|a_i < r)}_{\text{Reputational return}} & \text{if } a_i < r \end{array} \right\}$$

- $E_{-i}(v|a_i ...)$ inference about v conditional on a_i
- $r \in \{4, 5\}$ threshold number of vaccines that can signal
- $x \in [0, 1]$ probability vaccine decision will be observed by others
- λ value assigned to expectations others form
- ω_r social desirability of action

Equilibrium solution a^* - without signaling

In the absence of visibility: $\max_{a \in \{0,1,\ldots 5\}} U(a_i) = B(a_i; v_i) - C(a_i)$

- a_i^* pinned down by individuals' intrinsic motivation v_i.



Assuming $U_i(a_i;v_i) = (v_i - \kappa D)a_i - \sum\alpha(a)$ with $v \sim N(1.48,0.64)$, $\alpha=-0.3$, $\kappa=-0.1$, $D=2$, $a \in \{0,1,2,3,4,5\}$

Equilibrium solution a^{s*} - with signaling $x = 1$, no uncertainty

Cut-off agent $\hat{v}_r$ is indifferent between choosing a_i^* and $a_i^{s*} = r$:

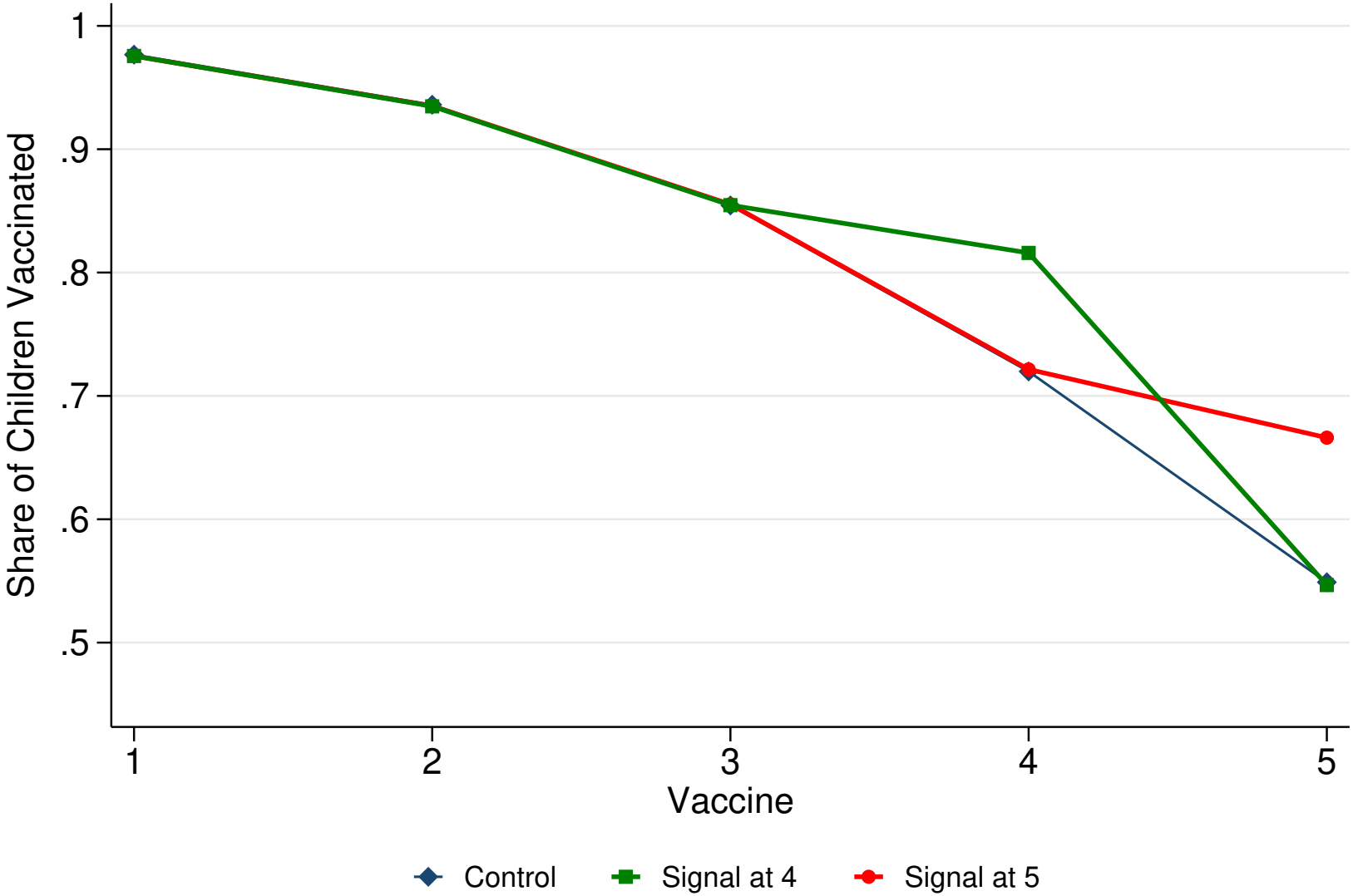
$$U(a_i^{s*}) - U(a_i^*) = \underbrace{B(a_i^{s*}; \hat{v}_r) - C(a_i^{s*}) - B(a_i^*; \hat{v}_r) + C(a_i^*)}_{\text{Difference in direct benefits}} + \underbrace{\lambda \omega_r \triangle(\hat{v}_r)}_{\text{Reputational returns}} = 0$$

where $\triangle(\hat{v}_r) = \underbrace{E(v|a_i^{s*} \geq r) - E(v|a_i^* < r)}_{\text{Difference in the average type based on \textbf{observed} actions}}$

$\Rightarrow$ New equilibrium if $S = \lambda \omega_r \triangle(\hat{v}_r) > 0$

Type distribution and cut-offs | Shift in cut-off type v_5

Equilibrium solution a^{s*} - low $\lambda\omega$, no uncertainty



v~N(1.48,0.64),α=−0.3, κ=−0.1, λω =0.2.

Dynamic choice with uncertainty

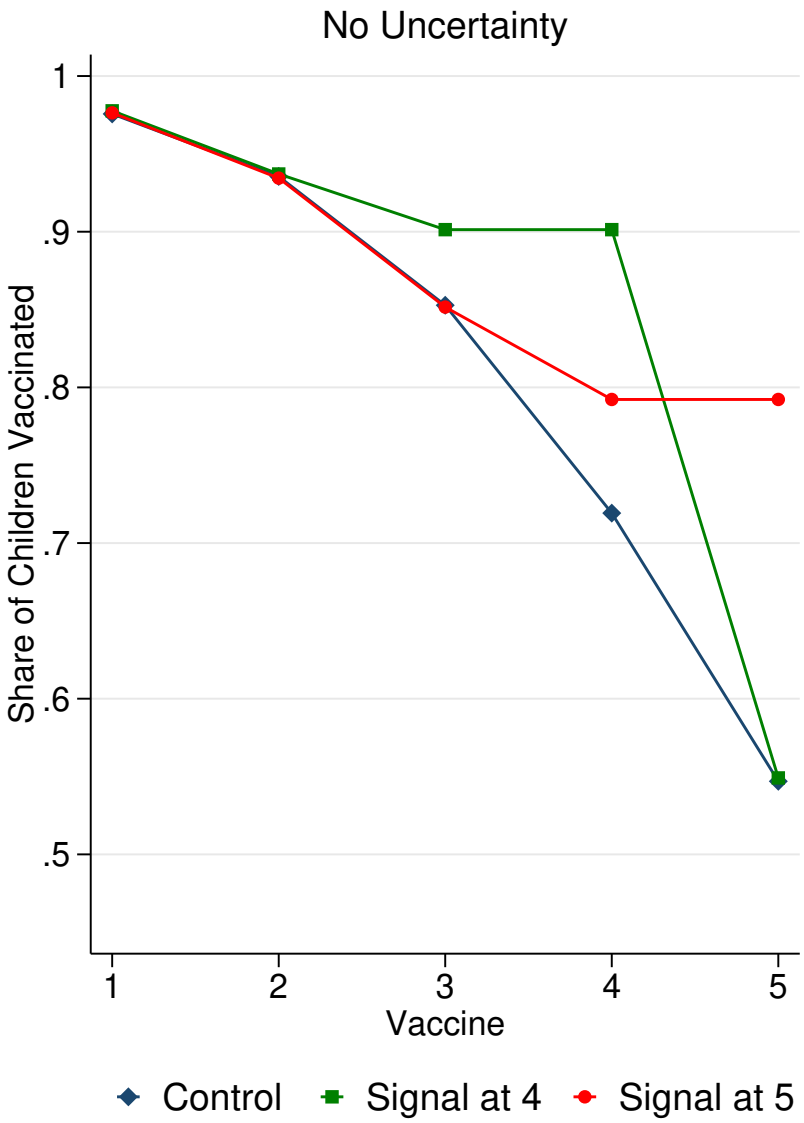
Uncertainty about shocks $\epsilon_{it} \rightarrow$ dynamic decision-making

Flow utility of a vaccine at time $t \in \{1,2,3,4,5\}$:

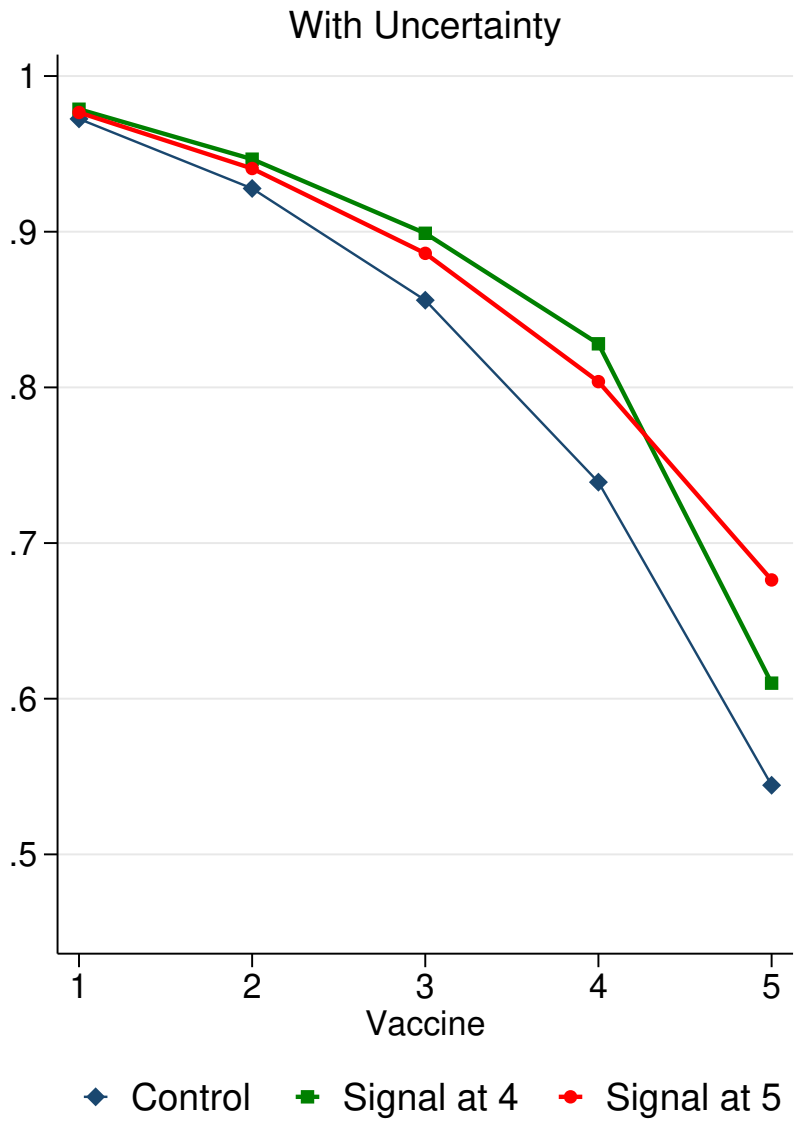
$$u_{it} = b(t; v_i) - c(t) \quad + \lambda \omega_r \triangle(\hat{v}_r) \mathbb{1}\{t = r\} \quad + \epsilon_{it}$$

- $b(t; v_i)$ and $c(t)$ marginal benefit and cost of vaccine t
- $\lambda \omega_r \triangle(\hat{v}_r)$ reputational return of vaccinating up to $t = r$
- ϵ_{it} iid shocks

Equilibrium solution a^{s*}



v~N(1.48,0.64),α=−0.3, κ=−0.1, λωΔ(v)=0.6.



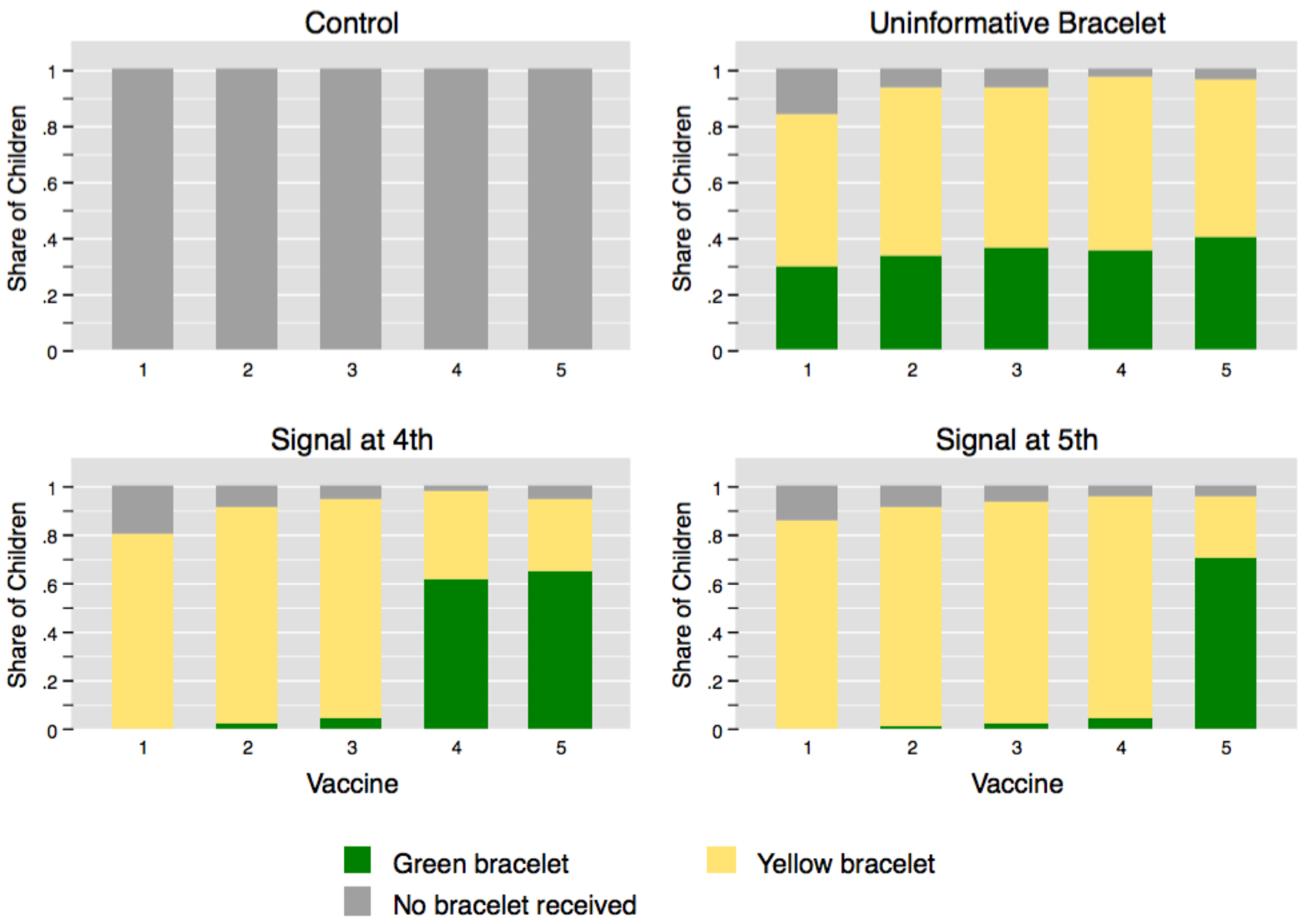
v~N(1.48,0.64),α=−0.16,κ=−0.1,λωΔ(v)=0.6.

Experimental design

	Vaccine 1	... 2	... 3	Vaccine 4	Vaccine 5
Control					
Signal at 4	1st visit			4th visit	4th visit
Signal at 5	1st visit			1st visit	5th visit
Uninformative Bracelet	1st visit 1st visit			1st visit 1st visit	1st visit 1st visit

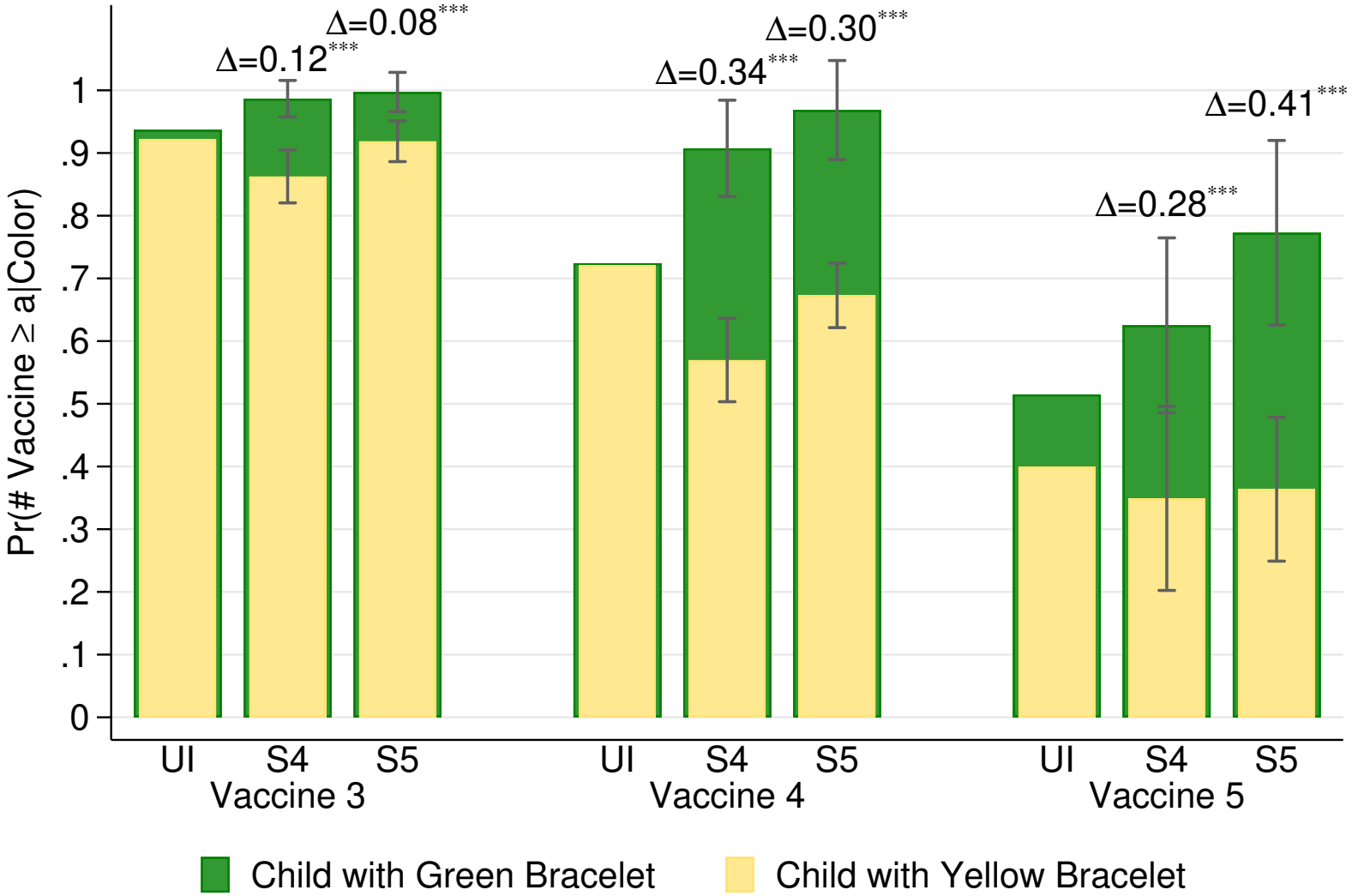
Experimental design

Correct implementation of signals



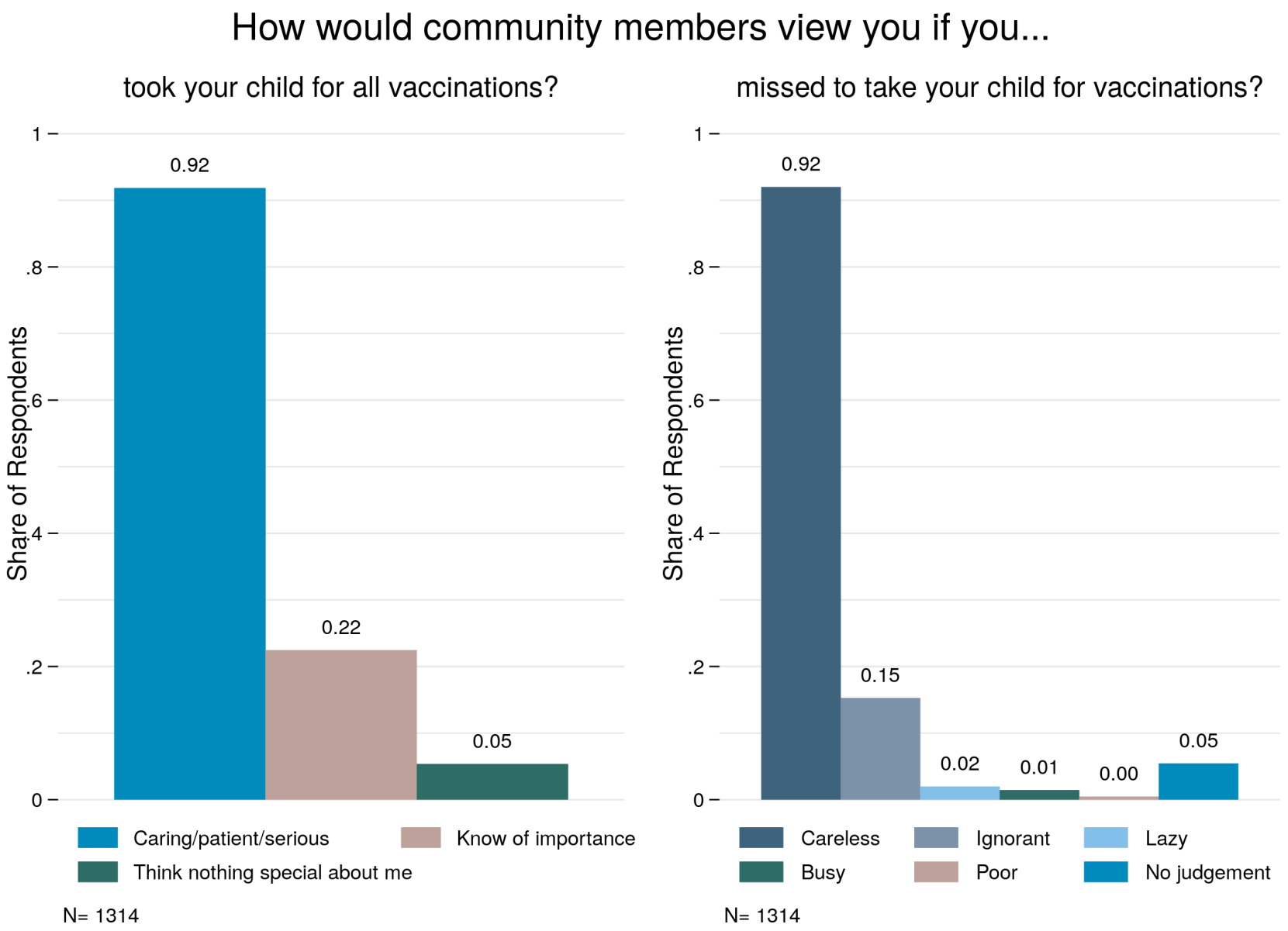
Data S4 and S5

Updating of beliefs

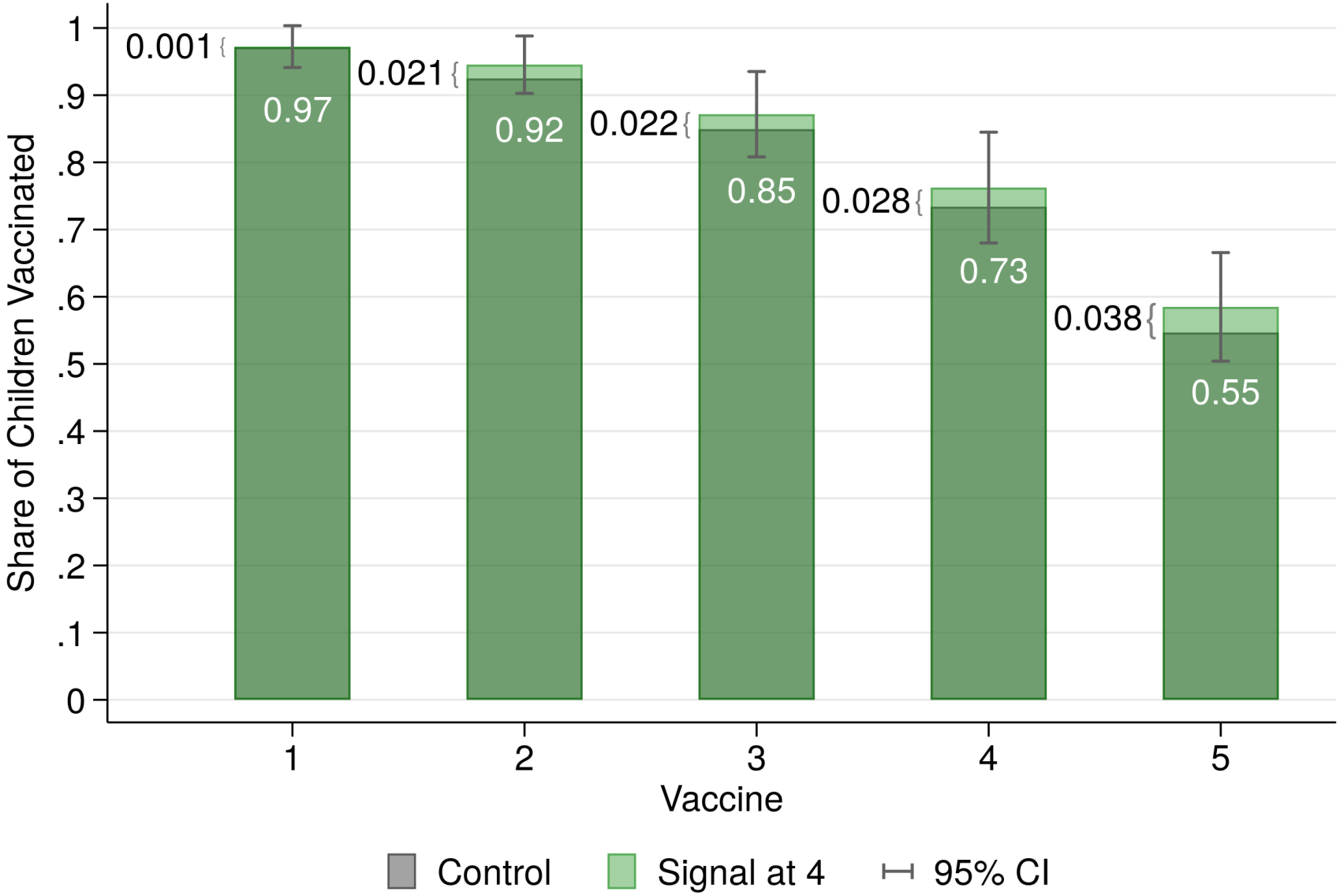


Vaccine 3 N = 3301, Vaccine 4 N = 3196, Vaccine 5 N = 1155

Social judgement

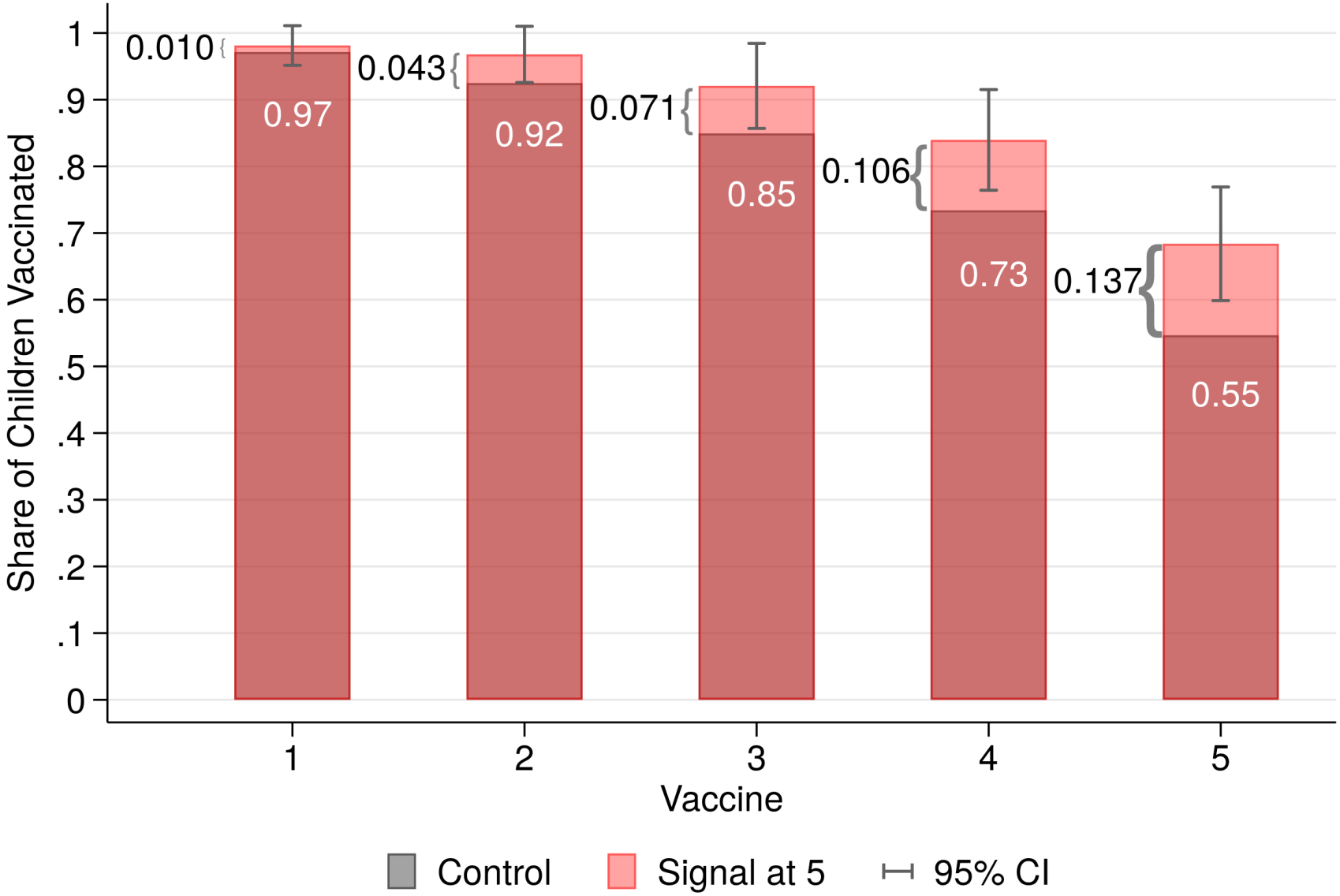


Results: signaling value + bracelet effect at 4



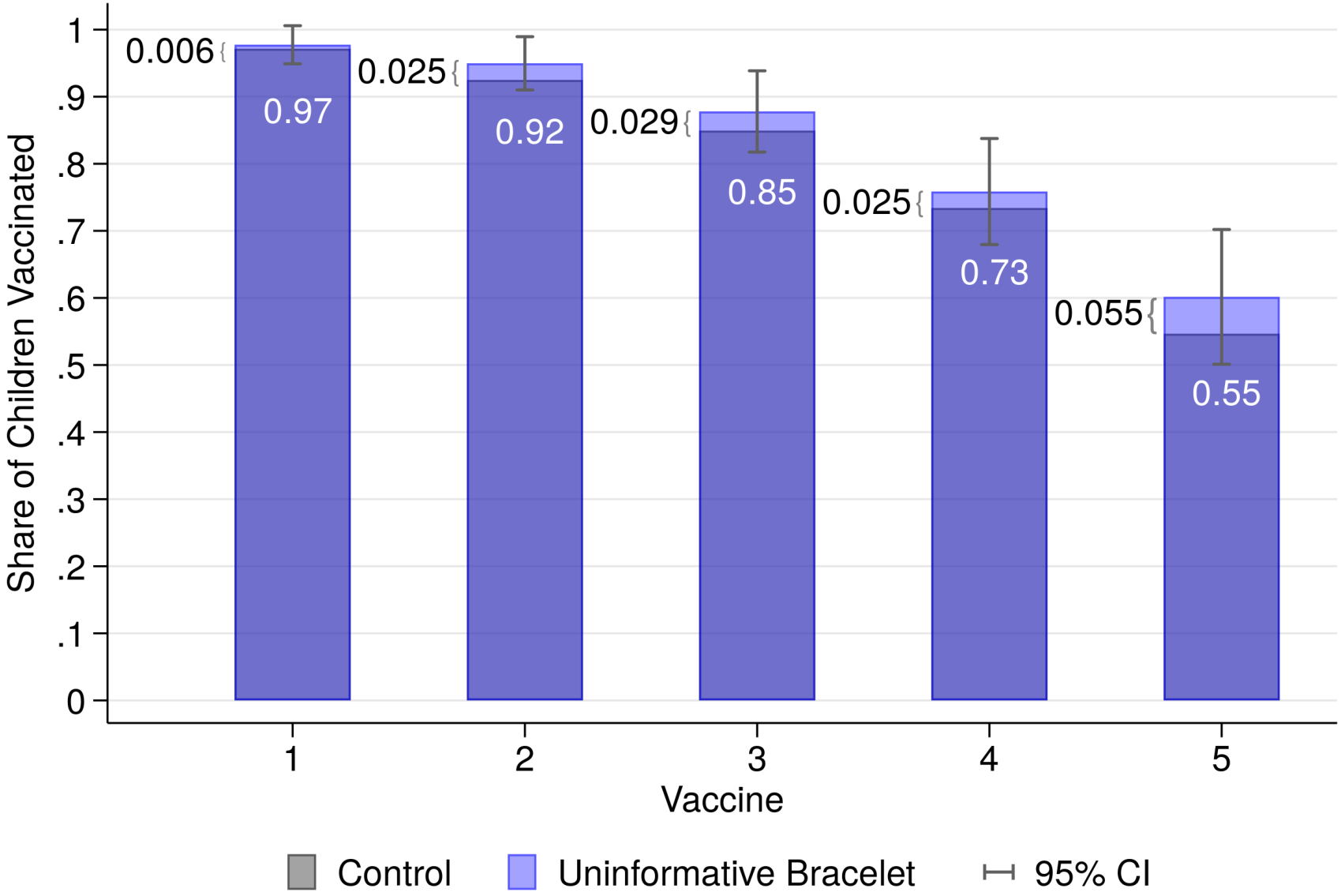
Number of Children for Vaccine 1, 2, 3, 4, 5: 3884, 3665, 3369, 3068, 1240.

Results: signaling value + bracelet effect at 5



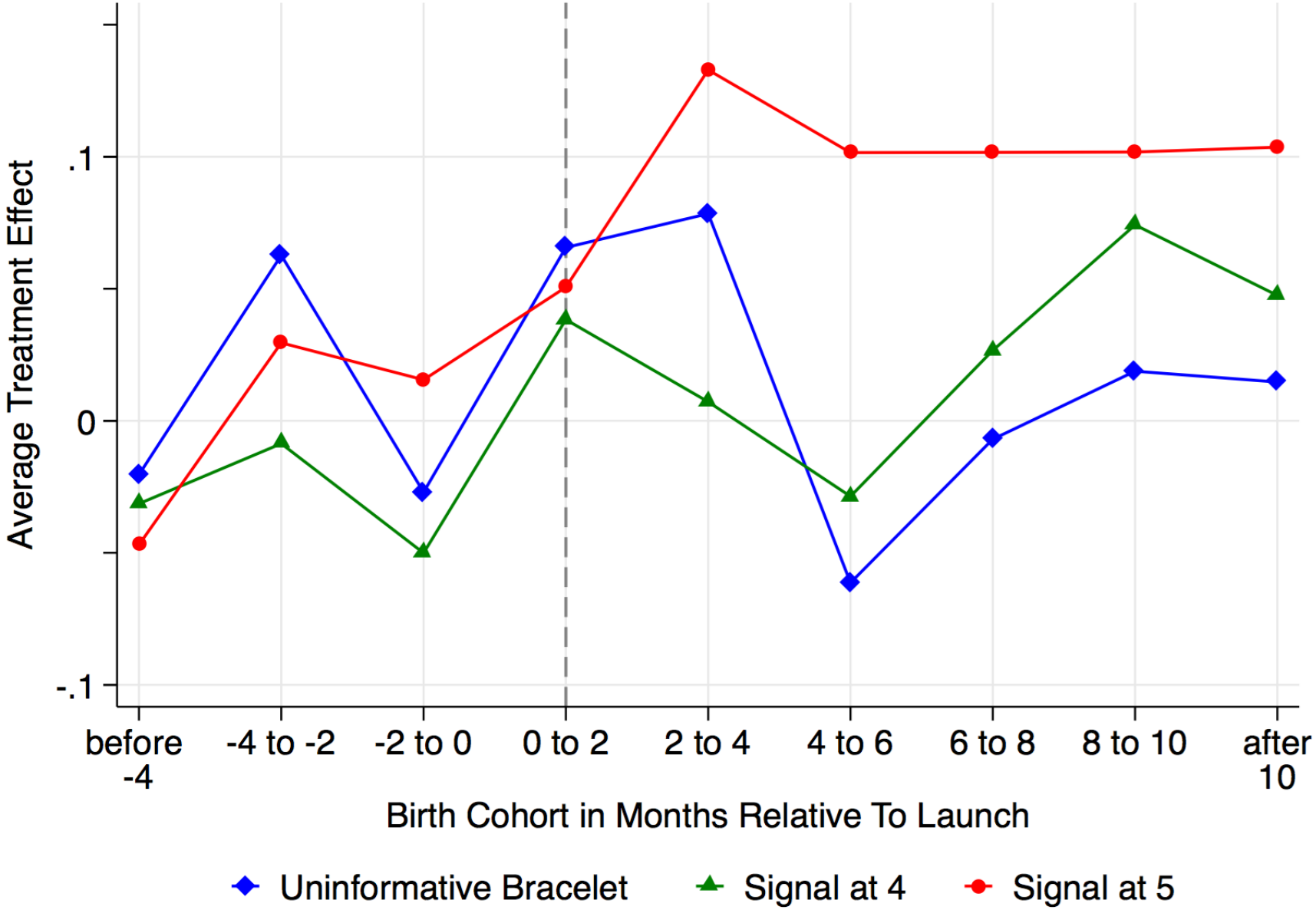
Number of Children for Vaccine 1, 2, 3, 4, 5: 3649, 3433, 3165, 2864, 1159.

Results: consumption, salience, reminder effects

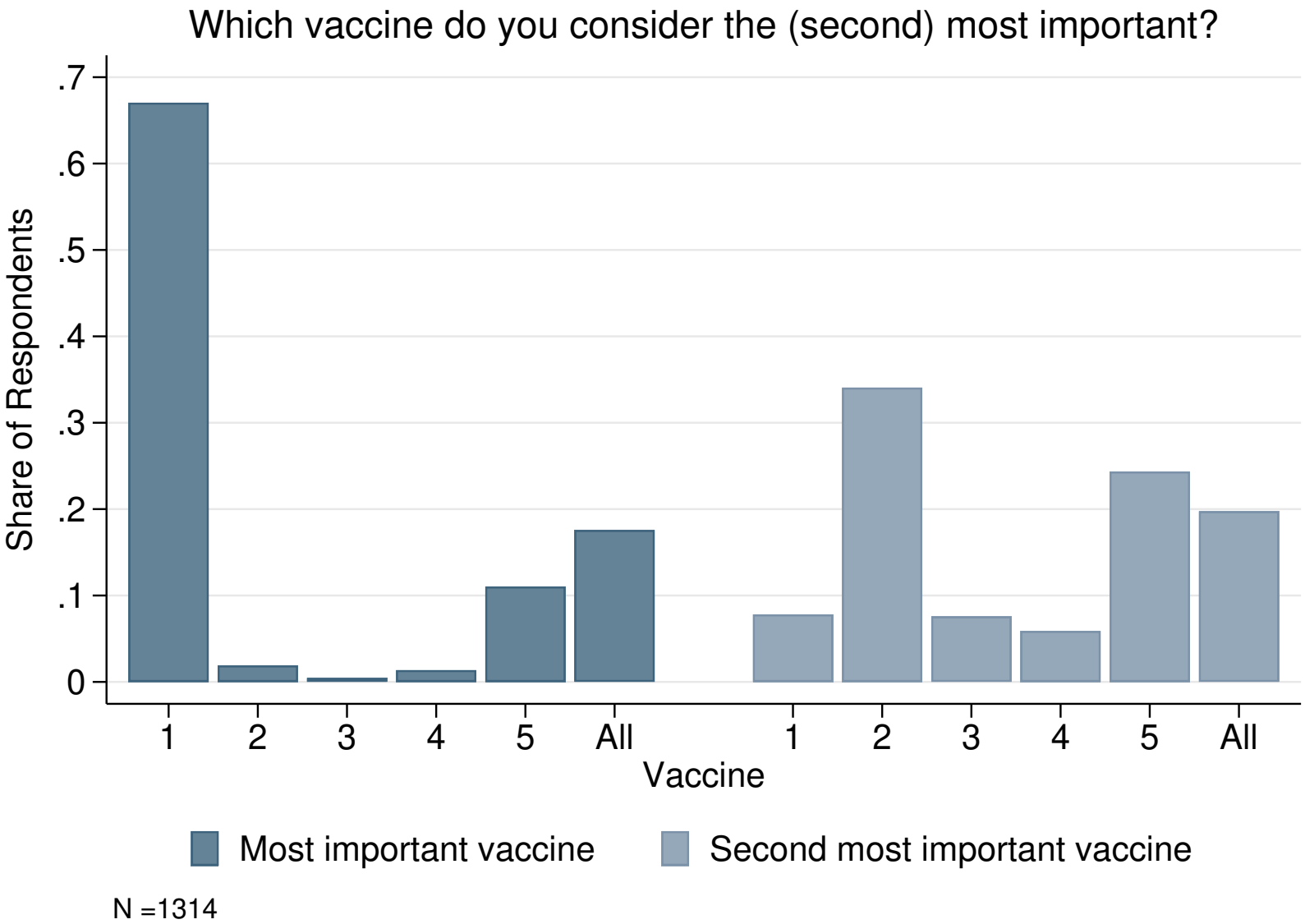


Number of Children for Vaccine 1, 2, 3, 4, 5: 3509, 3031, 3031, 2769, 1075.

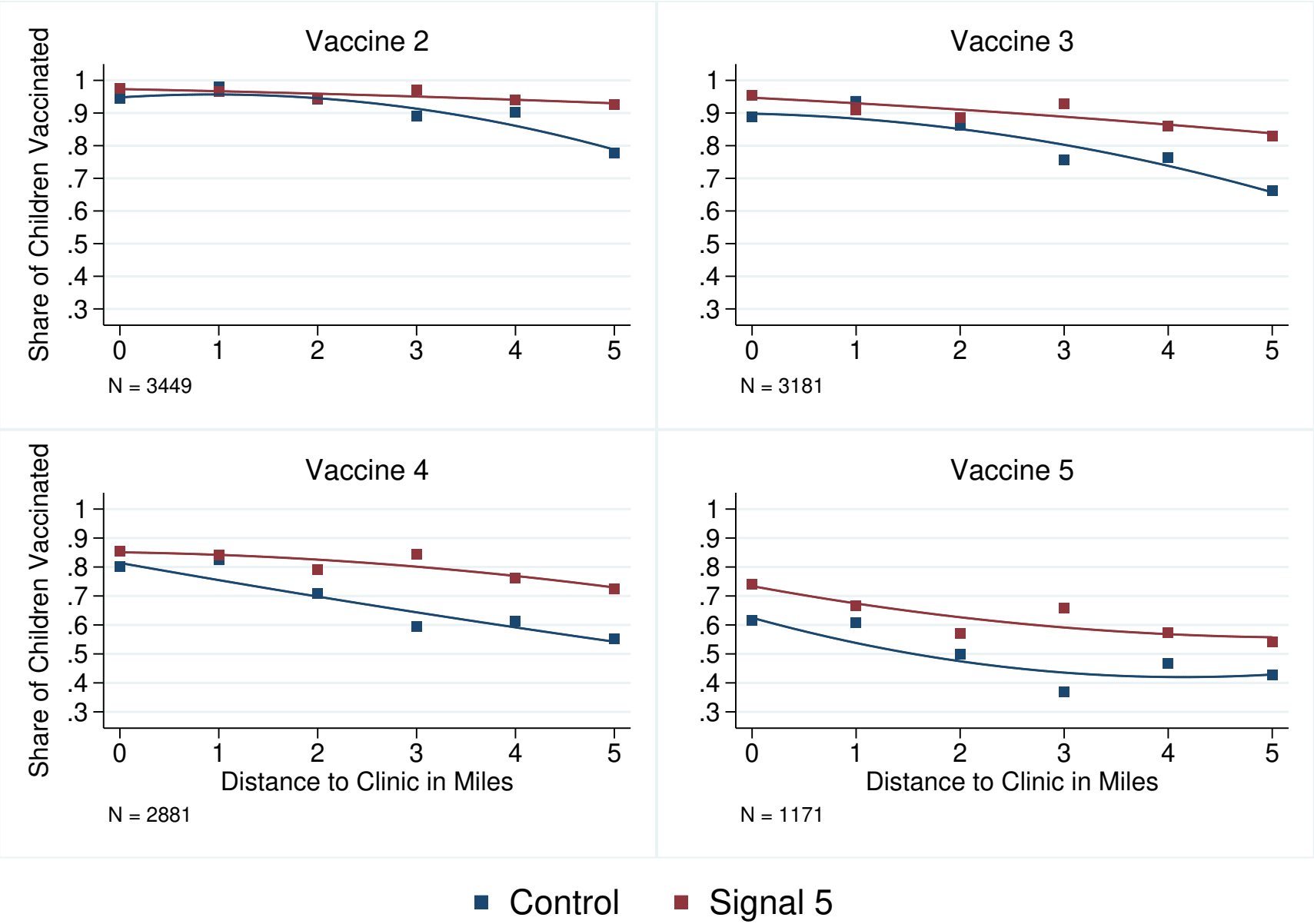
Results: treatment effects over time for vaccine 4



Results: preferences for different vaccines



Distance as cost



Dynamic choice model

Identification: Flow utility of a vaccine at time $t \in \{1,2,3,4,5\}$ is:

$$u_{it} = v_i - \kappa D_{v(i)} + S_4 T_{4j(i)} \mathbb{1}\{t=4\} + S_5 T_{5j(i)} \mathbb{1}\{t=5\} + \epsilon_{it}$$

- Unobservable heterogeneity: cost shocks (iid), type (persistent) $\Rightarrow$ identified as observe individuals make decisions across periods
- Observable heterogeneity: distance, signaling treatment $\Rightarrow$ $S_r = \lambda \omega_r \triangle(\hat{v})$

Estimation: μ_v, σ_v, κ, S_4, S_5 using maximum likelihood.

Parameter estimates

Parameter	Estimate	SE	Estimate	SE
	Compared to Control Group		Compared to Uninformative Bracelet	
S_5	0.686	0.109	0.431	0.084
S_4	-0.131	0.098	-0.305	0.096
κ	-0.066	0.008	-0.056	0.009
μ_v	0.824	0.047	1.095	0.062
σ_v	0.284	0.055	0.592	0.058
Signaling utility $\frac{S_5}{\kappa}$	**10.39 miles**		**7.7 miles**	

On average, parents' valuation is equivalent to 7-10 miles walking distance to the clinic.

Model fit

Section 7

Next Lecture

Next Lecture

- Non-Standard Beliefs
  - Overconfidence
  - Law of Small Numbers
  - Projection Bias
- Non-Standard Decision-Making
  - Limited Attention I