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

Stefano DellaVigna

March 11, 2020
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**

<table>
<thead>
<tr>
<th></th>
<th>No gift</th>
<th>Small gift</th>
<th>Large gift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of solicitation letters</td>
<td>3,262</td>
<td>3,237</td>
<td>3,347</td>
</tr>
<tr>
<td>Number of donations</td>
<td>397</td>
<td>465</td>
<td>691</td>
</tr>
<tr>
<td>Relative frequency of donations</td>
<td>0.12</td>
<td>0.14</td>
<td>0.21</td>
</tr>
</tbody>
</table>

- 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)

![Histogram of donations for each treatment](image)

- 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 $\alpha$
  - Individuals ‘forget’ their altruism $\alpha$
  - They infer $\alpha$ from their own behavior in a signaling game
  - They care about the inferred $\alpha$ with social signaling weight $\lambda_\alpha$
  - 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 prescribe 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
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.
Table 6. Response to social pressure: size of audience

<table>
<thead>
<tr>
<th>Statistic</th>
<th>[1]</th>
<th>[2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.23**</td>
<td>2.94**</td>
</tr>
<tr>
<td></td>
<td>(0.18)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>Score Difference</td>
<td>−0.93**</td>
<td>−0.96**</td>
</tr>
<tr>
<td></td>
<td>(0.20)</td>
<td>(0.21)</td>
</tr>
<tr>
<td>Year Effect</td>
<td>0.36**</td>
<td>0.33**</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Attendance</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Attendance × Score Difference</td>
<td>−0.02**</td>
<td>−0.02**</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Yellow Cards</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.07**</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Budget Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Social Pressure in the Workplace

Mas-Moretti (AER 2009). Evidence of response to social pressure in the workplace
- Workplace setting → 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

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

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: \( \Delta \theta_{-ist} \).

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

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ Co-worker permanent</td>
<td>0.176</td>
<td>0.159</td>
</tr>
<tr>
<td>Productivity</td>
<td>(0.023)</td>
<td>(0.023)</td>
</tr>
<tr>
<td>Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

$$\Delta y_{itsc} = \beta \Delta \overline{\theta}_{ist} + \gamma_{tds} + \psi \Delta X_{tcs} + e_{itsc}$$

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

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

\[ \Delta y_{iicts} = \beta_7 \Delta \bar{\theta}_{i-1}^{(6)}c + \beta_6 \Delta \bar{\theta}_{i-1}^{(5)}c + \beta_5 \Delta \bar{\theta}_{i-1}^{(4)}c + \beta_4 \Delta \bar{\theta}_{i-1}^{(3)}c + \beta_3 \Delta \bar{\theta}_{i-1}^{(2)}c + \beta_2 \Delta \bar{\theta}_{i-1}^{(1)}c + \beta_1 \Delta \bar{\theta}_{i-1}^{(0)}c + \beta_0 \Delta \bar{\theta}_{i-1}^{(-1)}c + \zeta M \]
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 generated 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 generated by the entry of a new worker should be larger for those workers who are observed by the new worker
<table>
<thead>
<tr>
<th>Model Description</th>
<th>(1)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>∆ Co-worker permanent productivity behind</td>
<td>0.233</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.019)</td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity in front</td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.018)</td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity behind &amp; closer</td>
<td>0.162</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.016)</td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity in front &amp; closer</td>
<td>0.016</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.015)</td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity behind &amp; farther</td>
<td>0.100</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.018)</td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity in front &amp; farther</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.018)</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Paper</th>
<th>Treatment question</th>
<th>Election type</th>
<th>Year</th>
<th>Place</th>
<th>Sample size</th>
<th>Control group $t_T$</th>
<th>Treatment group $t_C$</th>
<th>Exposure rate $e_T - e_C$</th>
<th>Persuasion rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Experiments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gerber and Green [2000]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door-to-door canvassing</td>
<td></td>
<td>Federal elect.</td>
<td>1998</td>
<td>New Haven</td>
<td>N = 14,473</td>
<td>0.422</td>
<td>0.463</td>
<td>0.270</td>
<td>0.263</td>
</tr>
<tr>
<td>Canvassing + mail + calls</td>
<td></td>
<td>Federal elect.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door-to-door canvassing</td>
<td></td>
<td>Local elect.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone calls by youth vote</td>
<td></td>
<td>Turnout</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone calls 18-30-year-olds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green, Gerber, and Nickerson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[2003]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door-to-door canvassing</td>
<td></td>
<td>General elect.</td>
<td>2001</td>
<td>6 cities</td>
<td>N = 18,933</td>
<td>0.286</td>
<td>0.310</td>
<td>0.293</td>
<td>0.118</td>
</tr>
<tr>
<td>General elect.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnout</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green and Gerber [2001]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone calls</td>
<td></td>
<td>General elect.</td>
<td>2000</td>
<td>4 cities</td>
<td>N = 4,377</td>
<td>0.660</td>
<td>0.711</td>
<td>0.737</td>
<td>0.205</td>
</tr>
<tr>
<td>Phone calls 18-30-year-olds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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

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
9999 ROBERT WAYNE   Aug 04  Nov 04  Aug 06
Voted    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!**

<table>
<thead>
<tr>
<th>MAPLE DR</th>
<th>Aug 04</th>
<th>Nov 04</th>
<th>Aug 06</th>
</tr>
</thead>
<tbody>
<tr>
<td>9995 JOSEPH JAMES SMITH</td>
<td>Voted</td>
<td>Voted</td>
<td>_____</td>
</tr>
<tr>
<td>9995 JENNIFER KAY SMITH</td>
<td>Voted</td>
<td>Voted</td>
<td>_____</td>
</tr>
<tr>
<td>9997 RICHARD B JACKSON</td>
<td>Voted</td>
<td>Voted</td>
<td>_____</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Experimental Group</th>
<th>Control</th>
<th>Civic Duty</th>
<th>Hawthorne</th>
<th>Self</th>
<th>Neighbors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage Voting</td>
<td>29.7%</td>
<td>31.5%</td>
<td>32.2%</td>
<td>34.5%</td>
<td>37.8%</td>
</tr>
<tr>
<td>N of Individuals</td>
<td>191,243</td>
<td>38,218</td>
<td>38,204</td>
<td>38,218</td>
<td>38,201</td>
</tr>
</tbody>
</table>

- 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)

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

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

<sup>a</sup> Election prior to treatment

<sup>b</sup> 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”
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.
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 \( v'_g(\cdot, \cdot) > 0, v''_g(\cdot, \cdot) < 0, \lim_{g \to \infty} v'_g(g, \cdot) = 0 \), and \( v(0, G_{-i}) = 0 \).

• Social Pressure \( s(g) = S(g^s - g) \cdot 1_{g < g^s} \geq 0 \)
  - 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 $a \leq \underline{a}$; (ii) $0 < g^*(a, S) < g_s$ for $\underline{a} < a < \bar{a}$; (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 $a \leq \underline{a}$ and $h^*(a, 0) > h_0$. (ii) For $S > 0$ (social pressure), $h^*(a, S) < h_0$ for $a \leq \underline{a}$; there is unique $a_0(S) \in (\underline{a}, \bar{a})$ 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 $F(a) < 1$)
  – *Social Pressure and Limited Altruism* ($S$-$NoA$, $S > 0$ and $F(a) = 1$)

• **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
  - Flyer
    - La Rabida
  - Flyer & Opt-Out
    - La Rabida
- Fundraise
  - No Flyer
    - ECU
  - Flyer
    - ECU
  - 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

- 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
- Opting out
Figure 4b. Frequency of (Unconditional) Giving

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

Legend:
- Center for Natural Hazards Mitigation Research at East Carolina University
- La Rabida Children's Hospital
Table 2. Results for Fund-Raising Treatments

<table>
<thead>
<tr>
<th>Specification:</th>
<th>OLS Regressions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dep. Var.:</td>
<td>Indicator for Answering the Door</td>
<td>Indicator for Giving</td>
</tr>
<tr>
<td>Flyer Treatment</td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Flyer with opt out Treatment</td>
<td>-0.0388***</td>
<td>-0.0009*</td>
</tr>
<tr>
<td>Flyer Treatment * ECU Charity</td>
<td>-0.0365</td>
<td>0.0006</td>
</tr>
<tr>
<td>Flyer with opt out * ECU Charity</td>
<td>-0.089</td>
<td>-0.0183</td>
</tr>
<tr>
<td>Flyer Treatment * La Rabida Charity</td>
<td>-0.0396</td>
<td>-0.0019</td>
</tr>
<tr>
<td>Flyer with opt out * La Rabida Charity</td>
<td>-0.106</td>
<td>-0.0202</td>
</tr>
<tr>
<td>Indicator ECU Charity</td>
<td>0.0041</td>
<td>-0.0263***</td>
</tr>
<tr>
<td>Omitted Treatment</td>
<td>No-Flyer</td>
<td>No-Flyer, La Rabida</td>
</tr>
<tr>
<td>Mean of Dep. Var. for Omitted Treatment</td>
<td>0.4151</td>
<td>0.413</td>
</tr>
<tr>
<td>Fixed Effects for Solicitor, Date-Location, Hour, and Area Rating</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>N</td>
<td>N = 7668</td>
<td>N = 7668</td>
</tr>
</tbody>
</table>
• **Evidence by Donation Size:**
Social pressure more likely to yield small donations
Use median donation size ($10) as cut-off point

![Figure 5a. Frequency of Giving: Small versus Large (pooled)](image-url)

- **Baseline** (N=3,166)
- **Flyer** (N=3,433)
- **Flyer with Opt Out** (N=1,070)
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
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 Treatments

- Baseline
  - 5-Minute Survey
    - $0
    - $5
  - 5-Minute Survey
    - $0
  - 5-Minute Survey
    - $5

- Flyer
  - 5-Minute Survey
    - $0
  - 10-Minute Survey
    - $0

- Opt-out
  - 5-Minute Survey
    - $0
    - $5
  - 10-Minute Survey
    - $0
    - $10
**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 $(P(OO)_j^c, c = LaR, Ec)$
  3. Probability of giving at all, and giving an amount range $(P(G)_j^c, j = F, NF, OO, c = LaR, Ec)$
  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 $\vartheta$ to reproduce the graphical findings, with quadratic loss function

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

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

• All moments $\widehat{P}$ are probabilities, straight from Figures

• What is $\vartheta$? Social pressure cost $S$, mean altruism $\mu$, 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 $\vartheta$
  – 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 \( \vartheta \):
  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. \( \eta \)—responsiveness of the probability of being at home to the utility of being at home
  4. \( \mu^c_\alpha (c = LaR, Ecu) \)—mean of the distribution \( F \) of the altruism \( \alpha \)
  5. \( \sigma^c_\alpha (c = LaR, Ecu) \)—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. \( \mu^S \)—mean of the distribution \( F^S \) from which the utility of the survey is drawn
  9. \( \sigma^S \)—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 $\mu^S$ and $\sigma^S$ ← Share completing survey
  – Value of time $v^S$ ← Comparison of effect of $10$ payment and 5 minute duration
  – Elasticity of home presence $\eta$ ← Share opening door in survey for different payments + Giving in charity
  – Altruism parameters $\mu^c$, $\sigma^c$, $G$ ← Given $\eta$, share giving different amounts
  – Social pressure parameters $S^i$ and $SS^S$ ← Share opening door and giving


### Appendix Table 1. Empirical Moments and Estimated Moments

<p>| Specification: Charity | Minimum-Distance Estimates | | |
| | | La Rabida Charity | ECU Charity |
| | | Empirical Moments | Estimated Moments | Empirical Moments | Estimated Moments |
| | | (1) | (2) | (3) | (4) |
| Moments for Charity | | | | | | |
| 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&lt;Giving&lt;10), P(Giving=10), P(10&lt;Giving&lt;=20), P(20&lt;Giving&lt;=50), P(Giving&gt;50) in Treatments NF, F, OO | X | X | X | X |
| N | N = 4962 | N = 4962 | N = 2707 | N = 2707 |</p>
<table>
<thead>
<tr>
<th>Table 4. Minimum-Distance Estimates: Benchmark Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common Parameters</strong></td>
</tr>
<tr>
<td>Prob. Answering Door (h) - Year 2008</td>
</tr>
<tr>
<td>Prob. Answering Door (h) - Year 2009</td>
</tr>
<tr>
<td>Prob. Observing Flyer (r)</td>
</tr>
<tr>
<td>Elasticity of Home Presence (eta)</td>
</tr>
<tr>
<td>Implied Cost of Altering Prob. Home by 10 pp.</td>
</tr>
<tr>
<td><strong>Survey Parameters</strong></td>
</tr>
<tr>
<td>Mean Utility (in $) of Doing 10-Minute Survey</td>
</tr>
<tr>
<td>Std. Dev. of Utility of Doing Survey</td>
</tr>
<tr>
<td>Value of Time of One-Hour Survey</td>
</tr>
<tr>
<td>Social Pressure Cost of Saying No to Survey</td>
</tr>
<tr>
<td><strong>Charity Parameters</strong></td>
</tr>
<tr>
<td>Std. Dev. of Weight on Altruism Function</td>
</tr>
<tr>
<td>Curvature of Altruism Function (G)</td>
</tr>
<tr>
<td>Social Pressure Cost of Giving 0 in Person</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Welfare in Standard (No-Flyer) Fund-Raiser</th>
<th>La Rabida Charity</th>
<th>ECU Charity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welfare per Household Contacted (in $)</td>
<td>-1.077 (0.160)</td>
<td>-0.439 (0.286)</td>
</tr>
<tr>
<td>Money Raised per Household Contacted</td>
<td>0.722 (0.036)</td>
<td>0.332 (0.046)</td>
</tr>
<tr>
<td>Money Raised per Household, Net of Salary</td>
<td>0.247 (0.036)</td>
<td>-0.143 (0.046)</td>
</tr>
</tbody>
</table>

- 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)

<table>
<thead>
<tr>
<th>Panel C. Welfare</th>
<th>La Rabida Charity</th>
<th>ECU Charity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Welfare in Standard (No-Flyer) Fund-Raiser</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welfare per Household Contacted (in $)</td>
<td>-1.077 (0.160)</td>
<td>-0.439 (0.286)</td>
</tr>
<tr>
<td>Money Raised per Household Contacted</td>
<td>0.722 (0.036)</td>
<td>0.332 (0.046)</td>
</tr>
<tr>
<td>Money Raised per Household, Net of Salary</td>
<td>0.247 (0.036)</td>
<td>-0.143 (0.046)</td>
</tr>
<tr>
<td><strong>Welfare in Fund-Raiser with Flier</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welfare per Household Contacted (in $)</td>
<td>-0.924 (0.145)</td>
<td>-0.404 (0.273)</td>
</tr>
<tr>
<td>Money Raised per Household Contacted</td>
<td>0.859 (0.044)</td>
<td>0.333 (0.046)</td>
</tr>
<tr>
<td>Money Raised per Household, Net of Salary</td>
<td>0.248 (0.044)</td>
<td>-0.278 (0.046)</td>
</tr>
<tr>
<td><strong>Welfare in Fund-Raiser with Opt-out</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welfare per Household Contacted (in $)</td>
<td>-0.586 (0.085)</td>
<td>-0.248 (0.196)</td>
</tr>
<tr>
<td>Money Raised per Household Contacted</td>
<td>0.810 (0.045)</td>
<td>0.369 (0.055)</td>
</tr>
<tr>
<td>Money Raised per Household, Net of Salary</td>
<td>0.294 (0.036)</td>
<td>-0.147 (0.046)</td>
</tr>
</tbody>
</table>
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 \( \alpha \)
  - Individuals ‘forget’ their altruism \( \alpha \)
  - They infer \( \alpha \) from their own behavior in a signaling game
  - They care about the inferred \( \alpha \) with social signaling weight \( \lambda_\alpha \)
  - 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
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 ticket purchase: 'If you purchase ticket, X RMB will go to charity': 0, 5, 10, 15 RMB
- Follow-up survey on motivation
### Sample sizes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Donation (RMB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>700</td>
</tr>
<tr>
<td>20</td>
<td>700</td>
</tr>
<tr>
<td>35</td>
<td>700</td>
</tr>
<tr>
<td>50</td>
<td>700</td>
</tr>
<tr>
<td>60</td>
<td>700</td>
</tr>
<tr>
<td>75</td>
<td>700</td>
</tr>
<tr>
<td>discount (RMB)</td>
<td></td>
</tr>
</tbody>
</table>
Results: Low Donation

- For low donation, monotonic effect of discount

![Graph showing true demand for different donation levels.](image)
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, \( \alpha \ (<0) \) is price elasticity
- \( a \) is donation, \( \gamma \) is (reduced-form) altruism
- So far, standard model with altruism
Striking result: Interpretation?

Part 2a: Ego utility on altruism:

\[ \lambda_\gamma E(\gamma|a, p, y) \]

- Individual derives utility from thinking of being altruistic (high \( a \))
- Weight on ego utility is \( \lambda_\gamma \): for \( \lambda_\gamma = 0 \), back to pure altruism case
- Individual solves a signaling game to infer \( \gamma \) 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:

\[ \lambda_\alpha E (\alpha | a, p, y) \]

- 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

\[
U(1) = V + \alpha p + \gamma a + \lambda_\alpha E(\alpha|a, p, 1) + \lambda_\gamma E(\gamma|a, p, 1) \geq U(0) = \lambda_\alpha E(\alpha|a, p, 0) + \lambda_\gamma E(\gamma|a, p, 0)
\]

or

\[
V + \alpha p + \gamma a + \Delta(a, p) > 0
\]

where \( \Delta \) is net ego utility

Updating on \( \gamma \) if purchase \( y = 1 \):

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

Specify priors on parameters to derive separating equilibrium of signaling game
True Demand vs. Model

- True Demand; donation: 0 RMB
- True Demand; donation: 5 RMB
- True Demand; donation: 10 RMB
- True Demand; donation: 15 RMB

- donation: 0 RMB
- donation: 5 RMB
- donation: 10 RMB
- donation: 15 RMB
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

David Birke djbirke@berkeley.edu

Anti-Bunching
No signaling vs. Signaling; $50-bonus vs. $100-bonus at 15
Model Setup

\[ U(\theta, a) = \theta a - \frac{a^2}{2} + \mu r(a) + b 1 \{ a \geq a \} \]

- **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 \( a \)
- **D1-Equilibrium** \( (\theta^*, r^*, \beta^*) \)
  - 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 \( \beta^*(a) \) 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 $\bar{a}$.
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

Your Charity

British Red Cross

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

End Part 2 (you cannot go back)
Experimental Design: Badge

Your Charity

British Red Cross

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

End Part 2 (you cannot go back)
Question 1: Do compliers go beyond $\bar{a} = 15$?

![Graph showing the share of subjects completing tasks beyond $\bar{a} = 15$ for different bonus schedules and task completions: 15 tasks or more, 15 or 16 tasks, and 17 tasks or more.](image)

- **15 tasks or more**
  - No bonus: 0%
  - 40c: 10%
  - $1.20: 20%

- **15 or 16 tasks**
  - No bonus: 30%
  - 40c: 40%
  - $1.20: 50%

- **17 tasks or more**
  - No bonus: 50%
  - 40c: 60%
  - $1.20: 70%

---

David Birke djbirke@berkeley.edu

Anti-Bunching 13 / 20
Question 2: Do inframarginals increase their effort?

Empirical CDF of tasks completed for charity under different bonus conditions.

- No bonus
- 40c–bonus
- $1.20–bonus

No badge and Badge conditions are compared.
3 Questions for the Experimental Data

When introducing/increasing a bonus incentive . . .

1. Do compliers go beyond the bonus threshold \( \bar{a} = 15 \)? 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
- Greek Transcription: 17
- Donation: $1.36
- Personal Gain: $1.20

Right
- Greek Transcription: 16
- Donation: $1.28
- Personal Gain: $0.40
Question 3: Do beliefs about what is seen as generous shift?

Badge 1: 17 tasks and 40c–bonus

Badge 2: x T asks
Share believing that Badge 2 is seen as more generous

Badge 2: 17 tasks and 40c–bonus
David Birke djbirke@berkeley.edu
Anti-Bunching 17 / 20
"Your score will not affect your payment."

"In appreciation for performing this task, you will be paid a bonus of 40 cents. Your score will not affect your payment."

"Please try as hard as you can."

"We will show you how well you did relative to others."

"Many participants scored more than 2,000."

"You will be paid an extra 1 cent for every 1,000 points."

"You will have a 1% chance of an extra $1 for every 100 points."

"The Red Cross will be given 1 cent for every 100 points."

"The Red Cross will be given 10 cents for every 100 points."

"You will be paid an extra 1 cent for every 100 points (4 weeks delay)."

"You will have a 50% chance of an extra 2 cents for every 100 points."

"You will be paid an extra 1 cent for every 100 points (2 weeks delay)."

"You will be paid an extra 1 cent for every 100 points."

"You will be paid an extra 4 cents for every 100 points."

"You will be paid an extra 40 cents if you score at least 2,000 points."

"You will be paid an extra 40 cents. However, you will lose this bonus unless you score at least 2,000 points."

"You will be paid an extra 10 cents for every 100 points."

"You will be paid an extra 80 cents if you score at least 2,000 points."
Previous Studies: DellaVigna and Pope (2018)

CDF

Points

No Payment

Gain 40c at 2,000

Gain 80c at 2,000

David Birke djbirke@berkeley.edu

Anti-Bunching
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:

\[ U(a_i; v_i, x, r, \lambda, \omega_r) = B(a_i; v_i) - C(a_i) + x\lambda \omega_r \begin{cases} E_i(v|a_i \geq r) & \text{if } a_i \geq r \\ E_i(v|a_i < r) & \text{if } a_i < r \end{cases} \]

- \( a_i \in \{0, 1, 2, 3, 4, 5\} \) 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)
Individuals’ preferences:

\[ U(a_i; v_i, x, r, \lambda, \omega_r) = B(a_i; v_i) - C(a_i) + x\lambda\omega_r \]

\[ \begin{cases} 
  E_i(v | a_i \geq r) & \text{if } a_i \geq r \\
  E_i(v | a_i < r) & \text{if } a_i < r
\end{cases} \]

- \( E_i(v | a_i...) \) 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
- \( \lambda \) value assigned to expectations others form
- \( \omega_r \) social desirability of action
Equilibrium solution $a^*$ - without signaling

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

- $a^*_i$ pinned down by individuals’ intrinsic motivation $v_i$.
Equilibrium solution $a^{s*}$ - with signaling $x = 1$, no uncertainty

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

$$U(a^{s*}_i) - U(a^*_i) = B(a^{s*}_i; \hat{v}_r) - C(a^{s*}_i) - B(a^*_i; \hat{v}_r) + C(a^*_i) + \lambda \omega_r \Delta(\hat{v}_r) = 0$$

where $\Delta(\hat{v}_r) = E(v|a^{s*}_i \geq r) - E(v|a^*_i < r)$

⇒ New equilibrium if $S = \lambda \omega_r \Delta(\hat{v}_r) > 0$
Equilibrium solution $a^{s*}$ - low $\lambda \omega$, no uncertainty

$\nu \sim N(1.48,0.64), \alpha = -0.3, \kappa = -0.1, \lambda \omega = 0.2.$
Dynamic choice with uncertainty

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

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

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

- $b(t; v_i)$ and $c(t)$ marginal benefit and cost of vaccine $t$
- $\lambda \omega_r \Delta(\hat{v}_r)$ reputational return of vaccinating up to $t = r$
- $\epsilon_{it}$ iid shocks
Equilibrium solution $a^{s*}$

No Uncertainty

Vaccine Control Signal at 4 Signal at 5

$v \sim N(1.48, 0.64)$, $\alpha = -0.3$, $\kappa = -0.1$, $\lambda \omega \Delta(v) = 0.6$.

With Uncertainty

Vaccine Control Signal at 4 Signal at 5

$v \sim N(1.48, 0.64)$, $\alpha = -0.16$, $\kappa = -0.1$, $\lambda \omega \Delta(v) = 0.6$. 

Anne Karing, Princeton University Social Signaling November 4, 2019 16 / 45
## Experimental design

<table>
<thead>
<tr>
<th></th>
<th>Vaccine 1</th>
<th>... 2</th>
<th>... 3</th>
<th>Vaccine 4</th>
<th>Vaccine 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Signal at 4</strong></td>
<td><img src="image1" alt="1st visit" /></td>
<td><img src="image2" alt="4th visit" /></td>
<td><img src="image2" alt="4th visit" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Signal at 5</strong></td>
<td><img src="image1" alt="1st visit" /></td>
<td><img src="image2" alt="1st visit" /></td>
<td><img src="image2" alt="1st visit" /></td>
<td><img src="image3" alt="5th visit" /></td>
<td></td>
</tr>
<tr>
<td><strong>Uninformative Bracelet</strong></td>
<td><img src="image1" alt="1st visit" /></td>
<td><img src="image2" alt="1st visit" /></td>
<td><img src="image2" alt="1st visit" /></td>
<td><img src="image3" alt="1st visit" /></td>
<td><img src="image3" alt="1st visit" /></td>
</tr>
</tbody>
</table>
Experimental design
Correct implementation of signals

Data S4 and S5
Anne Karing, Princeton University
Social Signaling
November 4, 2019

Control
Share of Children
1 2 3 4 5

Uninformative Bracelet
Share of Children
1 2 3 4 5

Signal at 4th
Share of Children
1 2 3 4 5

Signal at 5th
Share of Children
1 2 3 4 5

Vaccine

- Green bracelet
- Yellow bracelet
- No bracelet received
Updating of beliefs

\[ \Delta = 0.12^{***} \]

\[ \Delta = 0.08^{***} \]

\[ \Delta = 0.34^{***} \]

\[ \Delta = 0.30^{***} \]

\[ \Delta = 0.28^{***} \]

\[ \Delta = 0.41^{***} \]

Pr(# Vaccine \geq a | Color)

**Beliefs and truth**

Anne Karing, Princeton University

Social Signaling

November 4, 2019 25 / 45
How would community members view you if you...

took your child for all vaccinations?

N= 1314

missed to take your child for vaccinations?

N= 1314
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

![Bar graph showing the share of children vaccinated for different vaccines. The graph includes error bars and shows the percentage of children vaccinated for each vaccine, with a legend indicating 'Control', 'Signal at 5', and '95% CI'.]

Number of Children for Vaccine 1, 2, 3, 4, 5: 3649, 3433, 3165, 2864, 1159.
Results: consumption, salience, reminder effects

![Bar chart showing the share of children vaccinated with different vaccines.](chart.png)

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Control</th>
<th>Uninformative Bracelet</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.97</td>
<td>0.006</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.92</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.85</td>
<td>0.029</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.73</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.55</td>
<td>0.055</td>
<td></td>
</tr>
</tbody>
</table>

Number of Children for Vaccine 1, 2, 3, 4, 5: 3509, 3031, 3031, 2769, 1075.
Results: treatment effects over time for vaccine 4

Anne Karing, Princeton University

Social Signaling

November 4, 2019
Results: preferences for different vaccines

Which vaccine do you consider the (second) most important?

Vaccine
Most important vaccine
Second most important vaccine

N = 1314

Share of Respondents
1 2 3 4 5 All 1 2 3 4 5 All

Social learning
Anne Karing, Princeton University
Social Signaling
November 4, 2019

37 / 45
Distance as cost

- **Vaccine 2**: N = 3449
- **Vaccine 3**: N = 3181
- **Vaccine 4**: N = 2881
- **Vaccine 5**: N = 1171

**Legend**:
- Blue: Control
- Red: Signal 5

Anne Karing, Princeton University
Social Signaling
November 4, 2019
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)
  - Identified as observe individuals make decisions across periods

- **Observable heterogeneity:** distance, signaling treatment
  - $S_r = \lambda \omega_r \triangle(\hat{v})$

**Estimation:** $\mu_v, \sigma_v, \kappa, S_4, S_5$ using maximum likelihood.
### Parameter estimates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate Compared to Control Group</th>
<th>SE</th>
<th>Estimate Compared to Uninformative Bracelet</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_5$</td>
<td>0.686</td>
<td>0.109</td>
<td>0.431</td>
<td>0.084</td>
</tr>
<tr>
<td>$S_4$</td>
<td>-0.131</td>
<td>0.098</td>
<td>-0.305</td>
<td>0.096</td>
</tr>
<tr>
<td>$\kappa$</td>
<td>-0.066</td>
<td>0.008</td>
<td>-0.056</td>
<td>0.009</td>
</tr>
<tr>
<td>$\mu_v$</td>
<td>0.824</td>
<td>0.047</td>
<td>1.095</td>
<td>0.062</td>
</tr>
<tr>
<td>$\sigma_v$</td>
<td>0.284</td>
<td>0.055</td>
<td>0.592</td>
<td>0.058</td>
</tr>
<tr>
<td>Signaling utility $\frac{S_5}{\kappa}$</td>
<td><strong>10.39 miles</strong></td>
<td></td>
<td><strong>7.7 miles</strong></td>
<td></td>
</tr>
</tbody>
</table>

On average, parents’ valuation is equivalent to 7-10 miles walking distance to the clinic.
Section 7
Next Lecture

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