Econ 219B
Psychology and Economics: Applications
(Lecture 7)

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March 13, 2013
Outline

1. Social Preferences: Charitable Giving

2. Social Preferences: Social Pressure

3. Non-Standard Beliefs

4. Overconfidence
1 Social Preferences: Charitable Giving

- Andreoni (2004). Excellent survey of the theory and evidence

- Stylized facts:
  - US Giving very large: 1.5 to 2.1 percent GDP!
  - Most giving by individuals (Table 1)

<table>
<thead>
<tr>
<th>Source of gifts</th>
<th>Billions of dollars</th>
<th>Percent of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>183.7</td>
<td>76.3</td>
</tr>
<tr>
<td>Foundations</td>
<td>26.9</td>
<td>11.2</td>
</tr>
<tr>
<td>Bequests</td>
<td>18.1</td>
<td>7.5</td>
</tr>
<tr>
<td>Corporations</td>
<td>12.2</td>
<td>5.1</td>
</tr>
<tr>
<td>Total for all Sources</td>
<td>240.9</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Giving USA, 2003
• Giving fairly constant over time (Figure 1)
• Giving by income, age, and education (Table 2 – no controls)
  – Giving as percent of income fairly stable
  – Increase for very rich (tax incentives matter here)

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Percent of households who give</th>
<th>Average amount given by those who give</th>
<th>Percent of household income</th>
</tr>
</thead>
<tbody>
<tr>
<td>under $10,000</td>
<td>47.3</td>
<td>324</td>
<td>4.8</td>
</tr>
<tr>
<td>10,000–19,000</td>
<td>51.1</td>
<td>439</td>
<td>2.9</td>
</tr>
<tr>
<td>20,000–29,999</td>
<td>64.9</td>
<td>594</td>
<td>2.3</td>
</tr>
<tr>
<td>30,000–39,999</td>
<td>71.8</td>
<td>755</td>
<td>2.2</td>
</tr>
<tr>
<td>40,000–49,999</td>
<td>75.3</td>
<td>573</td>
<td>1.3</td>
</tr>
<tr>
<td>50,000–59,999</td>
<td>85.5</td>
<td>1,040</td>
<td>1.9</td>
</tr>
<tr>
<td>60,000–74,999</td>
<td>78.5</td>
<td>1,360</td>
<td>2.0</td>
</tr>
<tr>
<td>75,000–99,999</td>
<td>79.7</td>
<td>1,688</td>
<td>2.0</td>
</tr>
<tr>
<td>100,000 or above</td>
<td>88.6</td>
<td>3,558</td>
<td>3.0</td>
</tr>
</tbody>
</table>
• Giving to whom? (Table 3)
  – Mostly for religion
  – Also: human services, education, health
  – Very little international donations

<table>
<thead>
<tr>
<th>Type of Charity</th>
<th>Percent of Households who give</th>
<th>Average amount given by those who give</th>
<th>Percent of total household contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts, culture and humanities</td>
<td>9.4</td>
<td>221</td>
<td>2.6</td>
</tr>
<tr>
<td>Education</td>
<td>20.3</td>
<td>335</td>
<td>9.0</td>
</tr>
<tr>
<td>Environment</td>
<td>11.5</td>
<td>110</td>
<td>1.6</td>
</tr>
<tr>
<td>Health</td>
<td>27.3</td>
<td>218</td>
<td>8.1</td>
</tr>
<tr>
<td>Human Services</td>
<td>25.1</td>
<td>285</td>
<td>9.5</td>
</tr>
<tr>
<td>International</td>
<td>3.1</td>
<td>293</td>
<td>1.1</td>
</tr>
<tr>
<td>Private and community foundations</td>
<td>6.1</td>
<td>196</td>
<td>1.4</td>
</tr>
<tr>
<td>Public or Societal benefit</td>
<td>10.3</td>
<td>127</td>
<td>1.7</td>
</tr>
<tr>
<td>Recreation</td>
<td>7.0</td>
<td>161</td>
<td>1.4</td>
</tr>
<tr>
<td>Religious</td>
<td>48.0</td>
<td>946</td>
<td>59.4</td>
</tr>
<tr>
<td>Youth Development</td>
<td>20.9</td>
<td>140</td>
<td>3.8</td>
</tr>
<tr>
<td>Other</td>
<td>2.1</td>
<td>160</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Source: Author's calculations, data from Independent Sector, Giving and Volunteering, 1995.
• Compare to giving in other countries (Figure 2)
  
  – In US non-profits depend more on Charitable contributions
• What else do we know?

• Until 1990s, very limited research on charitable giving

• Then:

  1. Evidence by Jim Andreoni and others on fund-raising, and especially on crowding out prediction (see below)

  2. Field experiments by John List and others
• Focus on Field Experiments. First paper: **List and Lucking-Reiley (2002)** focuses on seed money
  
  – Capital campaign to raise money for computer center at Univ. Central Florida
  
  – 3,000 letters assign to 6 treatments
  
  – Randomization of seed money, i.e., how much money was already raised
  
  – Randomization of whether refund promised if threshold not matched
- Huge effect of the seed money, less so of refund

- Interpretation: Presumably signalling of quality

### TABLE 1
**RESULTS OF THE FIELD EXPERIMENT**

<table>
<thead>
<tr>
<th></th>
<th>10</th>
<th>10R</th>
<th>33</th>
<th>33R</th>
<th>67</th>
<th>67R</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Experimental Design</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of solicitations mailed</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Seed money (%)</td>
<td>10%</td>
<td>10%</td>
<td>33%</td>
<td>33%</td>
<td>67%</td>
<td>67%</td>
</tr>
<tr>
<td>Seed money ($)</td>
<td>$300</td>
<td>$300</td>
<td>$1,000</td>
<td>$1,000</td>
<td>$2,000</td>
<td>$2,000</td>
</tr>
<tr>
<td>Refund offered?</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

| **B. Results** |
| Number of contributions | 17  | 20  | 33  | 31  | 42  | 40  |
| Participation rate     | 3.4%| 4.0%| 6.6%| 6.2%| 8.4%| 8.0%|
| Total contributions     | $202| $379| $805| $863| $1,485| $1,775|
| Mean amount given       | $11.88| $18.95| $24.39| $27.84| $35.36| $44.38|
| Standard error of mean amount | $2.27| $3.13| $2.50| $4.59| $2.26| $6.19|
More recent work: Landry et al. (QJE, 2006)

- Door-to-door fund-raising as opposed to mailer
- Test different form of solicitation
  * Seed Money or not
  * Lottery or not
- Examines also features of solicitor

Main finding: Female attractiveness matters, male attractiveness does not
What does this teach us about charitable giving in general? That more affects giving than just pure altruism.
• Charitable giving important phenomenon – How do we understand it?

• Model 1. Social preferences: Giving because caring for welfare of others

• Problem (i): Amounts given off relative to lab experiments

• Problem (ii): Model predicts crowding out of giving:
  – If government spends on income of needy group, corresponding one-on-one decrease in giving
  – Evidence of crowding out: Limited crowd-out

• Problem (iii): Model predicts giving to one highest-value charity—Instead we observe dispersion across charities

• Problem (iv): In-person or phone requests for giving raise much more than impersonal requests (mail)
• **Model 2. Andreoni (1994):** Warm-Glow or Impure altruism.
  - Agent gets utility $v(g)$ directly from giving
  - Utility $v(g)$ sharply concave

• Can explain (i), (ii), and (iii) – See Problem Set 3

• Does not directly explain (iv) – Can assume though that warm-glow is triggered more by in-person giving
• **Model 3.** Giving is due to social pressure
  – Pay a disutility cost $S$ if do not give when asked
  – No disutility cost if can avoid to meet the solicitor

• Can explain (i), (ii), and (iii): Give small amounts to charities, mostly because asked

• Can also explain (iv): Give more in higher social pressure environments

• Key prediction differentiating Models 2 and 3:
  – Model 2: Agent seeks giving occasions to get warm glow
  – Model 3: Agents avoids giving occasions to avoid social pressure

• DellaVigna, List, and Malmendier (QJE 2012)
This Paper

• Model of giving with altruism and social pressure
  – 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

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.
This Paper

• Model of giving with altruism and social pressure
  – 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”
  – Survey Treatments: Administer surveys with varying payment and duration and with or without flyers to structurally estimate parameters.
Survey Flyers

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.
• 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 \( g^* \geq 0 \)
      · If saw flyer (w/ prob. \( r \)), donation via mail \( g_m^* \geq 0 \)
• Utility function of giver:
\[ U(g) = u(W - g - gm) + av(g + \theta gm, G_{-i}) - s(g) \]

• Agent cares about:
  - Private consumption \( u(W - g - gm) \), 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 \( v(0, G_{-i}) = 0 \).

• Two special cases for \( v(g, G_{-i}) \):
  - Pure altruism (Charness and Rabin 2002, Fehr and Gächter, 2000):
    \( v(g, G_{-i}) = v(g + \theta gm + G_{-i}) \), \( a \) is altruism parameter
  - Warm glow (Andreoni, 1989 and 1990):
    \( v(g, G_{-i}) = v(g) \), \( a \) is weight on warm glow

• Giving via mail is less attractive (\( \theta < 1 \)): less warm glow, cost of giving,…
• 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)

• Psychology evidence:
  
  – Tendency to conformity and obedience (Milgram, 1952 and Asch, 1957)
  
  – Effect stronger for face-to-face interaction
Figure. Social Pressure Cost At Estimated Parameters

The graph shows the relationship between Social Pressure Cost ($s(g)$) and Giving ($g$). The lines represent different scenarios:

- **La Rabida** (solid blue line)
- **ECU** (dashed green line)

As Giving increases, the Social Pressure Cost decreases linearly for both scenarios.
• Second-stage Maximization (Giving)

• 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 $a \leq a \leq \bar{a}$; (iv) $g^*(a, S) > g^s$ for $a > \bar{a}$.

• No giving via mail when at home

• Lemma 1b (Conditional Giving Via Mail). There is a unique optimal donation via mail $g^*_m(a)$ (conditional on not being at home), which is weakly increasing in $a$ and takes the form: (i) $g^*_m(a) = 0$ for $a < a_m$; (ii) $g^*_m(a) > 0$ for $a \geq a_m$; (iii) for all levels of $a$, $g^*_m(a) \leq g^*(a; S)$. 

• **First-Stage Maximization (Presence at Home)**

• Probability of being at home $h$:
  – **Control (NF) Treatment** $(r = 0)$: Exogenous, $h = h_0$
  – **Flyer (F) Treatment** $(r > 0)$: Choose $h \in [0, 1]$ at cost $c(h)$

• **Lemma 2 (Presence at Home).** There is a unique optimal probability of being at home $h^*(a, S)$
  – For $S = 0$ (no social pressure), $h^*(a, 0) = h_0$ for $a \leq \underline{a}$ and $h^*(a, 0) > h_0$.
  – 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 $h^*(a_0(S)) = h_0$.

• **Giving due to altruism** $\rightarrow h > h_0$ (Seek being at home)

• **Giving due to social pressure** $\rightarrow h < h_0$ (Avoid being at home)
• **Opt-Out (O) Treatment**
  
  – Flyer + Consumers can tell the charity not to disturb
  
  – Cost of probability of home:
    \[
    C(h) = \begin{cases} 
    0 & \text{if } h = 0 \\
    c(h) & \text{if } h > 0 
    \end{cases}
    \]
  
  – Still costly to remain at home, but no cost to keep charity out
  
  – (Notice: Never want to set $0 < h < h_0$)

• **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, $a < a_0(S)$. 
• 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
- Fundraise Flyer
  - La Rabida
- Fundraise Flyer & Opt-Out
  - La Rabida
- Fundraise No Flyer
  - ECU
- Fundraise Flyer
  - ECU
- 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
Estimation Strategy

• Estimate treatment effects conditioning on solicitor, town, and day fixed effects

\[ y_{i,j,t,h} = \alpha + \Gamma T_{i,j,t,h} + \eta_i + \varphi_j + \lambda_t + BX_{i,j,t,h} + \varepsilon_{i,j,t,h} \]

• Obtain estimate for baseline treatment from same regression without any controls.

• Estimate impact for
  – Probability of answering door
  – Probability of giving
  – (Implied Conditional probability of giving)
  – Probability of large versus small giving
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)

Legend:
- Center for Natural Hazards Mitigation Research (ECU)
- La Rabida Children's Hospital
- 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)

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>
</tr>
</thead>
<tbody>
<tr>
<td>Dep. Var.:</td>
<td>Indicator for</td>
</tr>
<tr>
<td></td>
<td>Answering the Door</td>
</tr>
<tr>
<td>Flyer Treatment</td>
<td>-0.0388 (0.0137)**</td>
</tr>
<tr>
<td>Flyer with opt out Treatment</td>
<td>-0.0966 (0.0193)**</td>
</tr>
<tr>
<td>Flyer Treatment * ECU Charity</td>
<td>-0.0365 (0.0313)</td>
</tr>
<tr>
<td>Flyer with opt out * ECU Charity</td>
<td>-0.089 (0.0271)**</td>
</tr>
<tr>
<td>Flyer Treatment * La Rabida Charity</td>
<td>-0.0396 (0.0144)**</td>
</tr>
<tr>
<td>Flyer with opt out * La Rabida Charity</td>
<td>-0.106 (0.0319)**</td>
</tr>
<tr>
<td>Indicator ECU Charity</td>
<td>0.0041 (0.0234)</td>
</tr>
</tbody>
</table>

Omitted Treatment: No-Flyer, No-Flyer, La Rabida Charity, La Rabida Charity

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

![Figure 5a. Frequency of Giving: Small versus Large (pooled)](image)
• **Giving via mail and Internet:**
  - Altruism → Giving via mail in response to flyer
  - Warm Glow → Also if warm glow in impersonal giving
  - Social pressure → No giving via mail

<table>
<thead>
<tr>
<th>Number of Households Giving (Mail/Internet)</th>
<th>ECU</th>
<th>La Rabida</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU (7)</td>
<td>(8)</td>
<td></td>
</tr>
<tr>
<td>Zero donations</td>
<td>One ($25) donation across all treatments</td>
<td>across all treatments</td>
</tr>
</tbody>
</table>

N = 2707   N = 4962
Summary and Interpretation

• Result 1: $P(H)_{NF} > P(H)_{F} > P(H)_{OO}$
  – Proposition 1: Support for social pressure

• Result 2: $P(G)_{F} = P(G)_{NF}$
  – Proposition 2: Consistent with heterogeneous population with both social pressure and altruism
  – Reconcile with Result 1? Social pressure reduces presence at home even among non-givers

• Result 3: $P(G)_{F} > P(G)_{OO}$
  – Proposition 2: Support for social pressure, not for other-signaling

• Result 4: $P(G^{LO})_{NF} > P(G^{LO})_{OO}$ but $P(G^{HI})_{NF} = P(G^{HI})_{OO}$
  – Proposition 4: Supports social pressure

• Result 5: $P(G_{m}) = 0$
  – Proposition 5: Supports social pressure (or in-person-only warm glow)
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
Figure 2b. Summary of Door-to-Door Experimental Treatments Run in 2009

Survey Treatments

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

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

Opt-out
- 5-Minute Survey
  - $0
  - $5
**Survey Results (2008, N = 1865)**

Higher payment (lower duration) increases proportion at home by 10% (insig.)

increases survey completion by 70% (significant)
• **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 $(P(OO)_j^{OO}, c = LaR, Ecu)$
  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 $(P(S)_j^S)$
• 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 $\psi$:
  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 $S^S$ ← Share opening door and giving
<table>
<thead>
<tr>
<th>Specification: Charity</th>
<th>Minimum-Distance Estimates</th>
<th>La Rabida Charity</th>
<th>ECU Charity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Empirical Moments</td>
<td>Estimated Moments</td>
<td>Empirical Moments</td>
</tr>
<tr>
<td>Moments for Charity</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>P(Home) No Flyer</td>
<td>0.4130</td>
<td>0.4142</td>
<td>0.4171</td>
</tr>
<tr>
<td>P(Home) Flyer</td>
<td>0.3733</td>
<td>0.3735</td>
<td>0.3806</td>
</tr>
<tr>
<td>P(Home) Opt-Out</td>
<td>0.3070</td>
<td>0.2989</td>
<td>0.3281</td>
</tr>
<tr>
<td>P(Opt Out) Opt-Out</td>
<td>0.1202</td>
<td>0.1142</td>
<td>0.0988</td>
</tr>
<tr>
<td>P(Giving) No Flyer</td>
<td>0.0717</td>
<td>0.0666</td>
<td>0.0455</td>
</tr>
<tr>
<td>P(Giving) Flyer</td>
<td>0.0699</td>
<td>0.0710</td>
<td>0.0461</td>
</tr>
<tr>
<td>P(Giving) Opt-Out</td>
<td>0.0515</td>
<td>0.0633</td>
<td>0.0272</td>
</tr>
<tr>
<td>Additional Moments (not shown)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>N</td>
<td>N = 4962</td>
<td>N = 4962</td>
<td>N = 2707</td>
</tr>
</tbody>
</table>

Appendix Table 1. Empirical Moments and Estimated Moments
Table 4. Minimum-Distance Estimates: Benchmark Results

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

Marginal utility of giving (for $S = 0$) is $a/(G+g)-1$
Hence, give $g > 0$ if $a > G=12.13$
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>
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<tr>
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<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>
2 Social Pressure

- Clear example of social pressure without social learning

- *Milgram experiment*: post-WWII

- Motivation: Do Germans yield to pressure more than others?
  - Subjects: Adult males in US
  - Recruitment: experiment on punishment and memory
  - Roles:
    * teacher (subjects)
    * learner (accomplice)
– Teacher asks questions
– Teacher 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:
  – 62% subjects reach 450V
  – Subjects regret what they did ex post
  – When people asked to predict behavior, almost no one predicts escalation to 450V
• It’s not the Germans (or Italians)! 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
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 → 98 percent accuracy

High social-pressure treatment: subjects choose after 4 to 8 subjects (confederates) unanimously choose the wrong answer → 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
• 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: Figure 1 – Clear pattern, very large effects
• Table 5. Response to incentives → After 1994, 3 points for winning (1 for drawing, 0 for losing).

<table>
<thead>
<tr>
<th>Statistic</th>
<th>[1]</th>
<th>[2]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td>3.50**</td>
<td>3.11**</td>
</tr>
<tr>
<td>(0.14)</td>
<td>(0.32)</td>
<td></td>
</tr>
<tr>
<td><strong>Score Difference</strong></td>
<td>−1.53**</td>
<td>−1.56**</td>
</tr>
<tr>
<td>(0.18)</td>
<td>(0.18)</td>
<td></td>
</tr>
<tr>
<td><strong>Year Effect</strong></td>
<td>0.81**</td>
<td>0.7**</td>
</tr>
<tr>
<td>(0.18)</td>
<td>(0.21)</td>
<td></td>
</tr>
<tr>
<td><strong>Year × Score Difference</strong></td>
<td>−0.58*</td>
<td>−0.52*</td>
</tr>
<tr>
<td>(0.23)</td>
<td>(0.23)</td>
<td></td>
</tr>
<tr>
<td><strong>Yellow Cards</strong></td>
<td></td>
<td>0.07**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.02)</td>
</tr>
</tbody>
</table>
- **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><strong>Score Difference</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.93**</td>
<td>-0.96**</td>
</tr>
<tr>
<td></td>
<td>(0.20)</td>
<td>(0.21)</td>
</tr>
<tr>
<td><strong>Year Effect</strong></td>
<td>0.36**</td>
<td>0.33**</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.11)</td>
</tr>
<tr>
<td><strong>Attendance</strong></td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td><strong>Attendance × Score Difference</strong></td>
<td>-0.02**</td>
<td>-0.02**</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td><strong>Yellow Cards</strong></td>
<td></td>
<td>0.07***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.02)</td>
</tr>
<tr>
<td><strong>Budget Home</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 6.—EFFECT OF THE SIZE AND COMPOSITION OF THE CROWD ON REFEREE BI**
• **Peer effect** literature also points to social pressure

• **Falk-Ichino (JOLE, 2006):** effect of peer pressure on task performance
  – Recruit High-school students in Switzerland to perform one-time job for flat payment
  – Stuff letters into envelopes for 4 hours
  – Control group of 8 students did the task individually
  – Treatment group of 16 students worked in pairs (but each student was instructed to stuff the envelopes individually)

• Results:
  – Students in treatment group stuffed more envelopes (221 vs. 190)
Students in treatment group coordinated the effort within group: within-pair standard-deviation of output is significantly less than the (simulated) between-pairs standard deviation.

Fig. 3: St. dev. within true and hypothetical pairs in pair sample
• **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

  – Social Pressure: Are others observing the employer?

• Slides courtesy of Enrico
Data

- We observe all the transactions that take place for 2 years in 6 stores. For each transaction, we observe the number of items scanned, and the length of the transaction in seconds.

- We define individual productivity as the number of items scanned per second.

- We know who is working at any moment in time, where, and whom they are facing.

- Unlike much of the previous literature, our measure of productivity is precise, worker-specific and varies with high-frequency.
Institutional features

- Workers in our sample perform the same task use the same technology, and are subject to the same incentives.
- Workers are unionized.
- Compensation is a fixed hourly payment.
- Firm gives substantial scheduling flexibility to the workers.
What is the relationship between individual effort and co-worker permanent productivity?

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

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

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: \( \Delta \bar{\theta}_{ist} \)

- 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</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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>

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

i = individual  
t = 10 minute time interval  
c = calendar date  
s = store
Finding 1: There is a positive association between changes in co-worker permanent productivity and changes in individual productivity

<table>
<thead>
<tr>
<th>Event</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry of above average productivity worker</td>
<td>0.011</td>
<td>(0.001)</td>
</tr>
<tr>
<td>Exit of an above average productivity worker</td>
<td>-0.005</td>
<td>(0.001)</td>
</tr>
<tr>
<td>Shift entry of above average productivity worker</td>
<td>0.006</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Shift exit of an above average productivity worker</td>
<td>-0.006</td>
<td>(0.002)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Delta ) Co-worker permanent productivity</td>
<td>0.159</td>
<td>0.261</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.033)</td>
</tr>
<tr>
<td>( \Delta ) Co-worker permanent prod. ( \times ) Above average worker</td>
<td>-0.214</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.046)</td>
</tr>
<tr>
<td>Observations</td>
<td>1,734,140</td>
<td>1,734,140</td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

\[
\Delta y_{its} = \beta \Delta \bar{\theta}_{ist} + \gamma_{ts} + \psi \Delta X_{ics} + e_{itcs}
\]
Individual-specific Spillover

- Our longitudinal data allow for models with an individual-specific spillover effect, $\beta_i$:

$$\Delta y_{itcs} = \beta_i \Delta \theta_{-icts} + \psi \Delta X_{tcs} + \gamma_{tds} + e_{itcs}$$

The relationship between individual permanent productivity and worker specific spillover effect
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

\[
\Delta y_{tcs} = \beta_{-7}\Delta \bar{\theta}_{i-(t-7)cs} + \beta_{-6}\Delta \bar{\theta}_{i-(t-6)cs} + \beta_{-5}\Delta \bar{\theta}_{i-(t-5)cs} + \beta_{-4}\Delta \bar{\theta}_{i-(t-4)cs} + \beta_{-3}\Delta \bar{\theta}_{i-(t-3)cs} + \beta_{-2}\Delta \bar{\theta}_{i-(t-2)cs} \\
+ \beta_{-1}\Delta \bar{\theta}_{i-(t-1)cs} + \beta_{0}\Delta \bar{\theta}_{i-(t)cs} + \beta_{1}\Delta \bar{\theta}_{i-(t+1)cs} + \beta_{2}\Delta \bar{\theta}_{i-(t+2)cs} + \beta_{3}\Delta \bar{\theta}_{i-(t+3)cs} + \beta_{4}\Delta \bar{\theta}_{i-(t+4)cs} + \beta_{5}\Delta \bar{\theta}_{i-(t+5)cs} \\
+ \beta_{6}\Delta \bar{\theta}_{i-(t+6)cs} + \beta_{7}\Delta \bar{\theta}_{i-(t+7)cs} + \zeta M + \epsilon_{tcs},
\]
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 5: Models by spatial orientation and proximity

<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>(0.019)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity in front</td>
<td>0.007</td>
<td>(0.018)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity behind &amp; closer</td>
<td>0.162</td>
<td>(0.016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity in front &amp; closer</td>
<td>0.016</td>
<td>(0.015)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity behind &amp; farther</td>
<td>0.100</td>
<td>(0.018)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>∆ Co-worker permanent productivity in front &amp; farther</td>
<td>0.003</td>
<td>(0.018)</td>
</tr>
</tbody>
</table>
Frequency of Interactions

- Suppose a shift has checkers A, B, and C. We calculate the percent of A's 10 minute intervals that have overlapped with B and C up to the time of the current shift. We do this for all checkers and all shifts.

- We then compute the average permanent productivity for checkers that are between 0% and 5% overlap, 5% and 20% overlap, and 20% to 100% overlap.
### Previous scheduling overlap

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(I) Δ Co-worker permanent prod: low exposure</td>
<td>0.013 (0.012)</td>
</tr>
<tr>
<td>(II) Δ Co-worker permanent prod: medium exposure</td>
<td>0.084 (0.014)</td>
</tr>
<tr>
<td>(III) Δ Co-worker permanent prod: high exposure</td>
<td>0.075 (0.017)</td>
</tr>
</tbody>
</table>

p-value: Ho: (I) = (II)  0.000  
Ho: (I) = (III)  0.003  
Ho: (II) = (III)  0.655

Observations  1,659,450
Conclusion

The theoretical effect of a change in the mix of co-workers can be either positive (peer effects) or negative (free riding).

FINDING 1
- the net effect is on average positive

FINDING 2
- There is substantial heterogeneity in this effect.
- Low productivity workers benefit from the spillover substantially more than high productivity workers.
Conclusions

- **FINDING 3**
  - Social pressure enforced by monitoring explains these peer effects
  - When more productive workers arrive into shifts, they induce a productivity increase only in workers that are in their line-of-vision.
  - The effect appears to decline with distance between registers

- **FINDING 4**
  - Optimally choosing the worker mix can lower the firm’s wage bill by about $2.5 million per year
  - This does not imply that the firm is not profit maximizing
• 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</th>
<th>Election type or question</th>
<th>Variable t</th>
<th>Year</th>
<th>Place</th>
<th>Sample size</th>
<th>Control group</th>
<th>Treatment group</th>
<th>Exposure rate</th>
<th>Persuasion rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gerber and Green [2000]</td>
<td>Door-to-door canvassing + mail + calls</td>
<td>Federal elect.</td>
<td>Turnout</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>Green, Gerber, and Nickerson [2003]</td>
<td>Door-to-door canvassing</td>
<td>Local elect.</td>
<td>Turnout</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>0.167</td>
</tr>
<tr>
<td>Green and Gerber [2001]</td>
<td>Phone calls by youth vote</td>
<td>General elect.</td>
<td>Turnout</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></td>
<td>Phone calls 18–30-year-olds</td>
<td>General elect.</td>
<td>Turnout</td>
<td>2000</td>
<td>2 cities</td>
<td>N = 4,377</td>
<td>0.405</td>
<td>0.416</td>
<td>0.414</td>
<td>0.045</td>
</tr>
</tbody>
</table>
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!’
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!
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
9999 LAURA WAYNE Voted Voted _____
•  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>ADDRESS</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></td>
<td></td>
</tr>
<tr>
<td>9997 RICHARD B JACKSON</td>
<td>Voted</td>
<td></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
  – Impact: Obama campaign considered using this, but decided too risky

| 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       |
3 Non-Standard Beliefs

- So far, focus on non-standard utility function $U\left(x_i^t|s_t\right)$ as deviations from standard model:

$$
\max_{x_i^t \in X_i} \sum_{t=0}^{\infty} \delta^t \sum_{s_t \in S_t} p(s_t) U\left(x_i^t|s_t\right)
$$

- Non-standard preferences
  - Self-Control Problems $(\beta, \delta)$
  - Reference Dependence $(U\left(x_i^t|s_i, r\right))$
  - Social Preferences $(U\left(x_i, x_{-i}|s\right))$
• Today: Non-Standard Beliefs:

\[
\max_{x_i^t \in X_i} \sum_{t=0}^{\infty} \delta^t \sum_{s_t \in S_t} \tilde{p}(s_t) U(x_i^t|s_t)
\]

where \( \tilde{p}(s_t) \) is the subjective distribution of states \( S_i \) for agent.

• Distribution for agent differs from actual distribution: \( \tilde{p}(s_t) \neq p(s_t) \)

• Three main examples:
  1. Overconfidence. Overestimate one’s own skills (or precision of estimate): \( \tilde{p}(\text{good state}_t) > p(\text{good state}_t) \)
  2. Law of Small Numbers. Gambler’s Fallacy and Overinference in updating \( \tilde{p}(s_t|s_{t-1}) \)
  3. Projection Bias. Expect future utility \( \tilde{U}(x_i^t|s_t) \) to be too close to today’s
4 Overconfidence

- Overconfidence is of at least two types:
  - Overestimate one’s ability (also called overoptimism)
  - Overestimate the precision of one’s estimates (also called overprecision)

- Psychology: Evidence on overconfidence/overoptimism
  - Svenson (1981): 93 percent of subjects rated their driving skill as above the median, compared to the other subjects in the experiment
  - Weinstein (1980): Most individuals underestimate the probability of negative events such as hospitalization
  - Buehler-Griffin-Ross (1994): Underestimate time needed to finish a project
• Applications in the field of overconfidence/overoptimism

• **Example 1. Overconfidence about self-control by consumers** ($\hat{\beta} > \beta$)
  
  – Evidence on self-control supports idea of naiveté
    
    * Status-quo bias (Madrian-Shea, 1999)
    
    * Response to teaser rates (Ausubel, 1999)
    
    * Health-club behavior (DellaVigna-Malmendier, 2006)
  – Prediction markets of Google employees (with raffle tickets for total of $10,000 per quarter in payoffs)
  – Data: years 2005-2007, 1,463 employees placed $\geq 1$ trade

Figure 2. Prices and Probabilities in Two and Five-outcome Markets

Trades in two (red) and five-outcome (blue) markets (23,462 and 49,416, respectively) are sorted into 20 bins according to price
(i.e., $0.5, 0.5-1.0$, etc.), and then average price and payoff probability for the bin is plotted. Dashed lines plot regression equations using OLS.
- Securities not related to Google correctly priced on average
- Securities with implications for Google: Substantial overconfidence for two-outcome security, Less so for five-outcome security

Table 5. Optimistic bias in the Google markets

<table>
<thead>
<tr>
<th></th>
<th>Obs.</th>
<th>Avg price</th>
<th>Avg payoff</th>
<th>Return (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All markets</td>
<td>70,706</td>
<td>0.357</td>
<td>0.342</td>
<td>-0.015***</td>
</tr>
<tr>
<td>Markets with implication for Google</td>
<td>37,910</td>
<td>0.310</td>
<td>0.293</td>
<td>-0.017***</td>
</tr>
<tr>
<td>Two-outcome markets with implication for Google</td>
<td>9,023</td>
<td>0.509</td>
<td>0.492</td>
<td>-0.017***</td>
</tr>
<tr>
<td>Best outcome for Google</td>
<td>4,556</td>
<td>0.456</td>
<td>0.199</td>
<td>-0.256***</td>
</tr>
<tr>
<td>Worst</td>
<td>4,467</td>
<td>0.563</td>
<td>0.790</td>
<td>0.227***</td>
</tr>
<tr>
<td>Five-outcome markets with implication for Google</td>
<td>26,511</td>
<td>0.239</td>
<td>0.222</td>
<td>-0.017***</td>
</tr>
<tr>
<td>Best outcome for Google</td>
<td>5,592</td>
<td>0.244</td>
<td>0.270</td>
<td>0.027</td>
</tr>
<tr>
<td>2nd</td>
<td>5,638</td>
<td>0.271</td>
<td>0.246</td>
<td>-0.025</td>
</tr>
<tr>
<td>3rd</td>
<td>5,539</td>
<td>0.296</td>
<td>0.179</td>
<td>-0.118**</td>
</tr>
<tr>
<td>4th</td>
<td>5,199</td>
<td>0.206</td>
<td>0.178</td>
<td>-0.028</td>
</tr>
<tr>
<td>Worst</td>
<td>4,543</td>
<td>0.162</td>
<td>0.236</td>
<td>0.074</td>
</tr>
</tbody>
</table>
Survey evidence suggests phenomenon general

**Oyer and Schaefer, 2005; Bergman and Jenter, 2007**

- Overconfidence of employees about own-company performance is leading explanation for provision of stock options to rank-and-file employees
- Stock options common form of compensation: (Black and Scholes) value of options granted yearly to employees in public companies over $400 (about one percent of compensation) in 1999 (Oyer and Schaefer, 2005)
- Incentive effects unlikely to explain the issuance: contribution of individual employee to firm value very limited
- Overconfidence about own-company performance can make stock options an attractive compensation format for employers
– Sorting contributes: Overconfidence plausible since workers overconfident about a company sort into it

• However, Bergman and Jenter (2007): employees can also purchase shares on open market, do not need to rely on the company providing them
  – Under what conditions company will still offer options to overconfident employees?
  – Also, why options and not shares in company?
  – Bergman and Jenter (2007): option compensation is used most intensively by company when employees more likely to be overconfident based on proxy (past returns)
• Example 3. Overconfidence about ability by CEOs

• Malmendier-Tate (JF 2005 and JFE 2008)

• Assume that CEOs overestimate their capacity to create value

• Consider implications for:
  – Investment decisions (MT 2005)
  – Mergers (MT forthcoming)
  – Equity issuance (MT 2007)

• Slides courtesy of Ulrike
Model

Assumptions

1. CEO acts in interest of current shareholders.
   \textit{(No agency problem.)}

2. Efficient capital market.
   \textit{(No asymmetric information.)}

Notation

$V_A = \text{market value of the acquiring firm}$

$V_T = \text{market value of the target firm}$

$V = \text{market value of the combined firm}$

$\hat{V}_A = \text{acquiring CEO’s valuation of his firm}$

$\hat{V} = \text{acquiring CEO’s valuation of the combined firm}$

$c = \text{cash used to finance the merger}$
Rational CEO

• Target shareholders demand share $s$ of firm such that:
  $$sV = V_T - c.$$  

• CEO decides to merge if $V - (V_T - c) > V_A$ (levels).
  $\Rightarrow$ Merge if $e > 0$ (differences), where $e$ is “synergies.”
  $\Rightarrow$ First-best takeover decision.

• Post-acquisition value to current shareholders:
  $$\bar{V} = V - (V_T - c) = (V_A + V_T + e - c) - (V_T - c) = V_A + e$$  
  $\Rightarrow \frac{\partial \bar{V}}{\partial c} = 0$ (No financing prediction.)
Overconfident CEO (I)

- CEO overestimates future returns to own firm:
  \[ \hat{V}_A > V_A \]

- CEO overestimates returns to merger:
  \[ \hat{V} - V > \hat{V}_A - V_A \]

- Target shareholders demand share \( s \) of firm such that:
  \[ sV = V_T - c \]

- CEO believes he should have to sell \( s \) such that:
  \[ s\hat{V} = V_T - c \]
Overconfident CEO (II)

• CEO decides to merge if

\[ \hat{V} - (V_T - c) - \left[ \frac{(\hat{V} - V)(V_T - c)}{V} \right] > \hat{V}_A \text{ (levels)}, \]

i.e. merges if

\[ e + \hat{e} > \left[ \frac{(\hat{V}_A - V_A + \hat{e})(V_T - c)}{V} \right] \text{ (differences),} \]

where \( \hat{e} \) are perceived “synergies.”
Propositions

Compare

\[ V(c) - (V_T - c) > V_A. \quad \text{and} \]
\[ \widehat{V}(c) - (V_T - c) - \frac{[\widehat{V}(c) - V(c)](V_T - c)}{V(c)} > \widehat{V}_A \]

1. Overconfident managers do some value-destroying mergers. (Rational CEOs do not.)
2. An overconfident manager does more mergers than a rational manager when internal resources are readily available.
3. An overconfident manager may forgo some value-creating mergers. (Rational managers do not.)
### Data

#### Data on private accounts

   Yermack (1995)

   **Key:** Panel data on stock and option holdings of CEOs of Forbes 500 companies 1980-1994

2. Personal information about these CEOs from
   - Dun & Bradstreet
   - Who’s who in finance

#### Data on corporate accounts

1. CRSP/COMPSTAT
   
   - Cash flow, Q, stock price…

2. CRSP/SDC-merger databases
   
   - Acquisitions
Primary Measure of Overconfidence
“Longholder”
(Malmendier and Tate 2003)

CEO holds an option until the year of expiration.
CEO displays this behavior at least once during sample period.
→ minimizes impact of CEO wealth, risk aversion, diversification

Robustness Checks:
1. Require option to be at least $x\%$ in the money at the beginning of final year
2. Require CEO to *always* hold options to expiration
3. Compare “late exercisers” to “early exercisers”
Empirical Specification

\[ \Pr\{Y_{it} = 1 \mid X, O_{it}\} = G(\beta_1 + \beta_2 \cdot O_{it} + X^T \gamma) \]

with
\begin{align*}
  i & \text{ company} \\
  t & \text{ year} \\
  Y & \text{ acquisition (yes or no)}
\end{align*}

\[ \Rightarrow H_0: \beta_2 = 0 \text{ (overconfidence does not matter)} \]
\[ \Rightarrow H_1: \beta_2 > 0 \text{ (overconfidence does matter)} \]
Identification Strategy (I)

Case 1:
Wayne Huizenga (Cook Data Services/Blockbuster)
- CEO for all 14 years of sample
- Longholder

J Willard Marriott (Marriott International)
- CEO for all 15 years of sample
- Not a Longholder

AND

Case 2:
Colgate Palmolive
- Keith Crane CEO from 1980-1983 (Not a Longholder)
- Reuben Mark CEO from 1984-1994 (Longholder)
Table 4. Do Overconfident CEOs Complete More Mergers?

| Longholder = holds options until last year before expiration (at least once) |
| Distribution: Logistic. Constant included. |
| Dependent Variable: Acquisition (yes or no); Normalization: Capital. |

<table>
<thead>
<tr>
<th></th>
<th>logit with controls</th>
<th>random effects</th>
<th>logit with fixed effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>logit</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>0.8733 (1.95)*</td>
<td>0.8600 (2.05)**</td>
<td>0.6234 (2.60)***</td>
</tr>
<tr>
<td>Qt-1</td>
<td>0.7296 (2.97)***</td>
<td>0.7316 (2.70)***</td>
<td>0.8291 (1.11)</td>
</tr>
<tr>
<td>Cash Flow</td>
<td>2.0534 (3.93)***</td>
<td>2.1816 (3.68)***</td>
<td>2.6724 (2.70)***</td>
</tr>
<tr>
<td>Ownership</td>
<td>1.2905 (0.30)</td>
<td>1.3482 (0.28)</td>
<td>0.8208 (0.11)</td>
</tr>
<tr>
<td>Vested Options</td>
<td>1.5059 (1.96)*</td>
<td>0.9217 (0.19)</td>
<td>0.2802 (2.36)***</td>
</tr>
<tr>
<td>Governance</td>
<td>0.6556 (3.08)***</td>
<td>0.7192 (2.17)**</td>
<td>1.0428 (0.21)</td>
</tr>
<tr>
<td>Longholder</td>
<td>1.5557 (2.58)***</td>
<td>1.7006 (3.09)***</td>
<td>2.5303 (2.67)***</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3690</td>
<td>3690</td>
<td>2261</td>
</tr>
<tr>
<td>Firms</td>
<td>327</td>
<td>184</td>
<td></td>
</tr>
</tbody>
</table>
Table 6. Are Overconfident CEOs Right to Hold Their Options? (I)

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>10th</td>
<td>-0.24</td>
</tr>
<tr>
<td>20th</td>
<td>-0.15</td>
</tr>
<tr>
<td>30th</td>
<td>-0.10</td>
</tr>
<tr>
<td>40th</td>
<td>-0.05</td>
</tr>
<tr>
<td>50th</td>
<td>-0.03</td>
</tr>
<tr>
<td>60th</td>
<td>0.03</td>
</tr>
<tr>
<td>70th</td>
<td>0.10</td>
</tr>
<tr>
<td>80th</td>
<td>0.19</td>
</tr>
<tr>
<td>90th</td>
<td>0.39</td>
</tr>
</tbody>
</table>

| Mean       | 0.03   |
| Standard Deviation | 0.27   |

Returns from exercising 1 year sooner and investing in the S&P 500 index

All exercises occur at the maximum stock price during the fiscal year.
Alternative Explanations

1. Inside Information or Signalling
   - Mergers should “cluster” in final years of option term
   - Market should react favorably on merger announcement
   - CEOs should “win” by holding

2. Stock Price Bubbles
   - Year effects already removed
   - All cross-sectional firm variation already removed
   - Lagged stock returns should explain merger activity

3. Volatile Equity

4. Finance Training
Empirical Predictions

1. On average?
2. Overconfident CEOs do more mergers that are likely to destroy value
3. Overconfident CEOs do more mergers when they have abundant internal resources
4. The announcement effect after overconfident CEOs make bids is lower than for rational CEOs
### Table 8. Diversifying Mergers

- **Longholder** = holds options until last year before expiration (at least once)
- **Distribution:** Logistic. Constant included; **Normalization:** Capital.
- **Dependent Variable:** Diversifying merger (yes or no).

<table>
<thead>
<tr>
<th></th>
<th>logit</th>
<th>logit with random effects</th>
<th>logit with fixed effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Longholder</strong></td>
<td>1.6008</td>
<td>1.7763</td>
<td>3.1494</td>
</tr>
<tr>
<td></td>
<td>(2.40)**</td>
<td>(2.70)***</td>
<td>(2.59)***</td>
</tr>
<tr>
<td><strong>Year Fixed Effects</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>3690</td>
<td>3690</td>
<td>1577</td>
</tr>
<tr>
<td><strong>Firms</strong></td>
<td>327</td>
<td>128</td>
<td></td>
</tr>
</tbody>
</table>

- **Dependent Variable:** Intra-industry merger (yes or no).

<table>
<thead>
<tr>
<th></th>
<th>logit</th>
<th>logit with fixed effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Longholder</strong></td>
<td>1.3762</td>
<td>1.4498</td>
</tr>
<tr>
<td></td>
<td>(1.36)</td>
<td>(1.47)</td>
</tr>
<tr>
<td><strong>Year Fixed Effects</strong></td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>3690</td>
<td>1227</td>
</tr>
<tr>
<td><strong>Firms</strong></td>
<td>327</td>
<td>100</td>
</tr>
</tbody>
</table>

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance. Industries are Fama French industry groups.
Empirical Predictions

<table>
<thead>
<tr>
<th>Rational CEO</th>
<th>Overconfident CEO</th>
</tr>
</thead>
</table>

1. On average?
2. Overconfident CEOs do more mergers that are likely to destroy value
3. Overconfident CEOs do more mergers when they have abundant internal resources
4. The announcement effect after overconfident CEOs make bids is lower than for rational CEOs
Kaplan-Zingales Index

\[ KZ = -1.00 \cdot \frac{\text{CashFlow}}{\text{Capital}} + 0.28 \cdot Q + 3.14 \cdot \text{Leverage} - 39.37 \cdot \frac{\text{Dividends}}{\text{Capital}} - 1.31 \cdot \frac{\text{Cash}}{\text{Capital}} \]

- Coefficients from logit regression (Pr{financially constrained})
- High values → Cash constrained
  - Leverage captures debt capacity
  - Deflated cash flow, cash, dividends capture cash on hand
  - Q captures market value of equity (Exclude?)
Table 9. Kaplan-Zingales Quintiles

Longholder = holds options until last year before expiration (at least once)
Distribution: Logistic. Constant included.
Dependent Variable: Acquisition (yes or no); Normalization: Capital.
All regressions are logit with random effects.

<table>
<thead>
<tr>
<th></th>
<th>Quintile 1</th>
<th>Quintile 2</th>
<th>Quintile 3</th>
<th>Quintile 4</th>
<th>Quintile 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longholder</td>
<td><strong>2.2861</strong></td>
<td><strong>1.6792</strong></td>
<td><strong>1.7756</strong></td>
<td><strong>1.9533</strong></td>
<td><strong>0.8858</strong></td>
</tr>
<tr>
<td></td>
<td>(2.46)**</td>
<td>(1.48)</td>
<td>(1.54)</td>
<td>(1.50)</td>
<td>(0.33)</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>718</td>
<td>719</td>
<td>719</td>
<td>719</td>
<td>718</td>
</tr>
<tr>
<td>Firms</td>
<td>125</td>
<td>156</td>
<td>168</td>
<td>165</td>
<td>152</td>
</tr>
</tbody>
</table>

Diversifying Mergers

<table>
<thead>
<tr>
<th></th>
<th>Quintile 1</th>
<th>Quintile 2</th>
<th>Quintile 3</th>
<th>Quintile 4</th>
<th>Quintile 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longholder</td>
<td><strong>2.5462</strong></td>
<td><strong>1.8852</strong></td>
<td><strong>1.7297</strong></td>
<td><strong>1.0075</strong></td>
<td><strong>1.0865</strong></td>
</tr>
<tr>
<td></td>
<td>(1.89)*</td>
<td>(1.51)</td>
<td>(1.36)</td>
<td>(0.01)</td>
<td>(0.18)</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>718</td>
<td>719</td>
<td>719</td>
<td>719</td>
<td>718</td>
</tr>
<tr>
<td>Firms</td>
<td>125</td>
<td>156</td>
<td>168</td>
<td>165</td>
<td>152</td>
</tr>
</tbody>
</table>

Regressions include Cash Flow, Qt-1, Size, Ownership, Vested Options, and Governance.
Empirical Predictions

1. On average?
2. Overconfident CEOs do more mergers that are likely to destroy value
3. Overconfident CEOs do more mergers when they have abundant internal resources
4. The announcement effect after overconfident CEOs make bids is lower than for rational CEOs
Empirical Specification

\[ \text{CAR}_i = \beta_1 + \beta_2 \cdot O_i + X'\gamma + \varepsilon_i \]

with \( i \) company \( O \) overconfidence \( X \) controls

\[ \text{CAR}_i = \sum_{t=-1}^{1} (r_{it} - E[r_{it}]) \]

where \( E[r_{it}] \) is daily S&P 500 returns (\( \alpha=0; \beta=1 \))
### Table 14. Market Response

**Longholder** = holds options until last year before expiration (at least once)

**Dependent Variable:** Cumulative abnormal returns [-1,+1]

<table>
<thead>
<tr>
<th></th>
<th>OLS</th>
<th>OLS</th>
<th>OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>Relatedness</td>
<td>0.0048</td>
<td>0.0062</td>
<td>0.0043</td>
</tr>
<tr>
<td></td>
<td>(1.37)</td>
<td>(1.24)</td>
<td>(1.24)</td>
</tr>
<tr>
<td>Corporate Governance</td>
<td><strong>0.0079</strong></td>
<td>0.0036</td>
<td><strong>0.0073</strong></td>
</tr>
<tr>
<td></td>
<td>(2.18)**</td>
<td>(0.64)</td>
<td>(1.98)**</td>
</tr>
<tr>
<td>Cash Financing</td>
<td>0.014</td>
<td>0.0127</td>
<td>0.0145</td>
</tr>
<tr>
<td></td>
<td>(3.91)***</td>
<td>(2.60)***</td>
<td>(3.99)***</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0005</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.46)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boss</td>
<td>0.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longholder</td>
<td><strong>-0.0067</strong></td>
<td><strong>-0.0099</strong></td>
<td><strong>-0.0079</strong></td>
</tr>
<tr>
<td></td>
<td>(1.81)*</td>
<td>(2.33)**</td>
<td>(2.00)**</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Industry Fixed Effects</td>
<td>no</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Industry*Year Fixed Effects</td>
<td>no</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Observations</td>
<td>687</td>
<td>687</td>
<td>687</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.10</td>
<td>0.58</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Regressions include Ownership and Vested Options.
Do Outsiders Recognize CEO Overconfidence?

Portrayal in Business Press:

1. Articles in
   - New York Times
   - Business Week
   - Financial Times
   - The Economist
   - Wall Street Journal
3. Articles which characterize CEO as
   - Confident or optimistic
   - Not confident or not optimistic
   - Reliable, conservative, cautious, practical, steady or frugal
Table 13. Press Coverage and Diversifying Mergers

<table>
<thead>
<tr>
<th></th>
<th>logit</th>
<th>logit with random effects</th>
<th>logit with fixed effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTALconfident</td>
<td>1.6971</td>
<td>1.7826</td>
<td>1.5077</td>
</tr>
<tr>
<td></td>
<td>(2.95)***</td>
<td>(3.21)***</td>
<td>(1.48)</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Observations</td>
<td>3647</td>
<td>3647</td>
<td>1559</td>
</tr>
<tr>
<td>Firms</td>
<td>326</td>
<td>326</td>
<td>128</td>
</tr>
</tbody>
</table>

|                       | 1.0424         | 1.0368                    | 0.8856                   |
|                       | (0.20)         | (0.16)                    | (0.31)                   |
| Year Fixed Effects    | yes            | yes                       | yes                      |
| Observations          | 3647           | 3647                      | 1226                     |
| Firms                 | 326            | 326                       | 100                      |

Dependent Variable: Diversifying merger (yes or no).

Dependent Variable: Intra-industry merger (yes or no).

Distribution: Logistic. Constant included; Normalization: Capital.

Regressions include Total Coverage, Cash Flow, Q₁, Size, Ownership, Vested Options, and Governance. Industries are Fama French industry groups.
• Overconfidence/Overprecision: Overestimate the precision of one’s estimates

• Alpert-Raiffa (1982). Ask questions such as
  – ‘The number of "Physicians and Surgeons" listed in the 1968 Yellow Pages of the phone directory for Boston and vicinity’
  – ‘The total egg production in millions in the U.S. in 1965.’
  – ‘The toll collections of the Panama Canal in fiscal 1967 in millions of dollars’

• Ask for 99 percent confidence intervals for 1,000 questions

• No. of errors: 426! (Compare to expected 20)

• (Issue: Lack of incentives)
• **Investor Overconfidence: Odean (1999)**

• Investor overconfidence/overprecision predicts excessive trading
  – investor believes signal is too accurate → Executes trade

• Empirical test using data set from discount brokerage house

• Follow all trades of 10,000 accounts

• January 1987-December 1993

• 162,948 transactions
• Traders that overestimate value of their signal trade too much

• Substantial cost for trading too much:
  – Commission for buying 2.23 percent
  – Commission for selling 2.76 percent
  – Bid-ask spread 0.94 percent
  – Cost for ‘round-trip purchase’: 5.9 percent (!)
• Stock return on purchases must be at least 5.9 percent.

• Compute buy-and-hold returns

• Evidence: Sales outperform purchases by 2-3 percent!

**Table 1—Average Returns Following Purchases and Sales**

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>84 trading days later</th>
<th>252 trading days later</th>
<th>504 trading days later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchases</td>
<td>49,948</td>
<td>1.83</td>
<td>5.69</td>
<td>-24.00</td>
</tr>
<tr>
<td>Sales</td>
<td>47,535</td>
<td>3.19</td>
<td>9.00</td>
<td>27.32</td>
</tr>
<tr>
<td>Difference</td>
<td></td>
<td>-1.36</td>
<td>-3.31</td>
<td>-3.32</td>
</tr>
<tr>
<td>N1</td>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>N2</td>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.002)</td>
</tr>
</tbody>
</table>
• Is the result weaker for individuals that trade the most? No

<table>
<thead>
<tr>
<th></th>
<th>84 trading days later</th>
<th>252 trading days later</th>
<th>504 trading days later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchases</td>
<td>29,078</td>
<td>2.13</td>
<td>7.07</td>
</tr>
<tr>
<td>Sales</td>
<td>26,732</td>
<td>3.04</td>
<td>9.76</td>
</tr>
<tr>
<td>Difference</td>
<td>-0.91</td>
<td>-2.69</td>
<td>-3.50</td>
</tr>
<tr>
<td>N1</td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>N2</td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.010)</td>
</tr>
</tbody>
</table>

• Huge cost to trading for individuals:
  – Transaction costs
  – Pick wrong stocks
• **Barber and Odean, 2001:** Gender difference
  
  – Psychology: Men more overconfident than women about financial decisions
  
  – Trading data: men trade 45 percent more than women → pay a larger returns cost

• This is correlational evidence:
  
  – gender correlates with overconfidence + gender correlates with trading → Overconfidence explanations
  
  – However: Gender may proxy for unobservables of investors that correlate with trading activity

• General issue with correlations design (Michigan and NYU schools + Heckman proponents of this)
• Overconfidence/overprecision can explain other puzzles in asset pricing:
  – short-term positive correlation of returns (momentum)
  – long-term negative correlation (long-term reversal)

• Daniel-Hirshleifer-Subrahmanyam (1998)

• Assume overconfidence + self-attribution bias (discount information that is inconsistent with one’s priors)
  – Overconfidence \( \rightarrow \) trade excessively in response to private information
  – Long-term: public information prevails, valuation returns to fundamentals \( \rightarrow \) long-term reversal
  – Short-term: additional private information interpreted with self-attribution bias \( \rightarrow \) become even more overconfident

• Two other explanations for this: Law of small numbers + Limited attention
5 Next Lecture

• Projection Bias

• Non-Standard Decision-Making

• Limited Attention
  – Financial Markets
  – Consumption