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

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February 29, 2012
Outline

1. Social Preferences: Charitable Giving II
2. Non-Standard Beliefs
3. Overconfidence
4. Law of Small Numbers
1 Social Preferences: Charitable Giving II

- **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 (2009)
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 (___/___) during ___:____ to ___:____ 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.

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:

\[ U(g) = u(W - g - g_m) + av(g + \theta g_m, G_{-i}) - s(g) \]

• Agent cares about:
  
  - Private consumption \( u(W - g - g_m) \), 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):
    \[ v(g, G_{-i}) = v(g + \theta g_m + G_{-i}) \], \( a \) is altruism parameter
  
    \[ v(g, G_{-i}) = v(g) \], \( a \) 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
• 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 $\underline{a} < a < \overline{a}$; (iii) $g^*(a, S) = g^s$ for $a \leq a \leq \overline{a}$; (iv) $g^*(a, S) > g^s$ for $a > \overline{a}$.

• 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 $a$, $g^*_m(a) \leq g^*(a; S)$. 
\[ g = 0, \quad h < h_0 \]

\[ g = g^s, \quad h < h_0 \]

\[ g = g^s, \quad h > h_0 \]

\[ 0 < g < g^s, \quad h < h_0 \]

\[ 0 < g < g^s, \quad h > h_0 \]
• 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 $a_0(S) \in (\underline{a}, \overline{a})$ 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
  
  – $A$-$NoS$: $P(G)_F = P(G)_{OO} > P(G)_{NF}$
  
  – $S$-$NoA$: $P(G)_{NF} > P(G)_F > P(G)_{OO}$
Experimental Design

• Fund-raising for two charities:
  – La Rabida Children’s Hospital in Chicago
  – East Carolina Hazard Center (ECU)
  – Ask survey respondents to rank 5 charities:
    • La Rabida – Rank 3.95 (out of 5)
    • Donate Life – Rank 3.79
    • Seattle Children's Hospital – Rank 3.47
    • Chicago Historical Society – Rank 2.96
    • ECU – Rank 2.54

• Door-to-Door (DTD) Fund-raising
  – How Common? Survey with 177 respondents
    • 73% had DTD visit in past 12 months (84% for phone)
    • 40% gave at least once in past 12 months (27% for phone)
    • Amount given (cap at $1,000) $26 for DTD ($59 for phone)
  – Summary: Common method, Small amounts given
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)

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)

- Center for Natural Hazards Mitigation Research at East Carolina University
- La Rabida Children’s Hospital
<table>
<thead>
<tr>
<th>Specification: Dep. Var.:</th>
<th>OLS Regressions</th>
<th>Indicator for Answering the Door</th>
<th>Indicator for Giving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flyer Treatment</td>
<td>-0.0388</td>
<td>-0.0365</td>
<td>0.0006</td>
</tr>
<tr>
<td></td>
<td>(0.0137)**</td>
<td>(0.0313)</td>
<td>(0.0094)</td>
</tr>
<tr>
<td>Flyer with opt out</td>
<td>-0.0966</td>
<td>-0.089</td>
<td>-0.0183</td>
</tr>
<tr>
<td>Treatment</td>
<td>(0.0193)**</td>
<td>(0.0271)**</td>
<td>(0.0100)*</td>
</tr>
<tr>
<td>Flyer Treatment</td>
<td>-0.0396</td>
<td>-0.0396</td>
<td>0.0006</td>
</tr>
<tr>
<td>* ECU Charity</td>
<td>(0.0144)**</td>
<td>(0.0144)**</td>
<td>(0.0078)</td>
</tr>
<tr>
<td>Flyer with opt out</td>
<td>-0.106</td>
<td>-0.106</td>
<td>-0.0202</td>
</tr>
<tr>
<td>* La Rabida Charity</td>
<td>(0.0319)**</td>
<td>(0.0319)**</td>
<td>(0.0132)</td>
</tr>
<tr>
<td>Indicator ECU Charity</td>
<td>0.0041</td>
<td>0.0041</td>
<td>-0.0263</td>
</tr>
<tr>
<td>(0.0234)</td>
<td>(0.0234)</td>
<td>(0.0085)**</td>
<td></td>
</tr>
<tr>
<td>Omitted Treatment</td>
<td>No-Flyer</td>
<td>No-Flyer, ECU Charity</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>
<td>0.0629</td>
</tr>
<tr>
<td>Fixed Effects for Solicitor, Date- Location, Hour, and Area Rating</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>N</td>
<td>N = 7668</td>
<td>N = 7668</td>
<td>N = 7668</td>
</tr>
</tbody>
</table>

Table 2. Results for Fund-Raising Treatments
• 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*)

- Baseline (N=3,166)
- Flyer (N=3,433)
- Flyer with Opt Out (N=1,070)
• 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>
</tr>
</thead>
<tbody>
<tr>
<td>ECU</td>
</tr>
<tr>
<td>(7)</td>
</tr>
<tr>
<td>Zero donations</td>
</tr>
<tr>
<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
Experimental Treatments Run in 2008

Survey Treatments

- Baseline
  - 5-Minute Survey: $0
- Flyer
  - 5-Minute Survey: $0
  - 10-Minute Survey: $10
Figure 2b. Summary of Door-to-Door Experimental Treatments Run in 2009

Survey Treatments

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

Flyer
- 5-Minute Survey
  - $0
- 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 ($P(OO)_j^c$, $c = LaR, Ecu$)
  3. Probability of giving at all, and giving an amount range ($P(G)_j^c$, $j = F, NF, OO$, $c = LaR, Ecu$)
  4. Probability of opening door in survey ($P(H)_j^S$)
  5. Probability of filling survey ($P(S)_j^S$)
• 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. $S_c^c (c = LaR, Ecu)$—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 $h_0 \leftarrow$ Control group
  
  – Prob. seeing flyer $r \leftarrow$ Share opting out
  
  – Utility of doing survey $\mu^S$ and $\sigma^S \leftarrow$ Share completing survey
  
  – Value of time $v^S \leftarrow$ Comparison of effect of $10$ payment and $5$ minute duration
  
  – Elasticity of home presence $\eta \leftarrow$ Share opening door in survey for different payments + Giving in charity
  
  – Altruism parameters $\mu^c, \sigma^c, G \leftarrow$ Given $\eta$, share giving different amounts
  
  – Social pressure parameters $S^i$ and $S^S \leftarrow$ Share opening door and giving
### Appendix Table 1. Empirical Moments and Estimated Moments

<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 (1)</td>
<td>Estimated Moments (2)</td>
<td>Empirical Moments (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>
</tbody>
</table>

**Additional Moments (not shown)**
- P(0<Giving<10), P(Giving=10), P(10<Giving<=20), P(20<Giving<=50), P(Giving>50) in Treatments NF, F, OO
- N: N = 4962, N = 4962, N = 2707, N = 2707
### Table 4. Minimum-Distance Estimates: Benchmark Results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Benchmark Estimates</th>
<th>Estimates with Identity Weighting Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common Parameters</strong></td>
<td></td>
<td></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><strong>Survey Parameters</strong></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><strong>Charity Parameters</strong></td>
<td></td>
<td></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?

Figure 7b. Overall Utility of Fund-Raiser as function of Altruism
Welfare
1. Low-altruism households pay social pressure cost
2. High-altruism households get benefit
3. Since the former dominate, on net negative welfare for solicitee

Panel C. Welfare

<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>
2 Non-Standard Beliefs

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

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

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

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

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 \( \tilde{U}(x^t_i | s_t) \) to be too close to today’s
3 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
- Economic experiment: Camerer and Lovallo (AER, 1999)
  - Experimental design:
    * Initial endowment: $10
    * Simultaneous entry decision: enter $\rightarrow$ play game or stay out $\rightarrow$ payoff 0
    * Parameter $c$ for entry payoffs:
      - Top $c$ entrants share $50$
      - Bottom $n - c$ entrants get $-10$

<table>
<thead>
<tr>
<th>Rank</th>
<th>Payoff for successful entrants as a function of “c”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>33</td>
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<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>
- $n = 12, 14, 16$ subjects

- Within-subject variation in games played if entry: chance or skill (trivia, puzzles)

- Only feedback: Total number of entrants

- Paid at the end of game for one randomly-determined round (no feedback on performance)

<table>
<thead>
<tr>
<th>Experiment #</th>
<th>Sample</th>
<th>$n$</th>
<th>Selection procedure</th>
<th>Rank order</th>
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<tbody>
<tr>
<td>1</td>
<td>Chicago, undergraduates</td>
<td>12</td>
<td>random</td>
<td>R/S</td>
</tr>
<tr>
<td>2</td>
<td>Chicago, undergraduates</td>
<td>14</td>
<td>random</td>
<td>S/R</td>
</tr>
<tr>
<td>3</td>
<td>Wharton, undergraduates</td>
<td>16</td>
<td>random</td>
<td>R/S</td>
</tr>
<tr>
<td>4</td>
<td>Wharton, undergraduates</td>
<td>16</td>
<td>random</td>
<td>S/R</td>
</tr>
<tr>
<td>5</td>
<td>Wharton, undergraduates</td>
<td>16</td>
<td>self-selection</td>
<td>R/S</td>
</tr>
<tr>
<td>6</td>
<td>Wharton, undergraduates</td>
<td>16</td>
<td>self-selection</td>
<td>S/R</td>
</tr>
<tr>
<td>7</td>
<td>Chicago, M.B.A.'s</td>
<td>14</td>
<td>self-selection</td>
<td>R/S</td>
</tr>
<tr>
<td>8</td>
<td>Wharton, M.B.A.'s</td>
<td>14</td>
<td>self-selection</td>
<td>S/R</td>
</tr>
</tbody>
</table>
- Optimal decision for risk-neutral players in chance game
  - Assume $e$ players enter and $n - e$ stay out
  - Probability of being in top group $p = c/e$ (with $c \leq e$)
  - Average payoff of entry is
    \[
    \pi_E = p \frac{50}{e} - (1 - p) 10 = \frac{c}{e} \frac{50}{c} - \frac{e - c}{e} 10 = \frac{50 - 10(e - c)}{e}
    \]
  - average payoff of exit $\pi_E = 0$
  - Enter is Best Response if $50 - 10(e - c) \geq 0$ or $e \leq 5 + c$
  - Asymmetric Nash Equilibria: $e^*_C = c + 4$ or $e^*_C = c + 5$ players enter
  - Group profits should be 10 (if $e^* = c + 4$) or 0 (if $e^* = c + 5$)

- Games of skill $\Rightarrow$ If overconfidence, overestimate chance of winning $p \Rightarrow$ Too much entry $e^*_S$
- Luck: Higher profits than in Nash eq. \(\Rightarrow\) Too little entry (Risk av.?)
- Skill: Lower profits (but still \(>0\)), Profits\(<0\) with selection (Exp. 5-8)

<table>
<thead>
<tr>
<th>Profit for random-rank condition</th>
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</thead>
<tbody>
<tr>
<td>Rounds</td>
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<tr>
<td>Experiment #</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
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<td>8</td>
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</table>

<table>
<thead>
<tr>
<th>Profit for skill-rank condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rounds</td>
</tr>
<tr>
<td>Experiment #</td>
</tr>
<tr>
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<td>6</td>
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<td>7</td>
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<tr>
<td>8</td>
</tr>
</tbody>
</table>
• Overconfidence about own performance *relative* to others
  – Overconfidence about own ability?
  – Or underestimation of entry of others?

• Forecasts of people about entry of others:
  – forecast 0.3 entrants too high in chance game;
  – forecast 0.5 entrants too low in skill game;
  – (some underestimation of entry of others)
• 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 naïveté
    * 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 ≥ 1 trade

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

Trades in two (red) and five-outcome (blue) markets (33,462 and 42,416, respectively) are sorted into 20 bins according to price (i.e., 0.0, 0.1-0.1, 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>
<thead>
<tr>
<th>Table 5. Optimistic bias in the Google markets</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>Obs.</td>
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<td>70,706</td>
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<td>37,910</td>
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<td>9,023</td>
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<td>5,638</td>
</tr>
<tr>
<td>5,539</td>
</tr>
<tr>
<td>5,199</td>
</tr>
<tr>
<td>4,543</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.  
   (*No agency problem.*)
2. Efficient capital market.  
   (*No asymmetric information.*)

Notation

\( V_A \) = market value of the acquiring firm  
\( V_T \) = market value of the target firm  
\( V \) = market value of the combined firm  
\( \hat{V}_A \) = acquiring CEO’s valuation of his firm  
\( \hat{V} \) = acquiring CEO’s valuation of the combined firm  
\( c \) = 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).
  \[ \Rightarrow \text{Merge if } e > 0 \text{ (differences), where } e \text{ is “synergies.”} \]
  \[ \Rightarrow \text{First-best takeover decision.} \]

- Post-acquisition value to current shareholders:
  \[ \overline{V} = V - (V_T - c) = (V_A + V_T + e - c) - (V_T - c) = V_A + e \]
  \[ \Rightarrow \frac{\partial \overline{V}}{\partial c} = 0 \text{ (No financing prediction.)} \]
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

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

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.)
Empirical Predictions

- **Rational CEO**
- **Overconfident CEO**

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
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.
\[ \Rightarrow \text{minimizes impact of CEO wealth, risk aversion, diversification} \]

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

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

with \( i \) company \quad \quad \quad \quad O \quad \text{overconfidence}
\[ t \] year \quad \quad \quad \quad X \quad \text{controls}
\[ Y \] acquisition (yes or no)

\[ \rightarrow H_0: \beta_2 = 0 \text{ (overconfidence does not matter)} \]
\[ \rightarrow H_1: \beta_2 > 0 \text{ (overconfidence does matter)} \]
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 logit</th>
<th>logit with fixed effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>0.8733</td>
<td>0.8600</td>
<td>0.6234</td>
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<tr>
<td></td>
<td>(1.95)*</td>
<td>(2.05)**</td>
<td>(2.60)*****</td>
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<tr>
<td>Qt_{t-1}</td>
<td>0.7296</td>
<td>0.7316</td>
<td>0.8291</td>
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<tr>
<td></td>
<td>(2.97)*****</td>
<td>(2.70)*****</td>
<td>(1.11)</td>
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<tr>
<td>Cash Flow</td>
<td>2.0534</td>
<td>2.1816</td>
<td>2.6724</td>
</tr>
<tr>
<td></td>
<td>(3.93)*****</td>
<td>(3.68)*****</td>
<td>(2.70)*****</td>
</tr>
<tr>
<td>Ownership</td>
<td>1.2905</td>
<td>1.3482</td>
<td>0.8208</td>
</tr>
<tr>
<td></td>
<td>(0.30)</td>
<td>(0.28)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Vested Options</td>
<td>1.5059</td>
<td>0.9217</td>
<td>0.2802</td>
</tr>
<tr>
<td></td>
<td>(1.96)*</td>
<td>(0.19)</td>
<td>(2.36)**</td>
</tr>
<tr>
<td>Governance</td>
<td>0.6556</td>
<td>0.7192</td>
<td>1.0428</td>
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<td></td>
<td>(3.08)*****</td>
<td>(2.17)**</td>
<td>(0.21)</td>
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<td>1.7006</td>
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<tr>
<td></td>
<td>(2.58)*****</td>
<td>(3.09)*****</td>
<td>(2.67)*****</td>
</tr>
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<td>yes</td>
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<tr>
<td>Observations</td>
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<td>3690</td>
<td>2261</td>
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<tr>
<td>Firms</td>
<td>327</td>
<td>184</td>
<td></td>
</tr>
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Table 6. Are Overconfident CEOs Right to Hold Their Options? (I)

<table>
<thead>
<tr>
<th>Percentile</th>
<th>Return</th>
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</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>
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<td>60th</td>
<td>0.03</td>
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<tr>
<td>70th</td>
<td>0.10</td>
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<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

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

| Rational CEO | Overconfident CEO |

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>
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<th>logit with fixed effects</th>
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<tbody>
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<td>1.7763</td>
<td>3.1494</td>
</tr>
<tr>
<td></td>
<td>(2.40)**</td>
<td>(2.70)***</td>
<td>(2.59)***</td>
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<tr>
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<td>327</td>
<td>128</td>
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**Dependent Variable:** Intra-industry merger (yes or no).

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<td>(0.75)</td>
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</tbody>
</table>

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

Rational CEO | Overconfident CEO

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 \(\rightarrow\) 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><strong>All Mergers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longholder</td>
<td>2.2861</td>
<td>1.6792</td>
<td>1.7756</td>
<td>1.9533</td>
<td>0.8858</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>

<table>
<thead>
<tr>
<th><strong>Diversifying Mergers</strong></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>2.5462</td>
<td>1.8852</td>
<td>1.7297</td>
<td>1.0075</td>
<td>1.0865</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

\[ CAR_i = \beta_1 + \beta_2 \cdot O_i + X' \gamma + \varepsilon_i \]

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

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

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>0.0079</td>
<td>0.0036</td>
<td>0.0073</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><strong>Longholder</strong></td>
<td>-0.0067</td>
<td>-0.0099</td>
<td>-0.0079</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

**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>TOTALconfident</td>
<td>1.6971 (2.95)***</td>
<td>1.7826 (3.21)***</td>
<td>1.5077 (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>

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

<table>
<thead>
<tr>
<th></th>
<th>1.0424 (0.20)</th>
<th>1.0368 (0.16)</th>
<th>0.8856 (0.31)</th>
</tr>
</thead>
<tbody>
<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>1226</td>
</tr>
<tr>
<td>Firms</td>
<td>326</td>
<td>326</td>
<td>100</td>
</tr>
</tbody>
</table>

Regressions include Total Coverage, Cash Flow, Q₁, Size, Ownership, Vested Options, and Governance. Industries are Fama French industry groups.
Conclusions

- Overconfident managers are more acquisitive.

- Much of this acquisitiveness is in the form of diversifying mergers.

- Overconfidence has largest impact if CEO has abundant internal resources.

- The market reacts more negatively to the mergers of overconfident CEOs.
• 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>
<thead>
<tr>
<th></th>
<th>Panel A: All Transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
</tr>
<tr>
<td>Purchases</td>
<td>49,948</td>
</tr>
<tr>
<td>Sales</td>
<td>47,535</td>
</tr>
<tr>
<td>Difference</td>
<td></td>
</tr>
<tr>
<td>N1</td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td></td>
</tr>
</tbody>
</table>
- Is the result weaker for individuals that trade the most? No

<table>
<thead>
<tr>
<th>Panel C: The 10 Percent of Investors Who Trade the Most</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n$</td>
</tr>
<tr>
<td>Purchases</td>
</tr>
<tr>
<td>Sales</td>
</tr>
<tr>
<td>Difference</td>
</tr>
<tr>
<td>N1</td>
</tr>
<tr>
<td>N2</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 → trade excessively in response to private information
  – Long-term: public information prevails, valuation returns to fundamentals → long-term reversal
  – Short-term: additional private information interpreted with self-attribution bias → become even more overconfident

• Two other explanations for this: Law of small numbers + Limited attention
4  Law of Small Numbers

• Overconfidence is only one form of non-Bayesian beliefs

• Tversky-Kahneman (1974). Individuals follow heuristics to simplify problems:
  – Anchoring. → Leads to over-precision (above)
  – Availability. → Connected to limited attention (next lecture)
  – Representativeness. → Today’s lecture

• Individuals expect random draws to be exceedingly representative of the distribution they come from
  – HTHHTT judged more representative than HHHTTT
  – But the two are equally likely! (exchangeability)
• Rabin (QJE, 2002). Law of Small Numbers
  
  – I.i.d. signals from urn drawn with replacement
  
  – Subjects instead believe drawn from an urn of size \( N < \infty \) without replacement
  
  – \( \rightarrow \) Gambler’s Fallacy: After signal, subject expect next draw to be a different signal
  
  – Example: Return to mutual fund is drawn from an urn with 10 balls, 5 Up and 5 Down (with replacement)
  
  – Observe ‘Up, Up’ — Compute probability of another Up
    * Bayesian: .5
    * Law of Small Numbers: \( 3/8 < .5 \)
  
  – Example of representativeness: ‘Up, Up, Down’ more representative than ‘Up, Up, Up’
• Evidence on gambler’s fallacy.

• **Clotfelter and Cook (MS, 1993)**

• Lotteries increasingly common in US ($17bn sales in 1989)

• Maryland daily-numbers lottery -> Bet on 3-digit number
  – Probability of correct guess .001
  – Payout: $500 per $1 bet (50 percent payout)

• Gambler’s Fallacy -> Betters will stop betting on number just drawn
  – Examine 52 winning numbers in 1988
  – In 52 of 52 cases (!) betting volume decreases 3 days after win, relative to baseline
- Substantial decrease in betting right after number is drawn
- Effect lasts about 3 months
- However: no cost for fallacy $\rightarrow$ Does effect replicate with cost?
• Terrell (JRU, 1994)

• New Jersey’s pick-three-numbers game (1988-1992)

• Pari-mutuel betting system
  – the fewer individuals bet on a number, the higher is the expected payout
  – Cost of betting on popular numbers
  – Payout ratio .52 $\Rightarrow$ Average win of $260$ for $50c$ bet

• Issue: Do not observe betting on all numbers $\Rightarrow$ Use payout for numbers that repeat
Table 1. Average payouts to winning numbers

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winners repeating within 1 week</td>
<td>8</td>
<td>349.06</td>
<td>91.66</td>
</tr>
<tr>
<td>Winners repeating between 1 and 2 weeks</td>
<td>8</td>
<td>349.44</td>
<td>81.56</td>
</tr>
<tr>
<td>Winners repeating between 2 and 3 weeks</td>
<td>14</td>
<td>307.76</td>
<td>58.33</td>
</tr>
<tr>
<td>Winners repeating between 3 and 8 weeks</td>
<td>59</td>
<td>301.03</td>
<td>70.55</td>
</tr>
<tr>
<td>Winners not repeating within 8 weeks</td>
<td>1622</td>
<td>260.11</td>
<td>57.98</td>
</tr>
<tr>
<td>All Winners</td>
<td>1714</td>
<td>262.79</td>
<td>57.99</td>
</tr>
</tbody>
</table>

- Strong gambler’s fallacy:
  - Right after win, 34 percent decrease in betting
  - $\rightarrow$ 34 percent payout increase
  - Effect dissipates over time
• Comparison with Maryland lottery:
  
  – Smaller effect (34 percent vs. 45 percent)

  – → Incentives temper phenomenon, but only partially

• Other applications:

  – Probabilities are known, but subjects misconstrue the i.i.d. nature of the draws.

  – Example: Forecast of the gender of a third child following two boys (or two girls)
• Back to Rabin (QJE, 2002).
  – Probabilities known $\rightarrow$ Gambler’s Fallacy
  – Probabilities not known $\rightarrow$ Overinference: After signals of one type, expect next signal of same type

• Example:
  – Mutual fund with a manager of uncertain ability.
  – Return drawn with replacement from urn with 10 balls
    * Probability .5: fund is well managed (7 balls Up and 3 Down)
    * Probability .5: fund is poorly managed (3 Up and 7 Down)
  – Observe sequence ‘Up, Up, Up’ $\rightarrow$ What is $P(\text{Well}|UUU)$?
    * Bayesian: $P(\text{Well}|UUU) = .5P(UUU|\text{Well}) / [.5P(UUU|\text{Well}) + .5P(UUU|\text{Poor})] = .7^3 / (.7^3 + .3^3) \approx .927.$
* Law-of-Small-Number: \( P(\text{Well}|UUU) = (7/10 \cdot 6/9 \cdot 5/8) / [(7/10 \cdot 6/9 \cdot 5/8) + (3/10 \cdot 2/9 \cdot 1/8)] \approx .972. \)

* Over-inference about the ability of the mutual-fund manager

  – Also assume:
    * Law-of-Small-Number investor believes that urn replenished after 3 periods
    * Need re-start or

  – What is Forecast of \( P(U|UUU) \)?
    * Bayesian: \( P(U|UUU) = .927 \cdot .7 + (1 - .927) \cdot .3 \approx .671 \)
    * Law-of-Small-Number: \( P(U|UUU) = .972 \cdot .7 + (1 - .972) \cdot .3 \approx .689 \)

* Over-inference despite the gambler’s fallacy beliefs
• Substantial evidence of over-inference (also called extrapolation)

• Notice: Case with unknown probabilities is much more common than lottery case

• Benartzi (JF, 2001)
  – Examine investment of employees in employer stock
  – Does it depend on the past performance of the stock?

• Sample:
  – S&P 500 companies with retirement program
  – Data from 11-k filing
  – 2.5 million participants, $102bn assets
Buy-and-Hold Raw Returns and Subsequent Allocations to Company Stock as a Percentage of Discretionary Contributions

This table displays equally weighted mean allocations to company stock (as a percentage of discretionary contributions) by quintile of past buy-and-hold raw returns. Company stock allocations are measured at the end of 1993. Portfolio 1 (5) includes retirement savings plans with the lowest (highest) past buy-and-hold raw returns. The table also provides the difference between the allocations of the extreme portfolios (i.e., portfolio 5 minus portfolio 1) and t-statistics. N = 142.

<table>
<thead>
<tr>
<th>Quintiles Formed on the Basis of Buy-and-Hold Raw Returns for:</th>
<th>Quintile of Buy-and-Hold Returns</th>
<th>Observed Difference (5 – 1)</th>
<th>T-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior year</td>
<td>(Low) 1 2 3 4 5 (High)</td>
<td>2.60%</td>
<td>0.60</td>
</tr>
<tr>
<td>Prior 2 years</td>
<td>21.10% 23.16% 27.85% 25.99% 23.70%</td>
<td>0.35</td>
<td>0.06</td>
</tr>
<tr>
<td>Prior 3 years</td>
<td>22.61% 22.43% 25.18% 28.74% 22.96%</td>
<td>13.64</td>
<td>3.33</td>
</tr>
<tr>
<td>Prior 4 years</td>
<td>14.14% 25.45% 26.21% 28.84% 27.78%</td>
<td>18.49</td>
<td>4.64</td>
</tr>
<tr>
<td>Prior 5 years</td>
<td>11.74% 22.20% 28.18% 31.10% 30.23%</td>
<td>18.57</td>
<td>4.33</td>
</tr>
<tr>
<td>Prior 6 years</td>
<td>12.64% 18.68% 26.27% 34.66% 31.21%</td>
<td>17.97</td>
<td>4.63</td>
</tr>
<tr>
<td>Prior 7 years</td>
<td>11.99% 18.72% 29.33% 33.45% 29.96%</td>
<td>22.34</td>
<td>5.87</td>
</tr>
<tr>
<td>Prior 8 years</td>
<td>11.36% 18.98% 24.11% 34.79% 33.70%</td>
<td>22.17</td>
<td>5.70</td>
</tr>
<tr>
<td>Prior 9 years</td>
<td>11.46% 20.69% 24.22% 32.96% 33.63%</td>
<td>25.60</td>
<td>6.49</td>
</tr>
<tr>
<td>Prior 10 years</td>
<td>11.08% 20.76% 20.52% 34.04% 36.68%</td>
<td>29.33</td>
<td>8.39</td>
</tr>
</tbody>
</table>

- Very large effect of past returns + Effect depends on long-term performance
- Is the effect due to inside information?

<table>
<thead>
<tr>
<th>Allocation to company stock as a percentage of discretionary contributions</th>
<th>Allocation to Company Stock</th>
<th>Observed Difference (5 - 1)</th>
<th>Threshold for Significant Difference at $\alpha = 10%$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocation to company stock</td>
<td>(Low) 1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Allocation to company stock</td>
<td>4.59%</td>
<td>12.19%</td>
<td>19.34%</td>
</tr>
<tr>
<td>One-year returns</td>
<td>6.64</td>
<td>6.55</td>
<td>1.27</td>
</tr>
<tr>
<td>Two-year returns</td>
<td>43.69</td>
<td>40.78</td>
<td>38.24</td>
</tr>
<tr>
<td>Three-year returns</td>
<td>59.29</td>
<td>70.28</td>
<td>68.64</td>
</tr>
<tr>
<td>Four-year returns</td>
<td>101.08</td>
<td>114.55</td>
<td>109.89</td>
</tr>
</tbody>
</table>

- No evidence of insider information

- Over-inference pattern observed for investors of all types
• Over-inference pattern observed for investors of all types

• **Barber-Odean-Zhou (JFE, forthcoming):** Uses Individual trades data
  – Individual US investors purchase stocks with high past returns
  – Average stock that individual investors purchase outperformed the stock market in the previous three years by over 60 percent

• This implies effect on pricing: Stocks with high past returns get overpriced
  -> Later mean-revert

• **DeBondt and Thaler (1985):**
  – Compare winners in the past 3 years to losers in past 3 years.
  – ‘Winners’ underperform the ‘losers’ by 25 percentage points over the next three years
• [Talk about Laibson JEP paper]
Barberis-Shleifer-Vishny (JFE, 1998)

- Alternative model of law of small number in financial markets.
- Draws of dividends are i.i.d.
- Investors believe that
  - draws come from ‘mean-reverting’ regime or ‘trending’ regime
  - ‘mean-reverting’ regime more likely ex ante
- Result: If investors observe sequence of identical signals,
  - Short-Run: Expect a mean-reverting regime (the gambler’s fallacy)
    - Returns under-react to information → Short-term positive correlation (momentum)
  - Long-run: Investors over-infer and expect a ‘trending’ regime → Long-term negative correlation of returns
5 Next Lecture

- Projection Bias

- Non-Standard Decision-Making

- Limited Attention
  - Financial Markets
  - Consumption