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

Stefano DellaVigna

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 1
Sources of Private Philanthropy, 2002

Source of gifts	Billions of dollars	Percent of total
Individuals	183.7	76.3
Foundations	26.9	11.2
Bequests	18.1	7.5
Corporations	12.2	5.1
Total for all Sources	240.9	100

Source: Giving USA, 2003

- – Giving fairly constant over time (Figure 1)

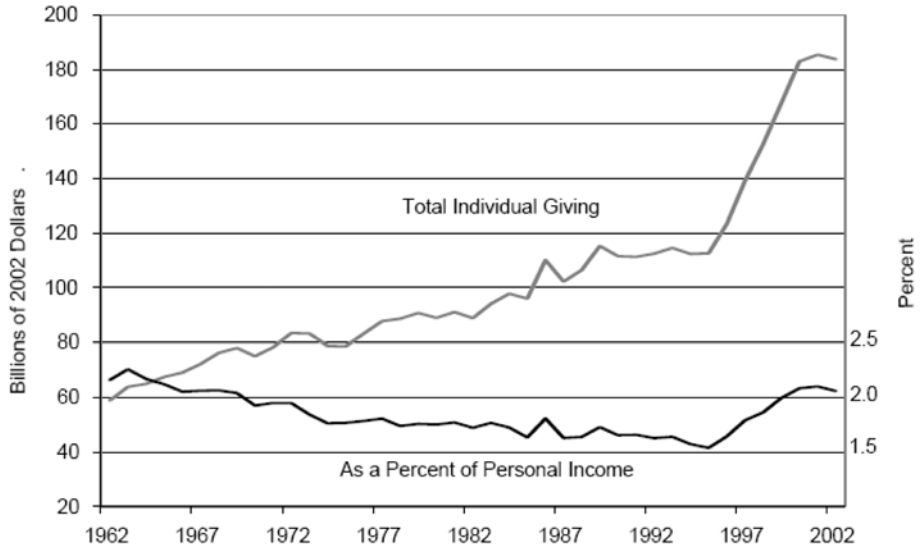


Figure 1: Trends in Individual Giving.
Source: Giving USA 2003.

- 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 2
Private philanthropy by income, age, and education of the giver, 1995

	Percent of households who give	Average amount given by those who give	Percent of household income
All contributing households	68.5	1,081	2.2
Household Income			
under $10,000	47.3	324	4.8
10,000–19,000	51.1	439	2.9
20,000–29,999	64.9	594	2.3
30,000–39,999	71.8	755	2.2
40,000–49,999	75.3	573	1.3
50,000–59,999	85.5	1,040	1.9
60,000–74,999	78.5	1,360	2.0
75,000-99,999	79.7	1,688	2.0
100,000 or above	88.6	3,558	3.0

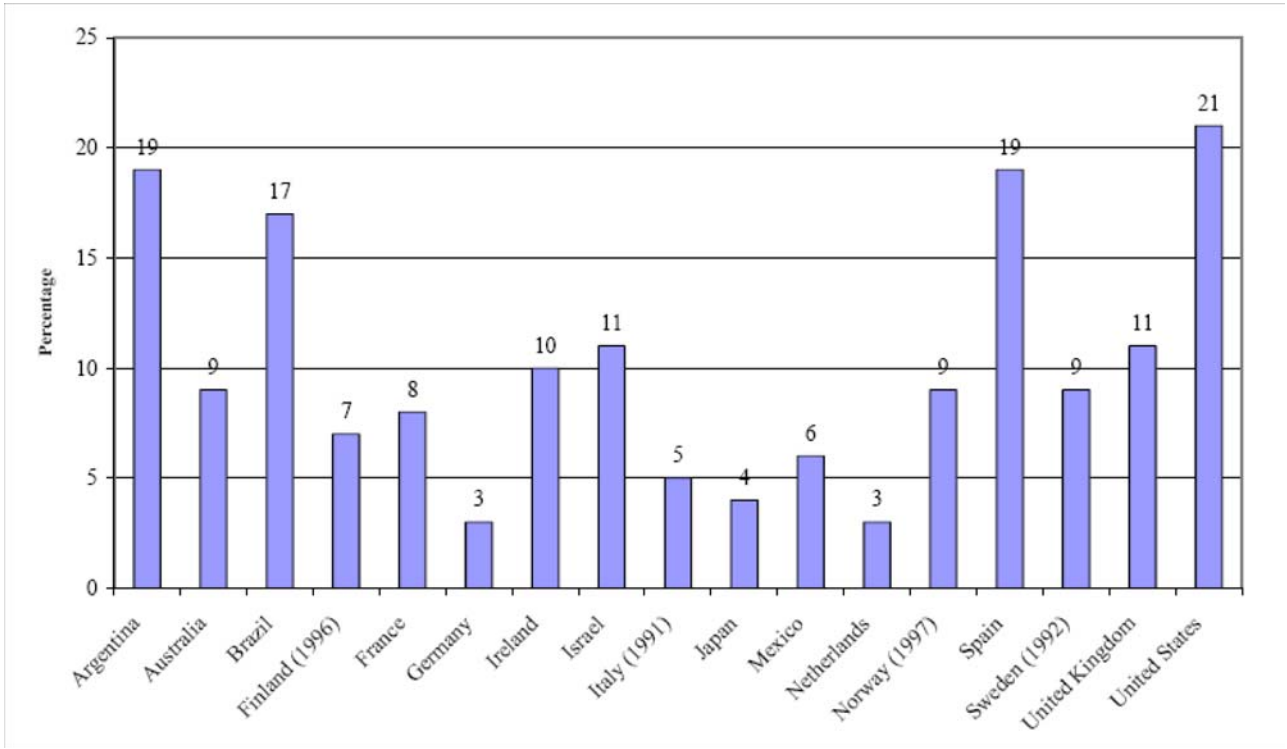
- Giving to whom? (Table 3)
  - Mostly for religion
  - Also: human services, education, health
  - Very little international donations

Table 3
Private Philantropy by Type of Charitable Organization, 1995.

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

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

TABLE 1
RESULTS OF THE FIELD EXPERIMENT

	10	10R	33	33R	67	67R
	A. Experimental Design					
Number of solicitations mailed	500	500	500	500	500	500
Seed money (%)	10%	10%	33%	33%	67%	67%
Seed money ($)	$300	$300	$1,000	$1,000	$2,000	$2,000
Refund offered?	no	yes	no	yes	no	yes
	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

- Huge effect of the seed money, less so of refund

- Interpretation: Presumably signalling of quality

- More recent work: **Landry et al. (QJE, 2006)**
  - Door-to-door fund-raising as oposed 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

TABLE IV

DICHOTOMOUS CONTRIBUTION DECISION AND SOLICITOR CHARA

	Model A	Model B	Model C	Model D	Model E
Overall constant—VCM is baseline	0.27**	0.28**	0.25**	0.27**	0.26**
	(0.03)	(0.08)	(0.07)	(0.08)	(0.07)
VCM with seed money	−0.11**	−0.08	−0.07	−0.06	−0.07
	(0.04)	(0.06)	(0.05)	(0.05)	(0.05)
Single-prize lottery	0.20**	0.19**	0.20**	0.21**	0.19**
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Multiple-prize lottery	0.15**	0.18**	0.20**	0.21**	0.20**
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Solicitor beauty rating		0.07**			
		(0.03)			
Beauty—male solicitor			−0.02	−0.03	−0.04
			(0.04)	(0.04)	(0.04)
Beauty—female solicitor			0.12**	0.13**	0.12**
			(0.04)	(0.04)	(0.04)

- 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

LA RABIDA
CHILDREN'S HOSPITAL

Fundraising Campaign for La Rabida Children's Hospital

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

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

LA RABIDA
CHILDREN'S HOSPITAL

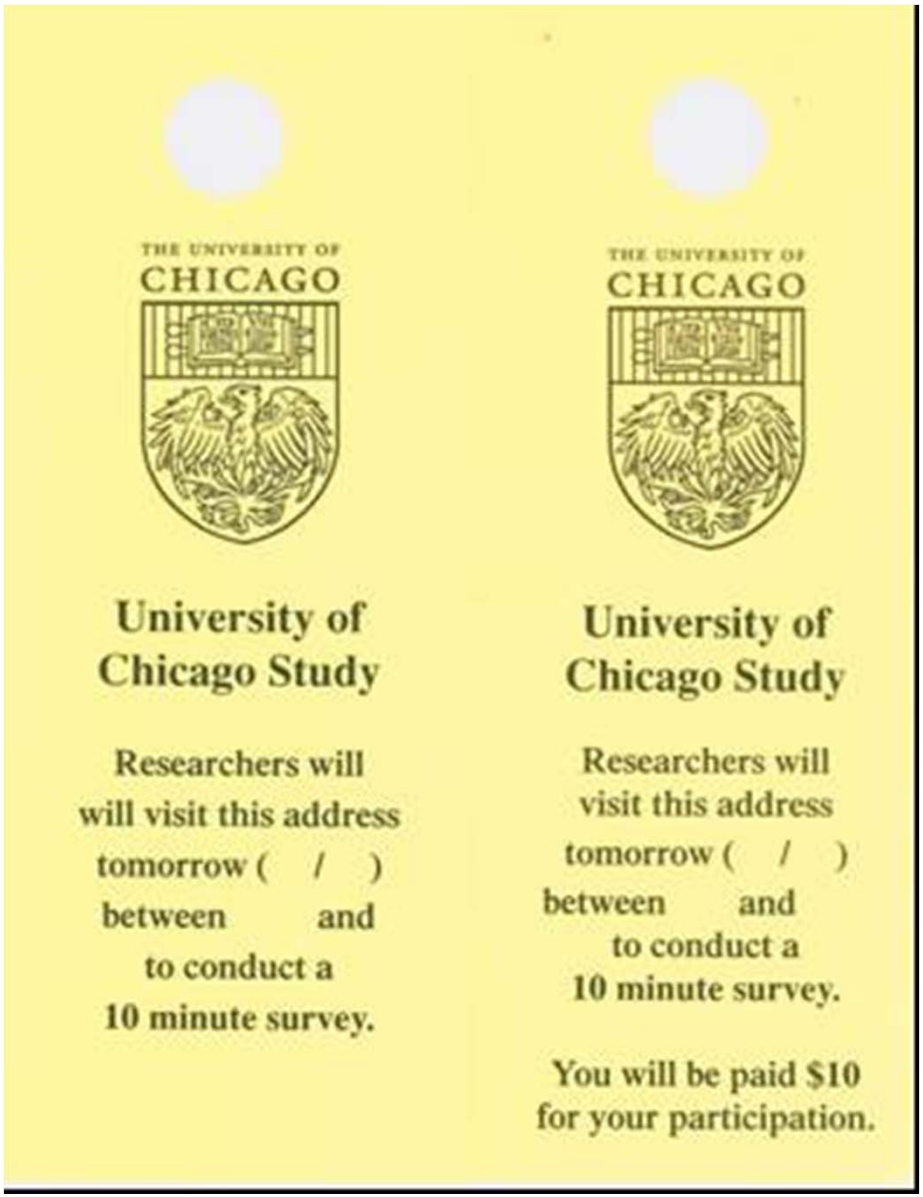
Fundraising Campaign for La Rabida Children's Hospital

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

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



THE UNIVERSITY OF
CHICAGO

University of Chicago Study

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

THE UNIVERSITY OF
CHICAGO

University of Chicago Study

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

You will be paid $10 for your participation.

- **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:

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

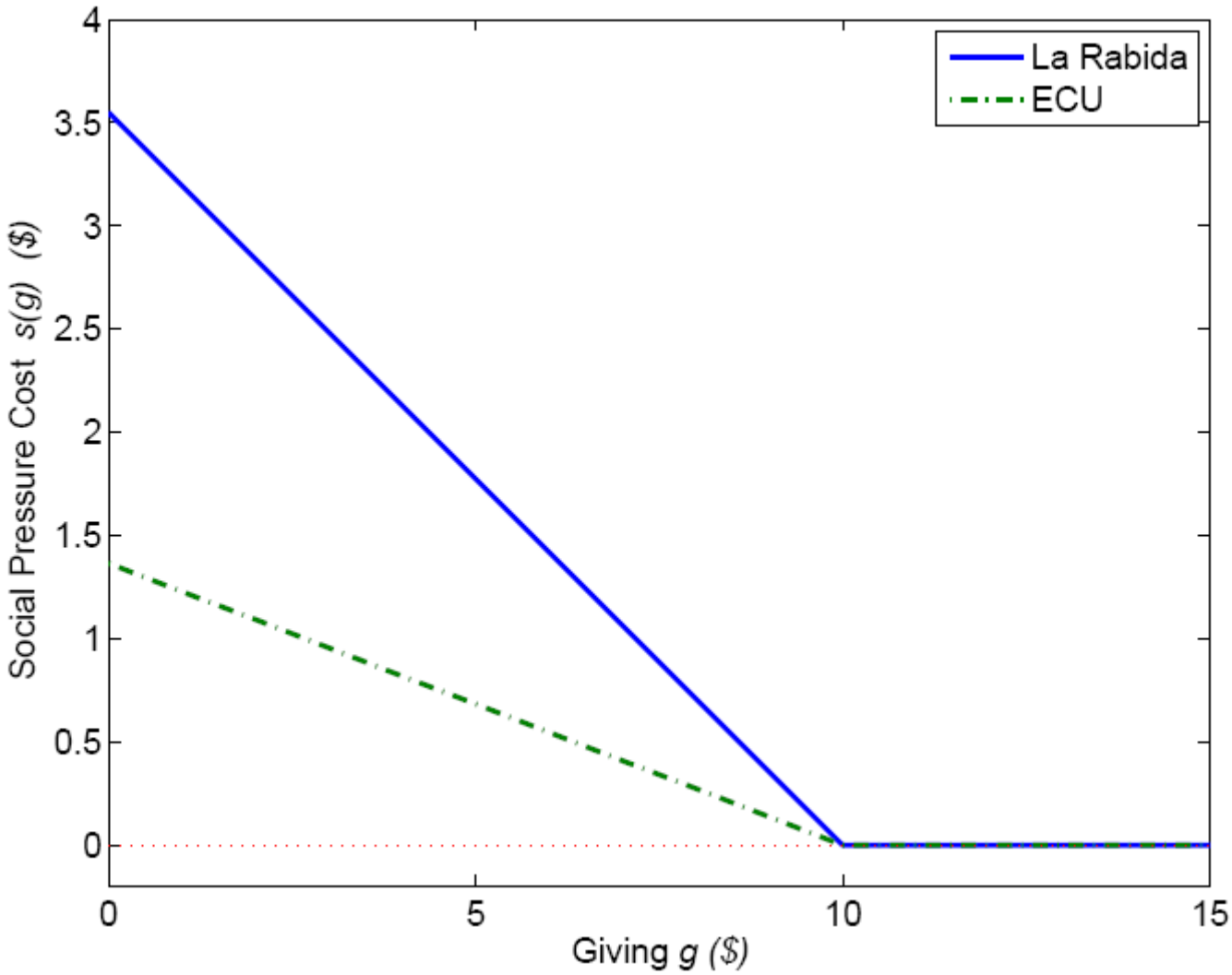
- Agent cares about:
  - Private consumption $u(W - g - g_m)$, with $u'(\cdot) > 0$ and $u''(\cdot) \leq 0$
  - Giving to charity $av(\cdot, G_{-i})$, with $v'_g(\cdot,\cdot) > 0$, $v''_{g,g}(\cdot,\cdot) < 0$, $\lim_{g\to\infty} v'_g(g,\cdot) = 0$, and $v(0, G_{-i}) = 0$.

- 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
  - *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 $s(g) = S(g^s - g) \cdot \mathbf{1}_{g<g^s} \geq 0$
  - Social pressure $s = 0$ if not at home or if giving $g \geq g^s$ (socially acceptable amount)
  - Social pressure $s > 0$ for giving $g < g^s$, decreasing in g
- Captures identity (Akerlof and Kranton, 2000), social norms, or self-signalling (Bodner and Prelec, 2002; Grossman, 2007)
- 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

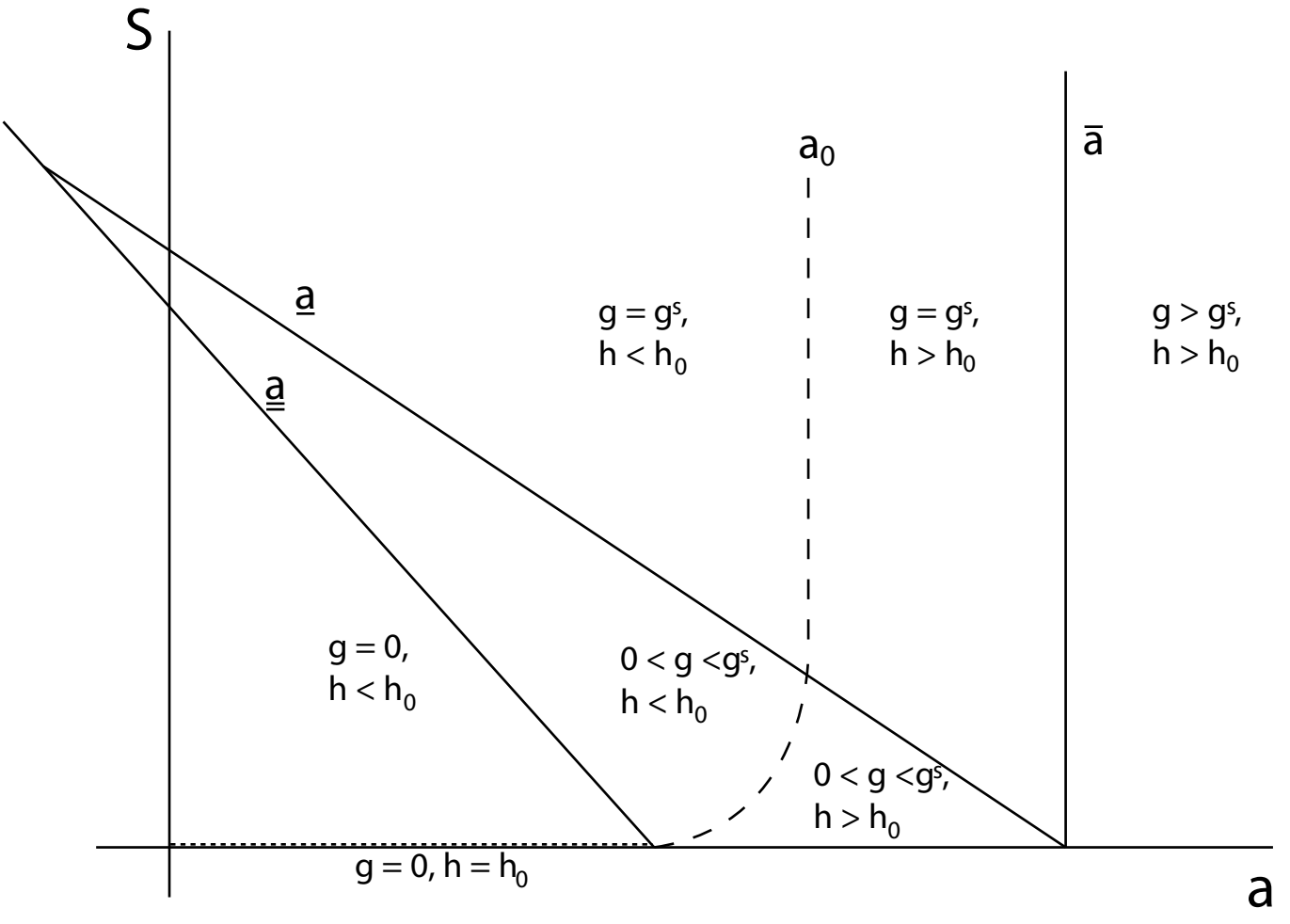


- **Second-stage Maximization (Giving)**

- **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 $a \leq \underline{\underline{a}}$; (ii) $0 < g^*(a, S) < g^s$ for $\underline{\underline{a}} < a < \underline{a}$; (iii) $g^*(a, S) = g^s$ for $\underline{a} \leq a \leq \bar{a}$; (iv) $g^*(a, S) > g^s$ for $a > \bar{a}$.*

- 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, $g_m^*(a) \leq g^*(a; S)$.*


S
a
a_0
$\bar{a}$
$\underline{a}$
$\underline{\underline{a}}$
g = g^s, h < h_0
g = g^s, h > h_0
g > g^s, h > h_0
g = 0, h < h_0
0 < g < g^s, h < h_0
0 < g < g^s, h > h_0
g = 0, 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* $a \leq \underline{\underline{a}}$ *and* $h^*(a, 0) > h_0$.
  - *For* $S > 0$ *(social pressure),* $h^*(a, S) < h_0$ *for* $a \leq \underline{\underline{a}}$; *there is unique* $a_0(S) \in (\underline{\underline{a}}, \bar{a})$ *such that* $h^*(a_0(S)) = h_0$.

- *Giving due to altruism* –> $h > h_0$ (Seek being at home)

- *Giving due to social pressure* –> $h < h_0$ (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 $0 < h < h_0$)

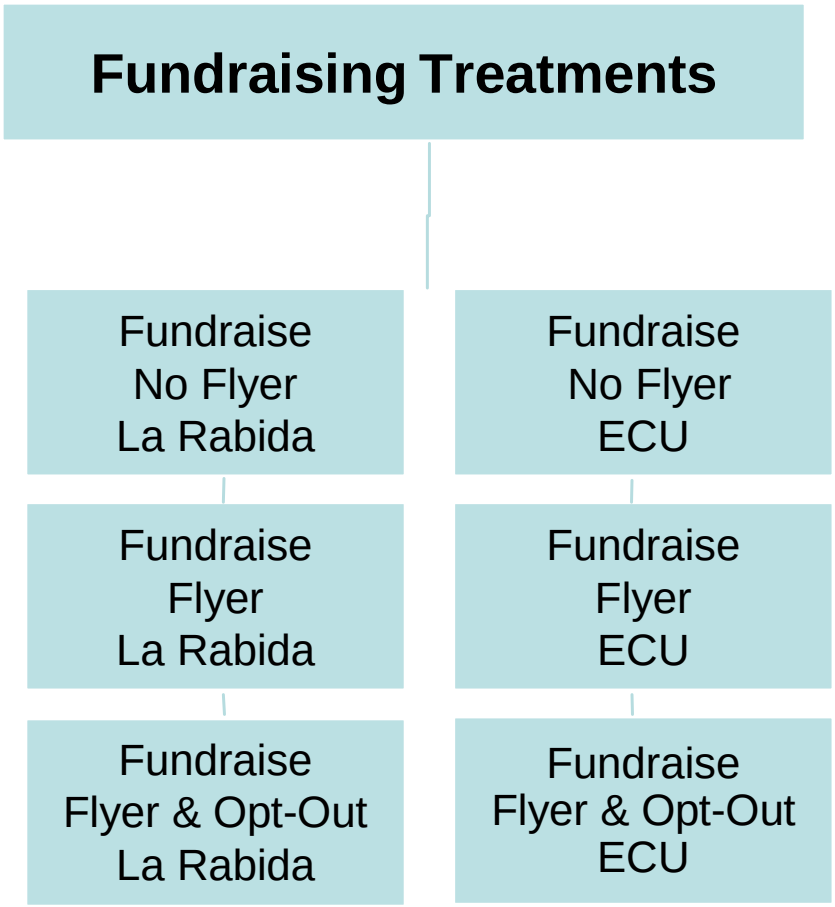
- **Lemma 3 (Opt-Out Decision).** *For $S = 0$ (no social pressure), the agent never opts out for any a. For $S > 0$ (social pressure), the agent opts out for sufficiently low altruism, $a < a_0(S)$.*

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

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

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

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


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

Experimental Design

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

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

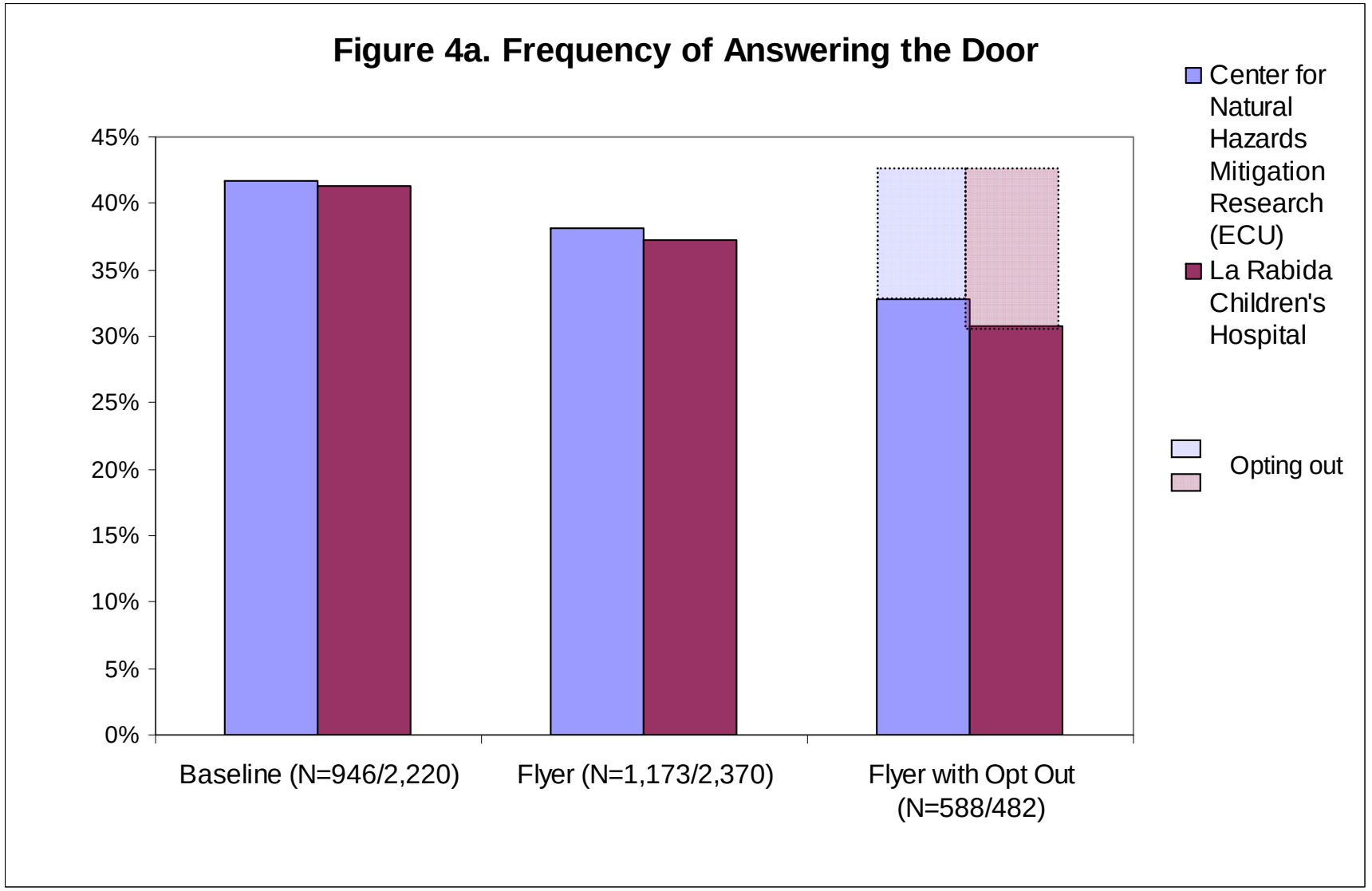


Figure 4a. Frequency of Answering the Door
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Baseline (N=946/2,220)
Flyer (N=1,173/2,370)
Flyer with Opt Out (N=588/482)
Center for Natural Hazards Mitigation Research (ECU)
La Rabida Children's Hospital
Opting out

Figure 4b. Frequency of (Unconditional) Giving

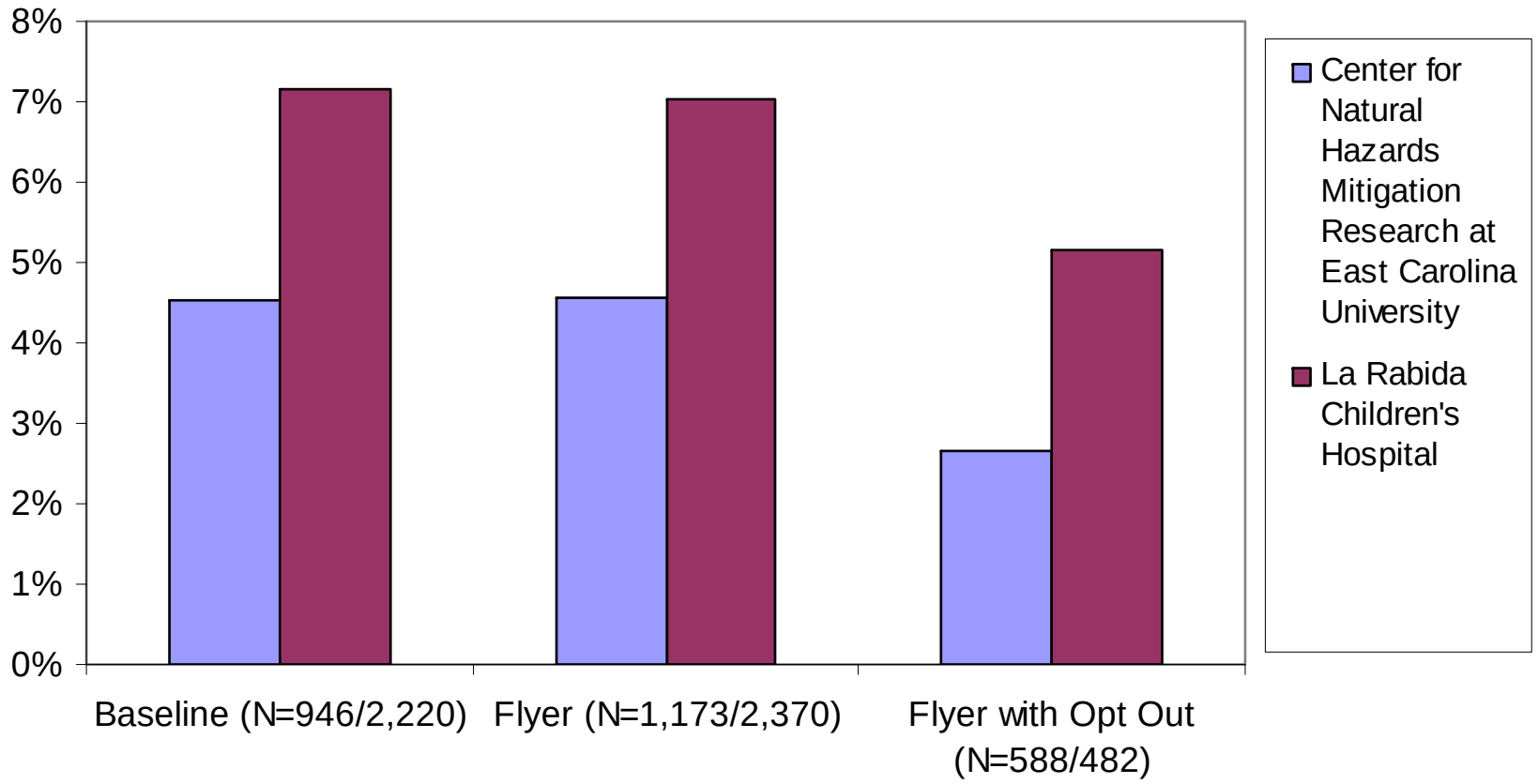


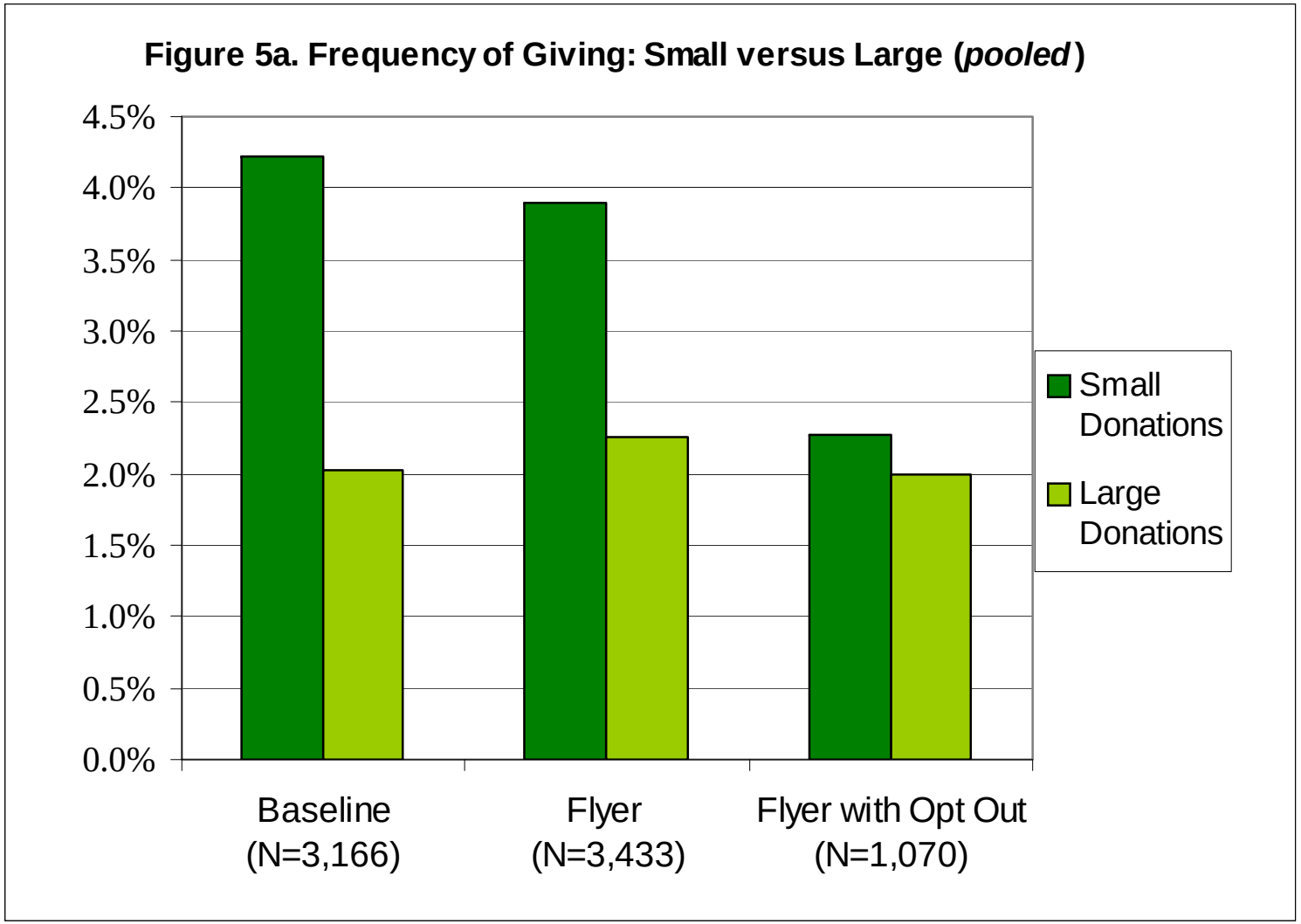
Table 2. Results for Fund-Raising Treatments

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

- **Evidence by Donation Size:**

  Social pressure more likely to yield small donations

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



- **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

Number of Households Giving (Mail/Internet)	
ECU	La Rabida
(7)	(8)
Zero donations across all treatments	One ($25) donation across all treatments
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

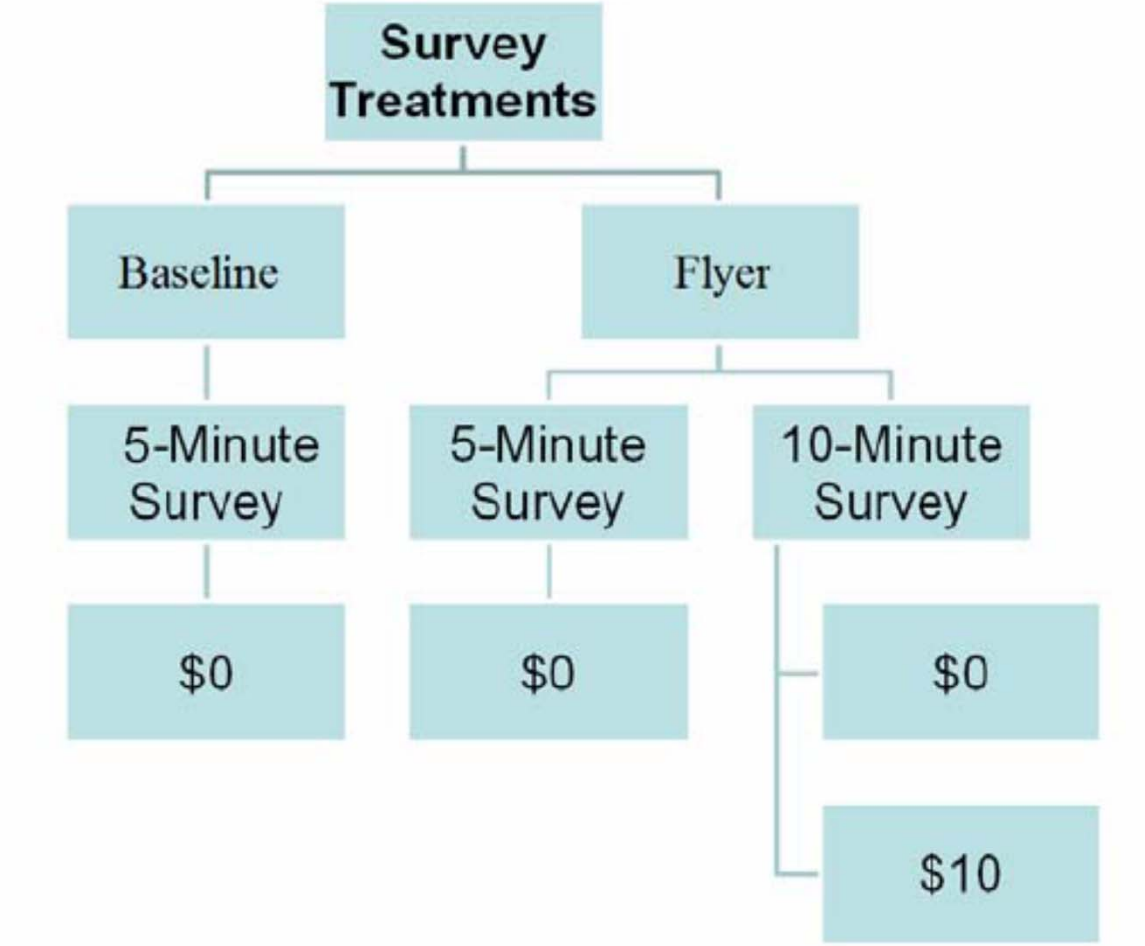
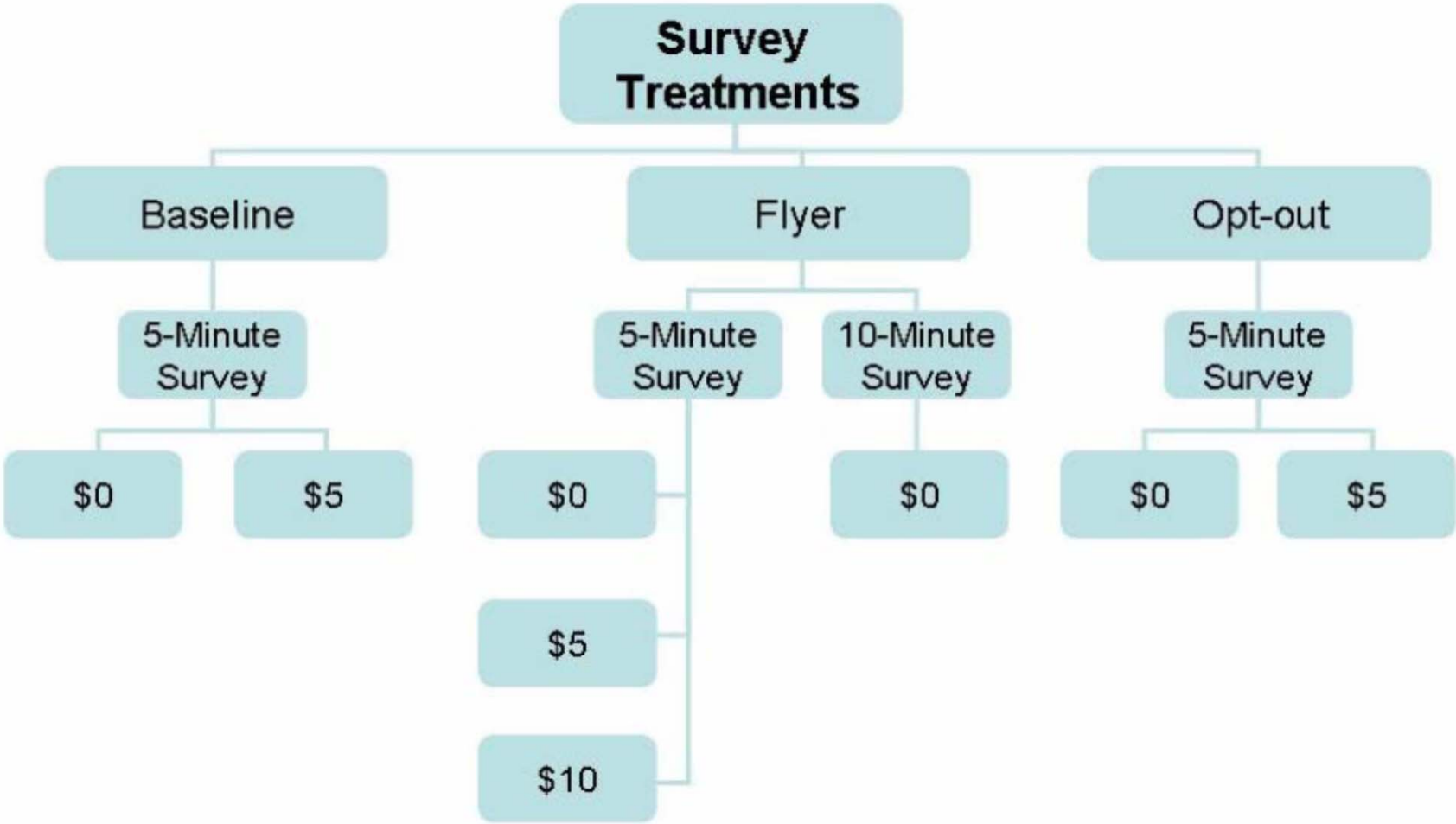
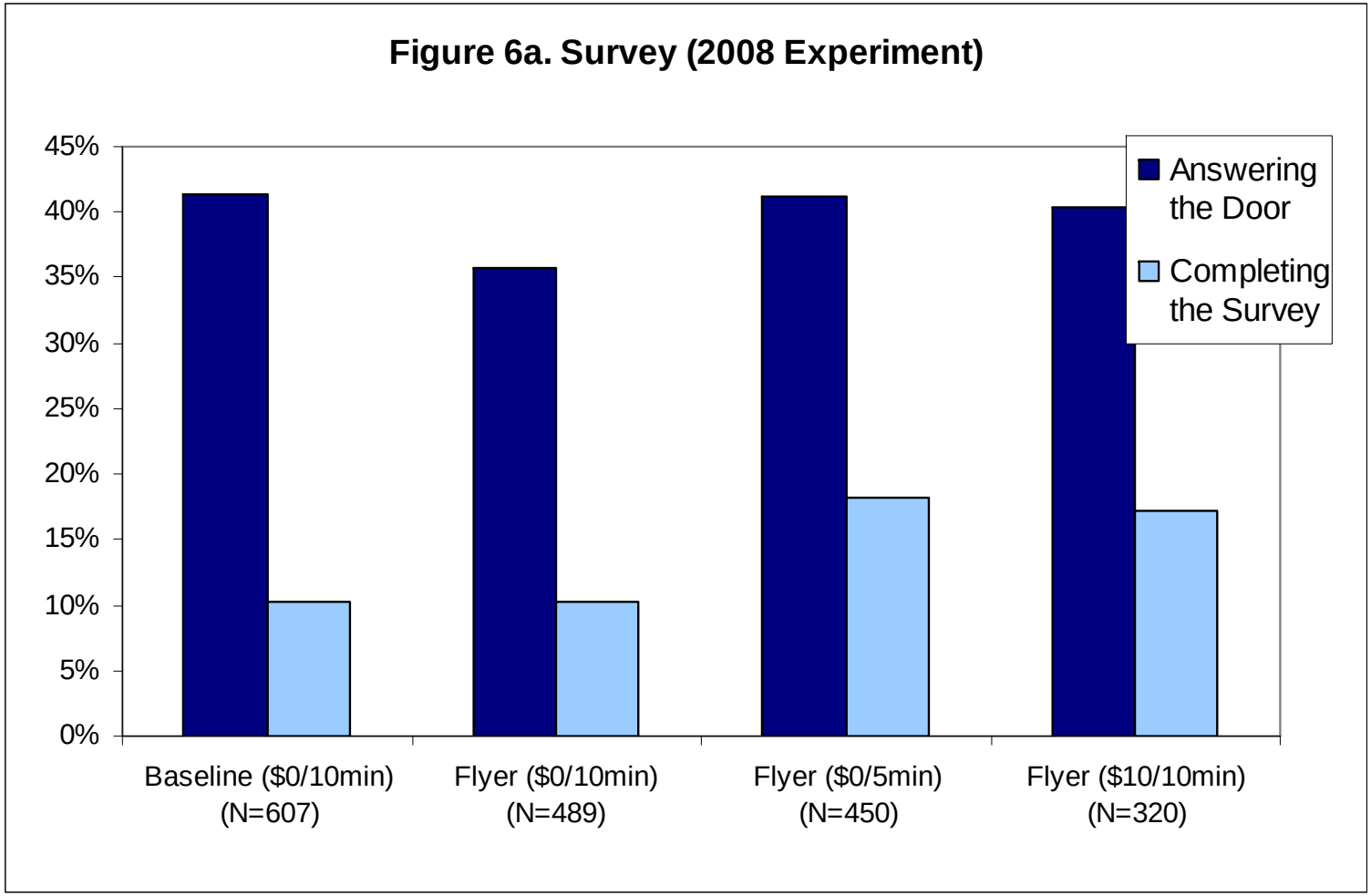


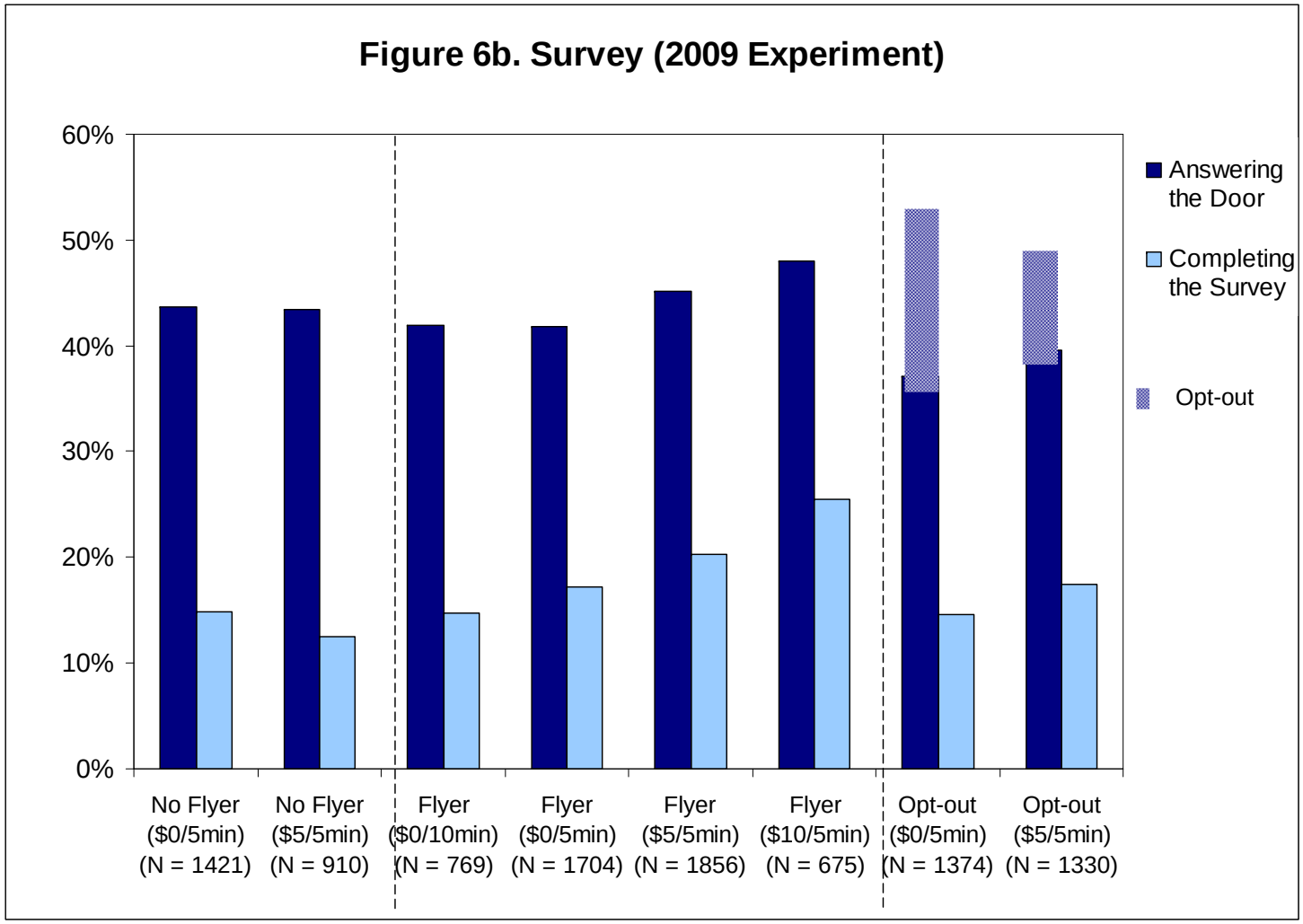
Figure 2b. Summary of Door-to-Door Experimental Treatments Run in 2009





- **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 $(P(OO)_{OO}^c,\ c = LaR, Ecu)$
  3. Probability of giving at all, and giving an amount range $(P(G)_j^c,\ j = F, NF, OO,\ c = LaR, Ecu)$
  4. Probability of opening door in survey $(P(H)_j^S)$
  5. Probability of filling survey $(P(S)_j^S)$

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

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

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

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

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

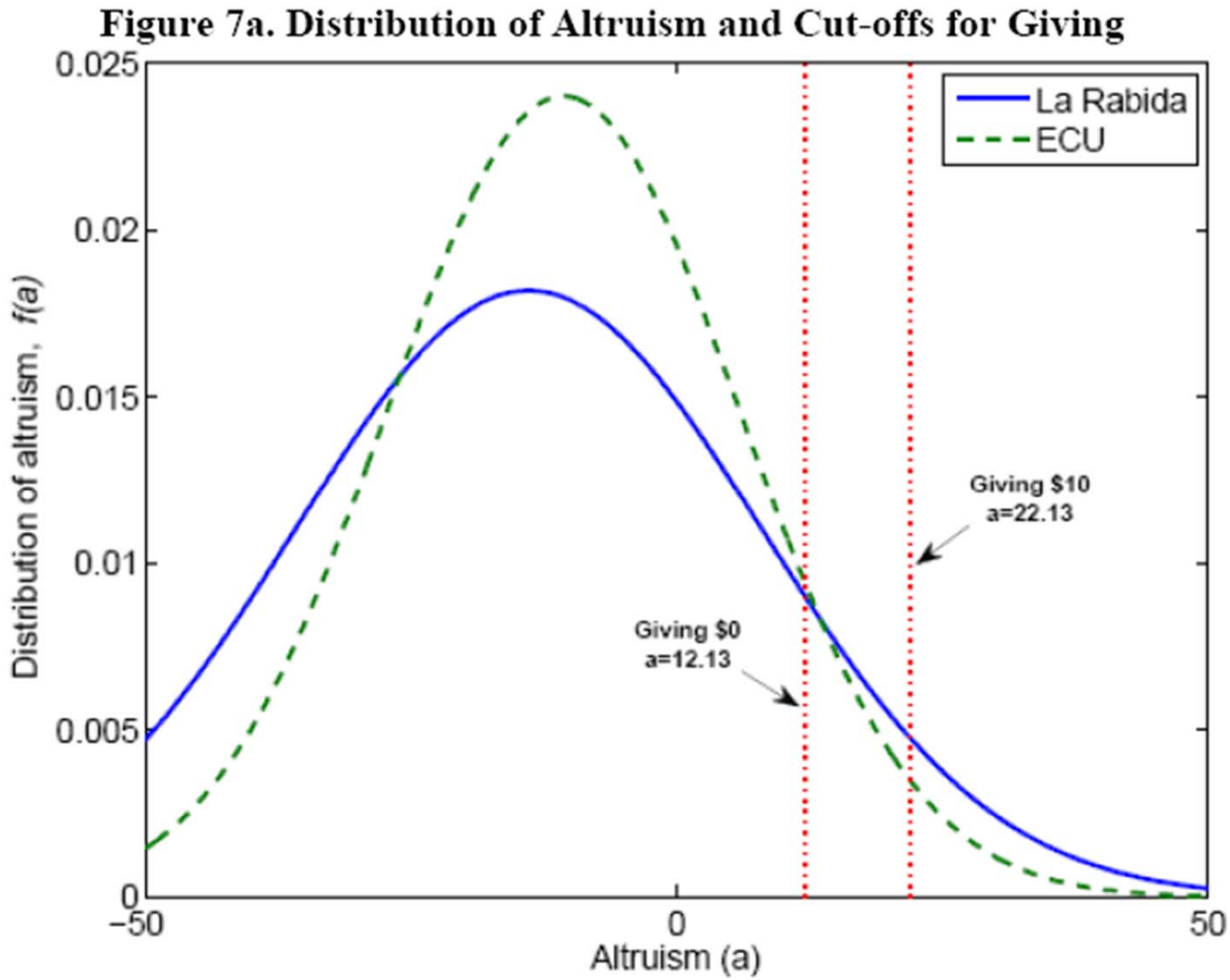
Appendix Table 1. Empirical Moments and Estimated Moments

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

Table 4. Minimum-Distance Estimates: Benchmark Results

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

Implied distribution of altruism

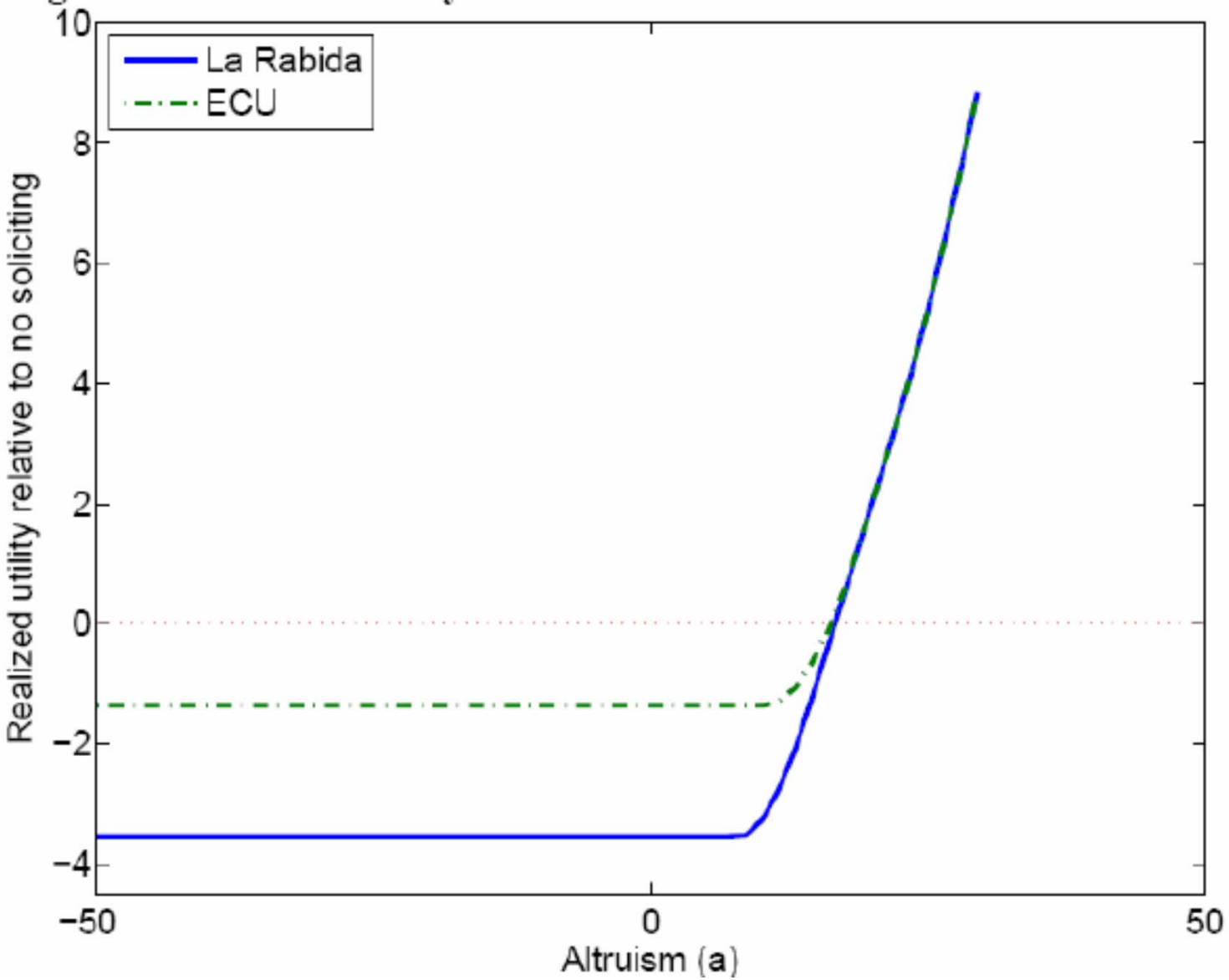


Marginal utility of giving (for $S = 0$) is $a/(G+g)-1$

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

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

Flyer and opt-out treatment increase solicitee welfare

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

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

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

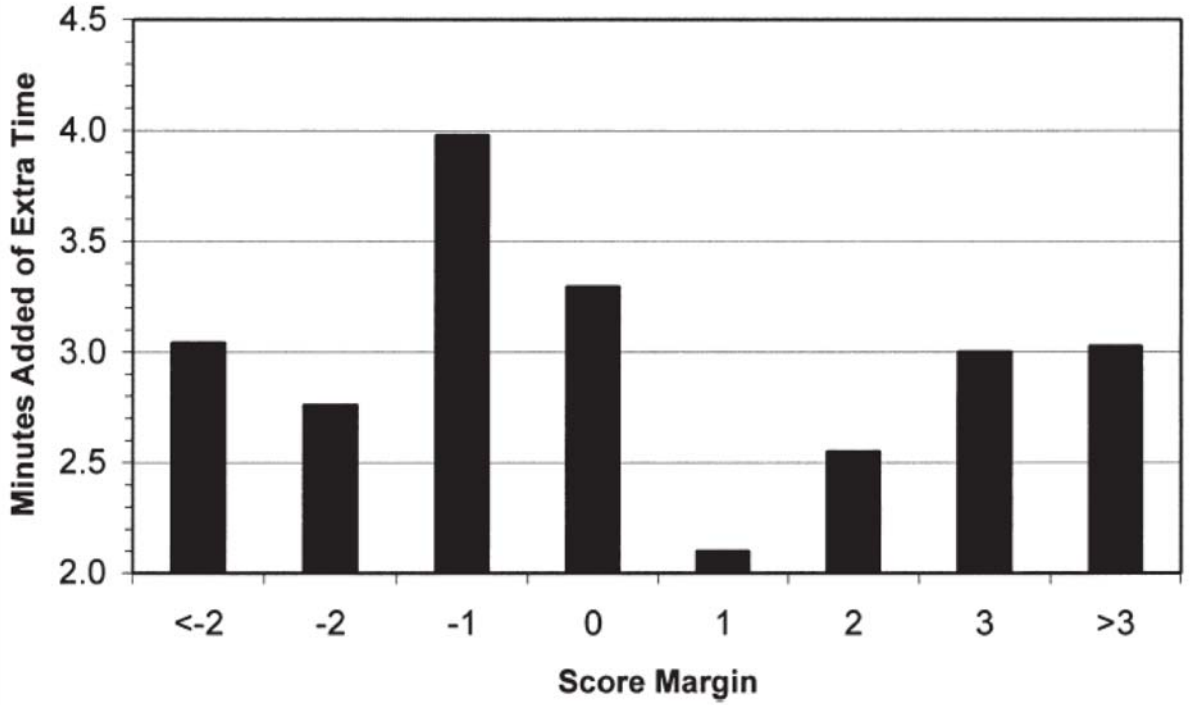
- An example of social pressure in a public event

- **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

FIGURE 1.—INJURY TIME AWARDED BY SCORE MARGIN



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

- Table 5. Response to incentives –> After 1994, 3 points for winning (1 for drawing, 0 for losing).

TABLE 5.—MARGINAL EFFECT OF INCENTIVES ON INJURY TIME

Statistic	[1]	[2]
Constant	3.50**	3.11**
	(0.14)	(0.32)
Score Difference	**−1.53****	**−1.56****
	(0.18)	**(0.18)**
Year Effect	0.81**	0.7**
	(0.18)	(0.21)
Year × Score Difference	**−0.58***	**−0.52***
	(0.23)	**(0.23)**
Yellow Cards		0.07**
		(0.02)

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

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

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

- P*eer 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

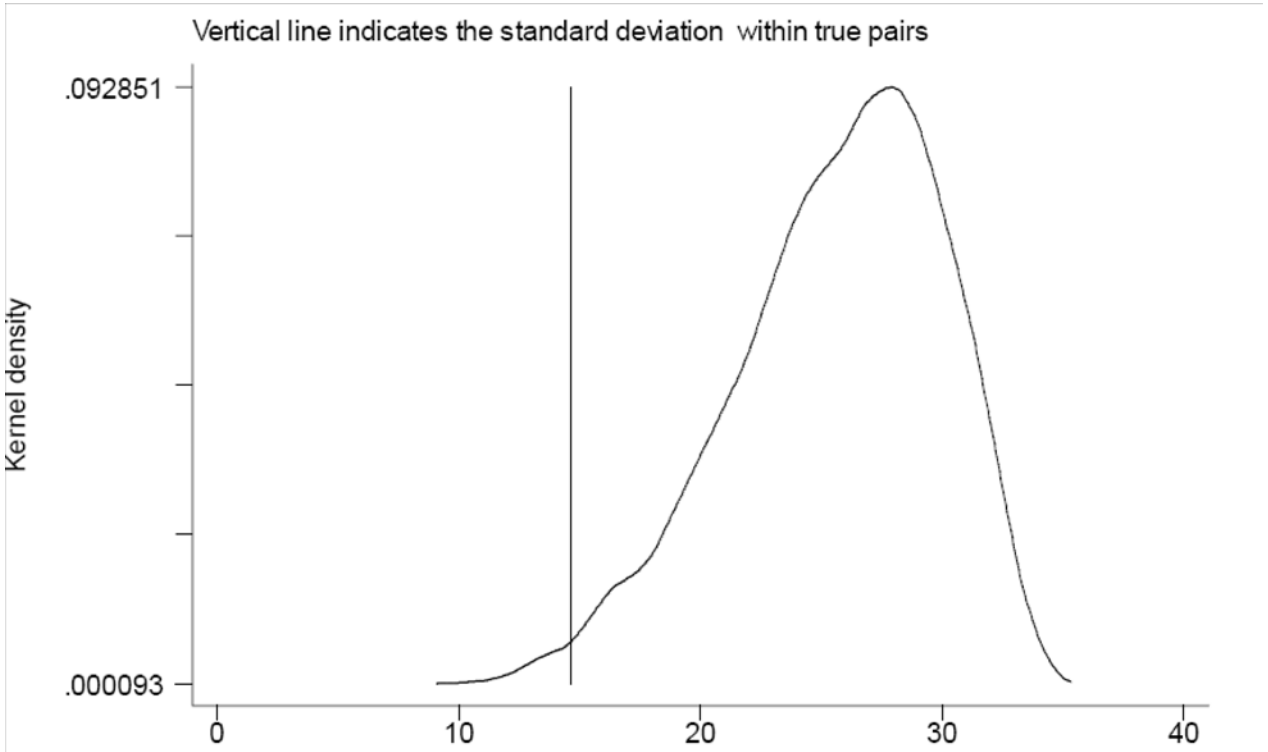


Fig. 3: St. dev. within true and hypothetical pairs in pair sample

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

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

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

- 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

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

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

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

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

Entry of above average productivity worker	0.011 (0.001)	
Exit of an above average productivity worker	-0.005 (0.001)	
Shift entry of above average productivity worker		0.006 (0.002)
Shift exit of an above average productivity worker		-0.006 (0.002)
Controls	Yes	Yes

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

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

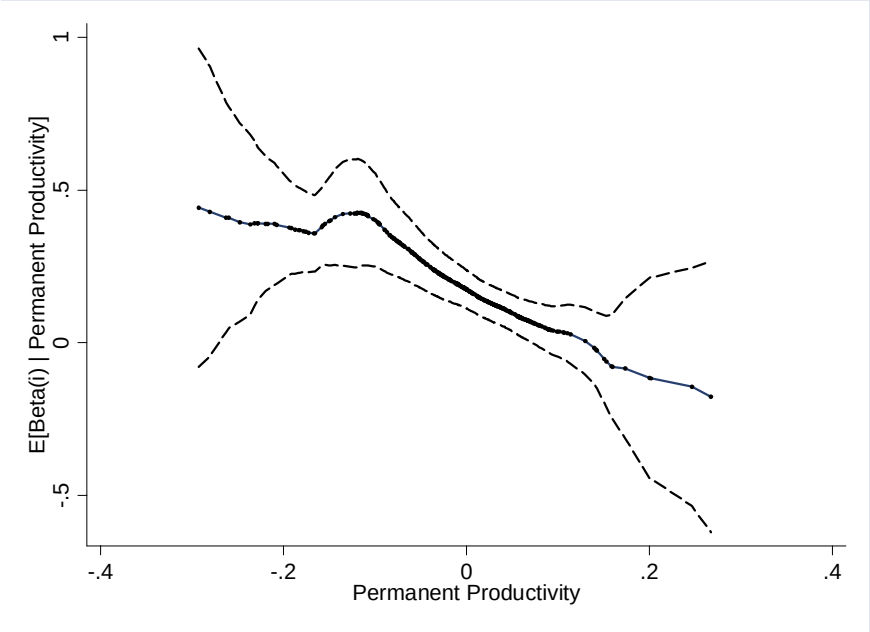
$$\Delta y_{itcs} = \beta \Delta \bar{\theta}_{-ist} + \gamma_{tds} + \psi \Delta X_{tcs} + e_{itcs}$$

Individual-specific Spillover

- Our longitudinal data allow for models with an individual-specific spillover effect, β_i:

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

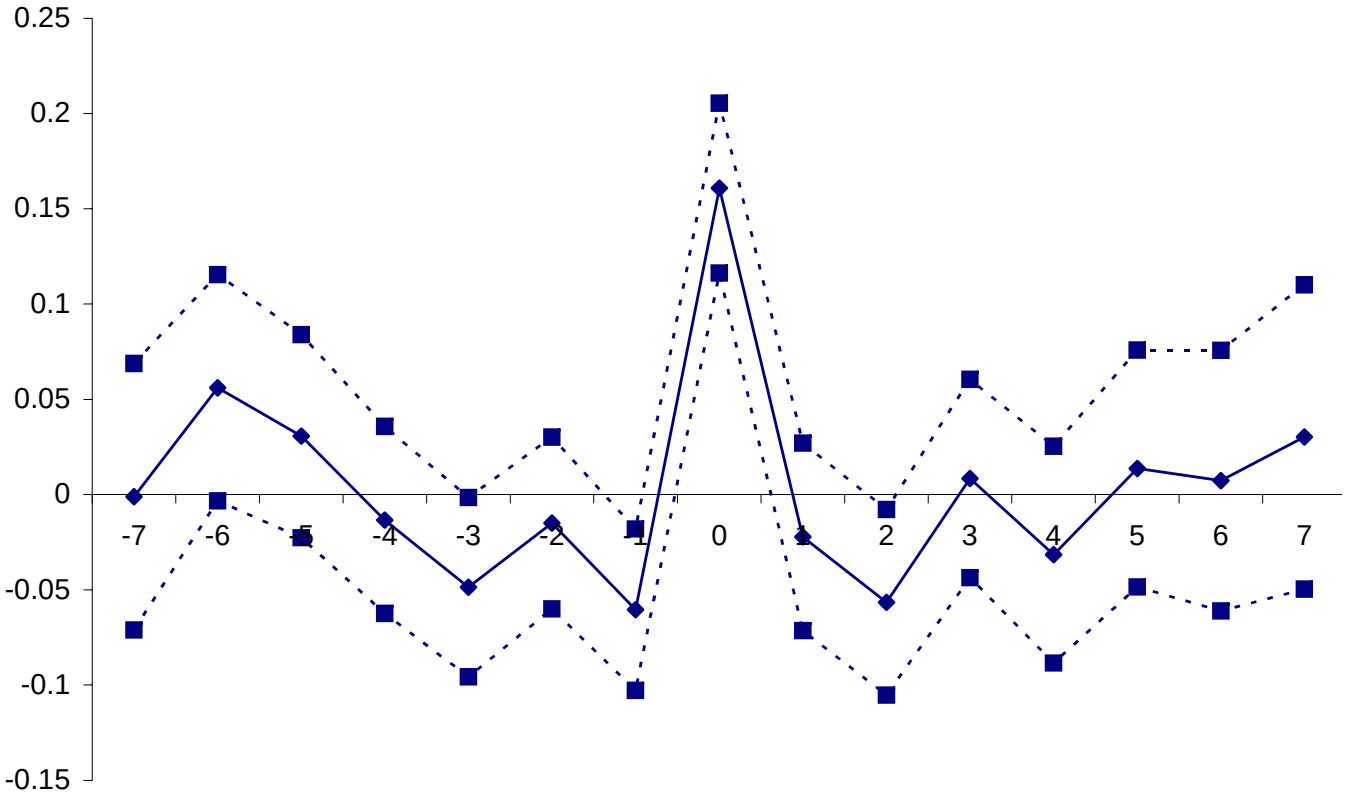
The relationship between individual permanent productivity and worker specific spillover effect



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



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

What explains spillovers?

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

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

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

Table 5: Models by spatial orientation and proximity

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

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

	(1)
(I) Δ Co-worker permanent	0.013
prod: low exposure	(0.012)
(II) Δ Co-worker permanent	0.084
prod: medium exposure	(0.014)
(III) Δ Co-worker permanent	0.075
prod: high exposure	(0.017)
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

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

- In these experiments, typically mailings are the cheapest, but also the least effective get-out-the-vote treatment

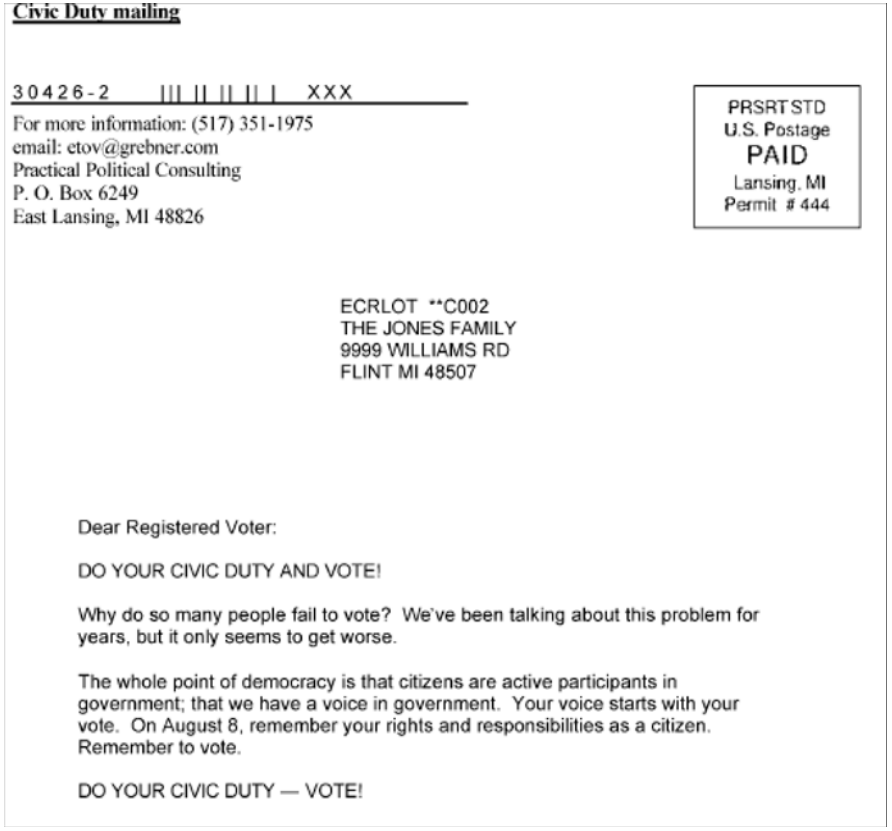
- **Gerber, Green, and Larimer (APSR, 2008):** Add social pressure to these treatments

- Setting:
  - August 2006, Michigan
  - Primary election for statewide offices
  - Voter turnout 17.7% registered voters

- Experimental sample: 180,000 households on Voter File

- Mailing sent 11 days prior to election

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



Civic Duty mailing

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

For more information: (517) 351-1975
email: etov@grebner.com
Practical Political Consulting
P. O. Box 6249
East Lansing, MI 48826

PRSRT STD
U.S. Postage
PAID
Lansing, MI
Permit # 444

ECRLOT **C002
THE JONES FAMILY
9999 WILLIAMS RD
FLINT MI 48507

Dear Registered Voter:

DO YOUR CIVIC DUTY AND VOTE!

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

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

DO YOUR CIVIC DUTY — VOTE!

- – *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!

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

Dear Registered Voter:

WHO VOTES IS PUBLIC INFORMATION!

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

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

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

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

DO YOUR CIVIC DUTY—VOTE!

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

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

Dear Registered Voter:

WHAT IF YOUR NEIGHBORS KNEW WHETHER YOU VOTED?

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

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

DO YOUR CIVIC DUTY — VOTE!

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

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

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

- Non-standard preferences
  - Self-Control Problems (β, δ)
  - 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:

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

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

- Distribution for agent differs from actual distribution: $\tilde{p}\left(s_t\right) \neq p\left(s_t\right)$

- Three main examples:
  1. *Overconfidence*. Overestimate one's own skills (or precision of estimate): $\tilde{p}\left(good\ state_t\right) > p\left(good\ state_t\right)$
  2. *Law of Small Numbers.* Gambler's Fallacy and Overinference in updating $\tilde{p}\left(s_t | s_{t-1}\right)$
  3. *Projection Bias.* Expect future utility $\widetilde{U}\left(x_i^t | s_t\right)$ 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*)

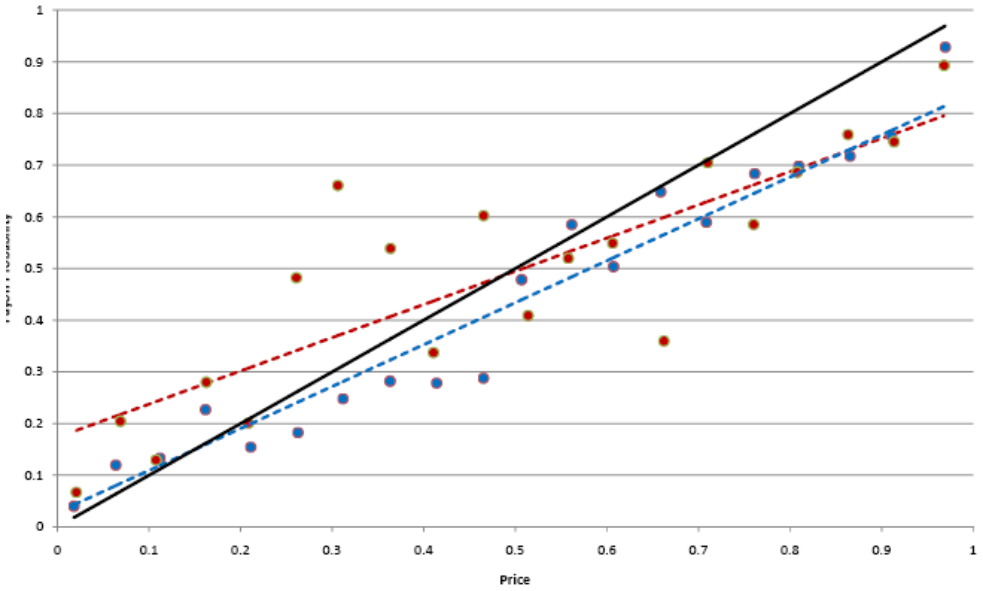
- Psychology: Evidence on overconfidence/overoptimism
  - **Svenson (1981):** 93 percent of subjects rated their driving skill as above the median, compared to the other subjects in the experiment
  - **Weinstein (1980):** Most individuals underestimate the probability of negative events such as hospitalization
  - **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)

- **Example 2. Overconfidence for employees: Cowgill, Wolfers, and Zitzewitz (2008)**
  - 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 (22,452and 42,416, respectively) are sorted into 20 bins according to price (i.e., 0-5, 5-10, 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

	Obs.	Avg price	Avg payoff	Return (SE)	
All markets	70,706	0.357	0.342	-0.015***	(0.003)
Markets with implication for Google	37,910	0.310	0.293	-0.017***	(0.004)
Two-outcome markets with implication for Google	9,023	0.509	0.492	-0.017***	(0.006)
Best outcome for Google	4,556	0.456	0.199	-0.256***	(0.063)
Worst	4,467	0.563	0.790	0.227***	(0.064)
Five-outcome markets with implication for Google	26,511	0.239	0.222	-0.017***	(0.005)
Best outcome for Google	5,592	0.244	0.270	0.027	(0.040)
2nd	5,638	0.271	0.246	-0.025	(0.066)
3rd	5,539	0.296	0.179	-0.118**	(0.053)
4th	5,199	0.206	0.178	-0.028	(0.041)
Worst	4,543	0.162	0.236	0.074	(0.056)

- 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).

  $\Rightarrow$ Merge if $e > 0$ (differences), where e is "synergies."

  $\Rightarrow$ First-best takeover decision.

- Post-acquisition value to current shareholders:

$$\overline{V} = V - (V_T - c) = (V_A + V_T + e - c) - (V_T - c) = V_A + e$$

$$\Rightarrow \frac{\partial \overline{V}}{\partial c} = 0 \text{ (}\textit{No financing prediction.}\text{)}$$

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

1. Hall-Liebman (1998)
   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/COMPUSTAT

   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

$$\Pr\{Y_{it} = 1 \mid X, O_{it}\} = G(\beta_1 + \beta_2 \bullet O_{it} + X^T\boldsymbol{\gamma})$$

with
- i company
- t year
- Y acquisition (yes or no)
- O overconfidence
- X controls

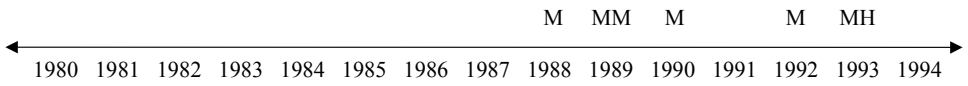
→ H_0: $\beta_2 = 0$ (overconfidence does not matter)
→ H_1: $\beta_2 > 0$ (overconfidence does matter)

Identification Strategy (I)

Case 1:

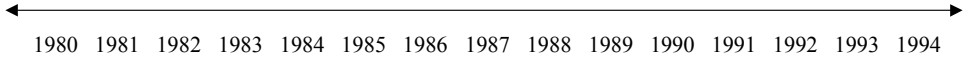
Wayne Huizenga (Cook Data Services/Blockbuster)

- 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)

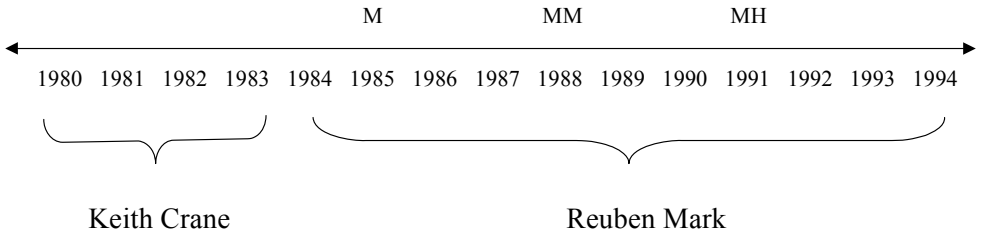


Table 4. Do Overconfident CEOs Complete More Mergers?

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

	logit with controls	random effects logit	logit with fixed effects
Size	**0.8733**	**0.8600**	**0.6234**
	(1.95)*	(2.05)**	(2.60)***
Q_{t-1}	**0.7296**	**0.7316**	**0.8291**
	(2.97)***	(2.70)***	(1.11)
Cash Flow	**2.0534**	**2.1816**	**2.6724**
	(3.93)***	(3.68)***	(2.70)***
Ownership	**1.2905**	**1.3482**	**0.8208**
	(0.30)	(0.28)	(0.11)
Vested Options	**1.5059**	**0.9217**	**0.2802**
	(1.96)*	(0.19)	(2.36)**
Governance	**0.6556**	**0.7192**	**1.0428**
	(3.08)***	(2.17)**	(0.21)
Longholder	**1.5557**	**1.7006**	**2.5303**
	(2.58)***	(3.09)***	(2.67)***
Year Fixed Effects	yes	yes	yes
Observations	3690	3690	2261
Firms		327	184

Table 6. Are Overconfident CEOs Right to Hold Their Options? (I)

Returns from exercising 1 year sooner and investing in the S&P 500 index	
Percentile	Return
10th	-0.24
20th	-0.15
30th	-0.10
40th	-0.05
50th	-0.03
60th	0.03
70th	0.10
80th	0.19
90th	0.39
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

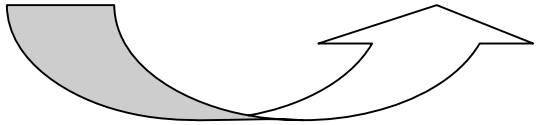
2. Stock Price Bubbles
   - Year effects already removed
   - All cross-sectional firm variation already removed
   - Lagged stock returns should explain merger activity

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).

	logit	logit with random effects	logit with fixed effects
Longholder	**1.6008**	**1.7763**	**3.1494**
	(2.40)**	(2.70)***	(2.59)***
Year Fixed Effects	yes	yes	yes
Observations	3690	3690	1577
Firms		327	128

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

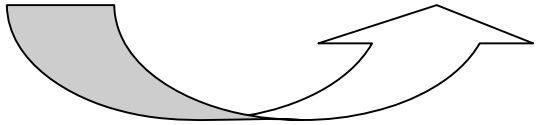
Longholder	**1.3762**	**1.4498**	**1.5067**
	(1.36)	(1.47)	(0.75)
Year Fixed Effects	yes	yes	yes
Observations	3690	3690	1227
Firms		327	100

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

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

- 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: Acquistion (yes or no)**; Normalization:** Capital.
All regressions are logit with random effects.

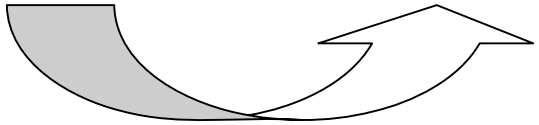
	Least Equity Dependent		---------->		Most Equity Dependent
			All Mergers		
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Longholder	**2.2861**	**1.6792**	**1.7756**	**1.9533**	**0.8858**
	(2.46)**	(1.48)	(1.54)	(1.50)	(0.33)
Year Fixed Effects	yes	yes	yes	yes	yes
Observations	718	719	719	719	718
Firms	125	156	168	165	152
			Diversifying Mergers		
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Longholder	**2.5462**	**1.8852**	**1.7297**	**1.0075**	**1.0865**
	(1.89)*	(1.51)	(1.36)	(0.01)	(0.18)
Year Fixed Effects	yes	yes	yes	yes	yes
Observations	718	719	719	719	718
Firms	125	156	168	165	152

Regressions include Cash Flow, Q_{t-1}, Size, Ownership, Vested Options, and Governance.

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

Empirical Specification

$$CAR_i = \beta_1 + \beta_2 \bullet O_i + X'\gamma + \varepsilon_i$$

with i company

O overconfidence

X controls

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

where $E[r_{it}]$ is daily S&P 500 returns (α=0; β=1)

Table 14. Market Response

Longholder = holds options until last year before expiration (at least once)
Dependent Variable: Cumulative abnormal returns [-1,+1]

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

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
2. Articles published 1980-1994
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).	logit	logit with random effects	logit with fixed effects
TOTALconfident	**1.6971**	**1.7826**	**1.5077**
	(2.95)***	(3.21)***	(1.48)
Year Fixed Effects	yes	yes	yes
Observations	3647	3647	1559
Firms		326	128
Dependent Variable: Intra-industry merger (yes or no).			
TOTALconfident	**1.0424**	**1.0368**	**0.8856**
	(0.20)	(0.16)	(0.31)
Year Fixed Effects	yes	yes	yes
Observations	3647	3647	1226
Firms		326	100
Regressions include Total Coverage, Cash Flow, Q_{t-1}, 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

Panel A: All Transactions

	n	84 trading days later	252 trading days later	504 trading days later
Purchases	49,948	1.83	5.69	−24.00
Sales	47,535	3.19	9.00	27.32
Difference		−1.36	−3.31	−3.32
N1		(0.001)	(0.001)	(0.001)
N2		(0.001)	(0.001)	(0.002)

- Is the result weaker for individuals that trade the most? No

Panel C: The 10 Percent of Investors Who Trade the Most

	n	84 trading days later	252 trading days later	504 trading days later
Purchases	29,078	2.13	7.07	25.28
Sales	26,732	3.04	9.76	28.78
Difference		−0.91	−2.69	−3.50
N1		(0.001)	(0.001)	(0.001)
N2		(0.001)	(0.001)	(0.010)

- 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
  - Tading 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

5 Next Lecture

- Projection Bias
- Non-Standard Decision-Making
- Limited Attention
  - Financial Markets
  - Consumption