The “Control Game”, Monetary Incentives and Crowding Out

Monetary rewards and crowding out

Monetary fines and crowding out

The “control game” and hidden costs of incentives

Social esteem explanations for crowding out

A test of the social esteem hypothesis

Crowding Out

By crowding out in this setting we mean counterproductive effects of monetary incentives (the introduction of the incentive may crowd out the intrinsic motivation to for instance perform a good deed or be productive).

In a famous book from 1970 (The Gift Relationship) the sociologist Richard Titmuss argued that paying people to donate blood could reduce the supply of blood donors.

Also a literature in psychology on that monetary rewards may lower intrinsic motivation (e.g. Deci, Journal of Personality and Social Psychology 1971). But the idea has only been taken seriously by economists relatively recently.

Paying for Blood Donation (Mellström and Johannesson JEEA 2008)

Setting: Subjects (n=262) are given the opportunity to become blood donors (complete a health examination consisting of a health declaration and a physical examination at the Regional Blood Center at Sahlgrenska University Hospital in Gothenburg). Subjects are offered different incentive schemes to become a blood donor depending on the experimental treatment.

Treatments:

1. No compensation.

2. A SEK 50 compensation.

3. A choice between SEK 50 or donating SEK 50 to charity.

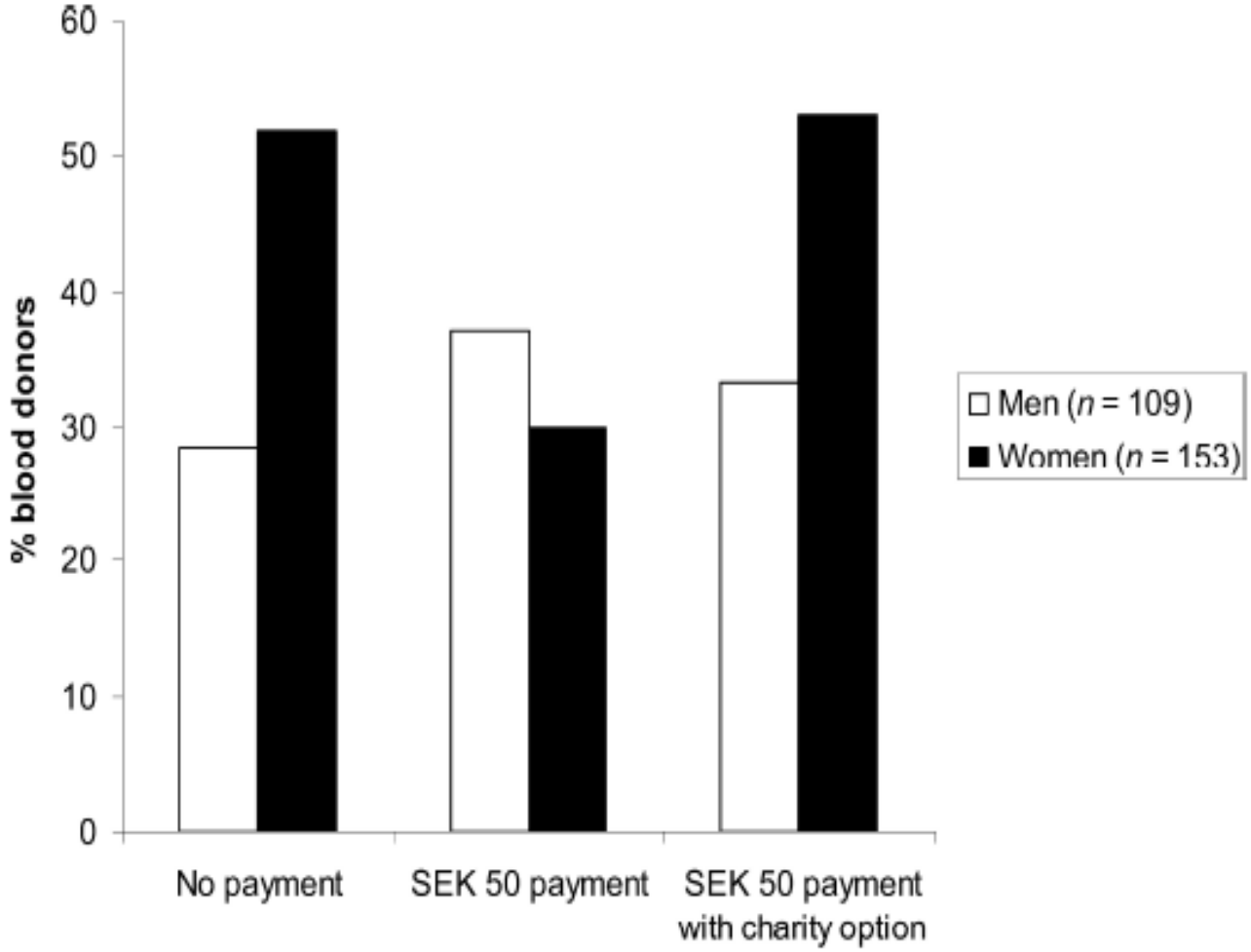


FIGURE 1. The supply of blood donors among men and women in the three experimental treatments.

TABLE 2. Experimental results: The supply of blood donors in each treatment.

	All Subjects		Men		Women	
	Number	%	Number	%	Number	%
Treatment						
No payment (1)	38/89	42.70	10/35	28.57	28/54	51.85
SEK 50 payment (2)	28/85	32.94	13/35	37.14	15/50	30.00
SEK 50 payment with charity option (3)	39/88	44.32	13/39	33.33	26/49	53.06
Hypotheses tests (p-value of difference)*						
Crowding-out hypothesis (treatment 1 versus 2)	0.185		0.445		0.024	
Charity-option hypothesis (treatment 2 versus 3)	0.125		0.732		0.020	

Note: *A Pearson chi-square test is used to estimate p-values.

FINES FOR ARRIVING LATE (Gneezy and Rustichini Journal of Legal Studies 2000)

Setting: A study of day-care centers in Israel. The day care centers operates between 7.30 and 16.00. Before the study there was no fine if parents came late to pick up their children.

Treatments:

1. Control group: the number of parents who arrived late were recorded each week (for 20 weeks).
2. Test group: In the first 4 weeks the number of parents arriving late was recorded each week. In the 5th week a fine for coming late was introduced (a fine of NIS 10 per child for a delay of 10 minutes or more; $1≈ NIS 3.5). In the 17th week the fine was removed (and the number of parents arriving late recorded until the end of the 20th week).

Subjects: The study was carried out on 10 day-care centers in Israel (center 1-6 in the test group and center 7-10 in the control group). Between 28 and 37 children in each day care center.

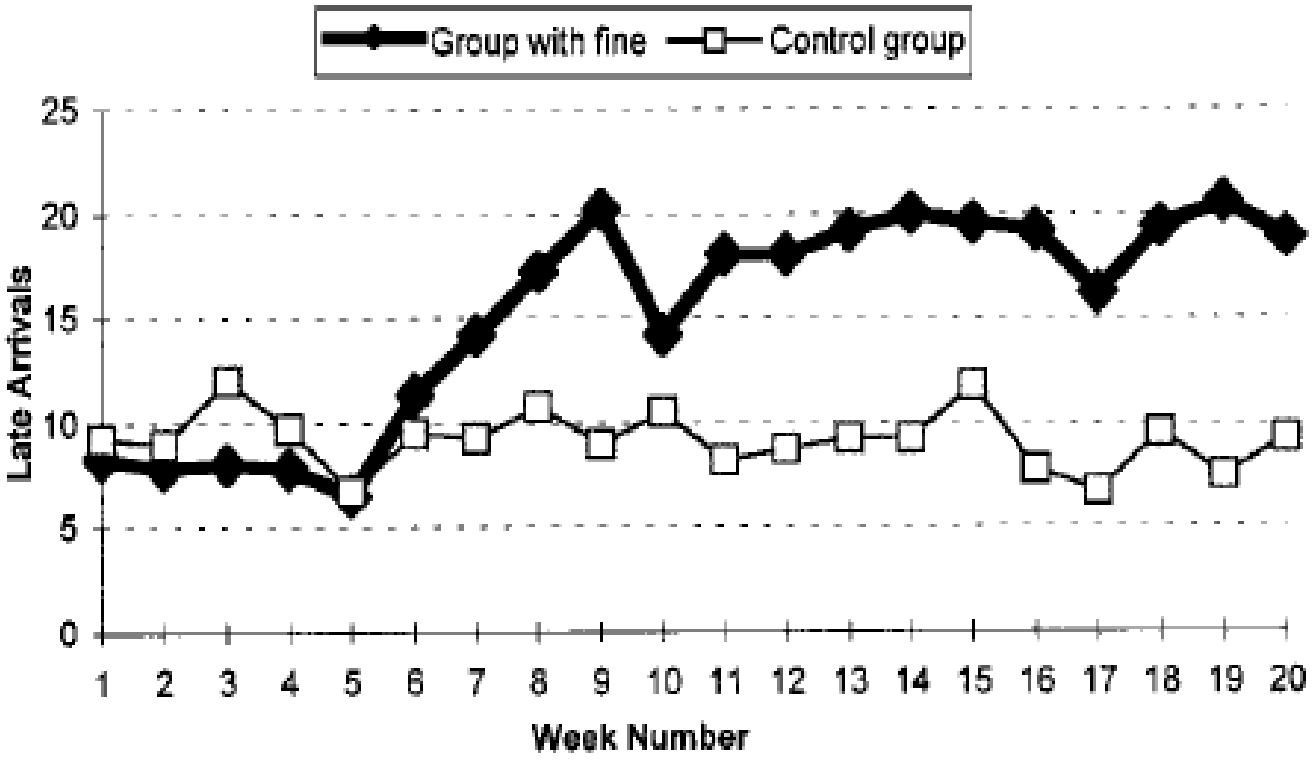
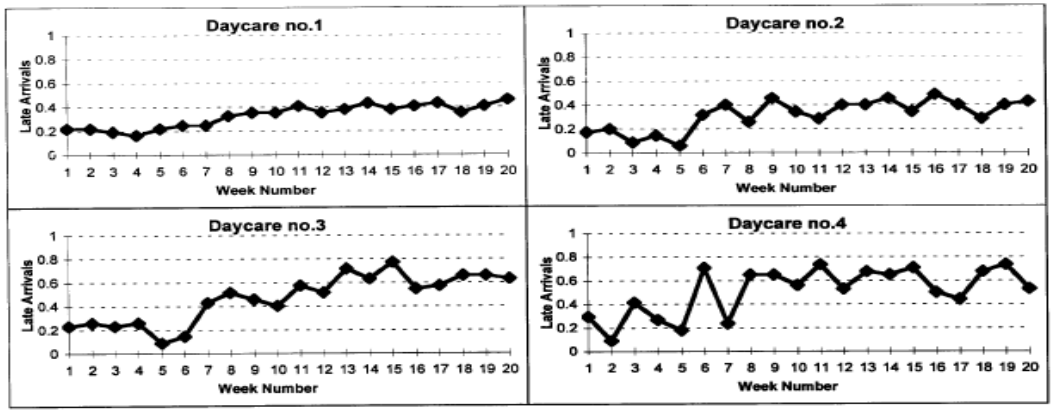


FIGURE 1.—Average number of late-coming parents, per week



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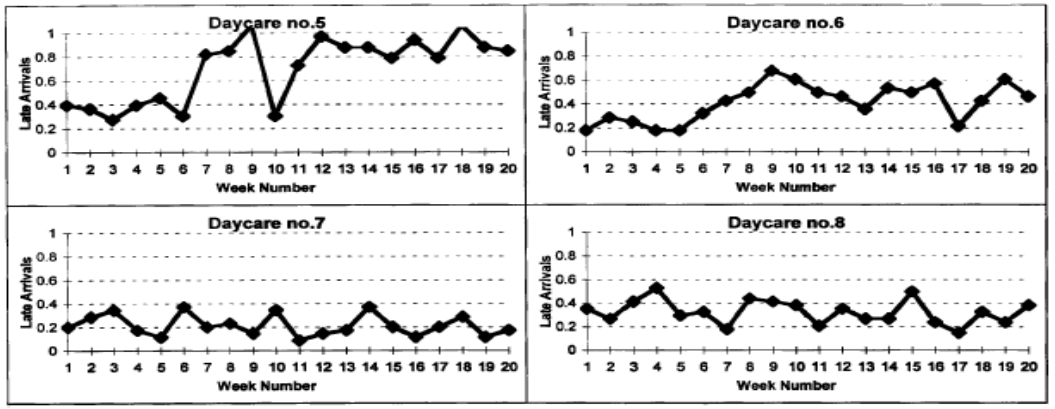

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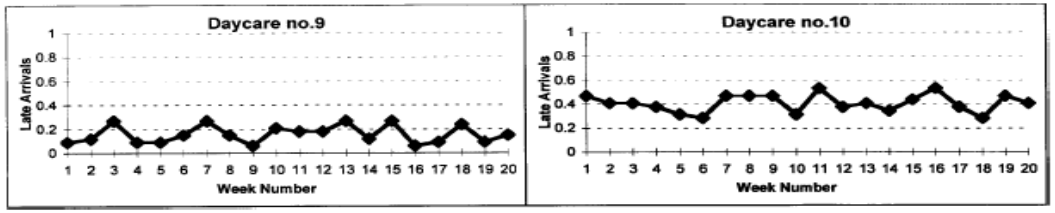

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FIGURE 3.—Average number of late-coming parents for the 10 different day-care centers

TABLE 2

AVERAGE NUMBER OF LATE-COMING PARENTS, ACCORDING TO FOUR PERIODS OF THE STUDY

Center	No. of Children	Weeks 1–4	Weeks 5–8	Weeks 5–16	Weeks 17–20
1	37	7.25	9.5	12.5	15.25
2	35	5.25	9	12.2	13.25
3	35	8.5	10.25	16.8	22
4	34	9	15	19.1	20.25
5	33	11.75	20	24.6	29.5
6	28	6.25	10	13.1	12
7	35	8.75	8	7.2	6.75
8	34	13.25	10.5	10.9	9.25
9	34	4.75	5.5	5.5	4.75
10	32	13.25	12.25	13.1	12.25

NOTE.—The four periods of the study are as follows: before the fine (weeks 1–4), the first 4 weeks with the fine (weeks 5–8), the entire period with the fine (weeks 5–16), and the postfine period (weeks 17–2).

Hidden Costs of Control (Falk and Kosfeld AER 2006)

Setting: The “control game”. A game between two anonymous persons. The “agent” has an endowment of 120 money units and the “principal” has an endowment of 0 money units. The agent choose how many money units to transfer to the principal, and each money unit transferred is multiplied by two (i.e. a dictator game where donations are multiplied by 2).

Main treatments:

1. The principal choose between restricting the agent’s choice set so that the agent has to give at least 5 money units to the principal or not restricting the agent’s choice set (in which case the agent can give between 0 and 120 money units to the principal).

2. Same as treatment one, except that the agent has to give at least 10 money units if the restriction is imposed.

3. Same as treatment one, except that the agent has to give at least 20 money units if the restriction is imposed.

The strategy method used (i.e. the agent decided how much to give to the principal both in case the restriction would be imposed and in case the restriction would not be imposed).

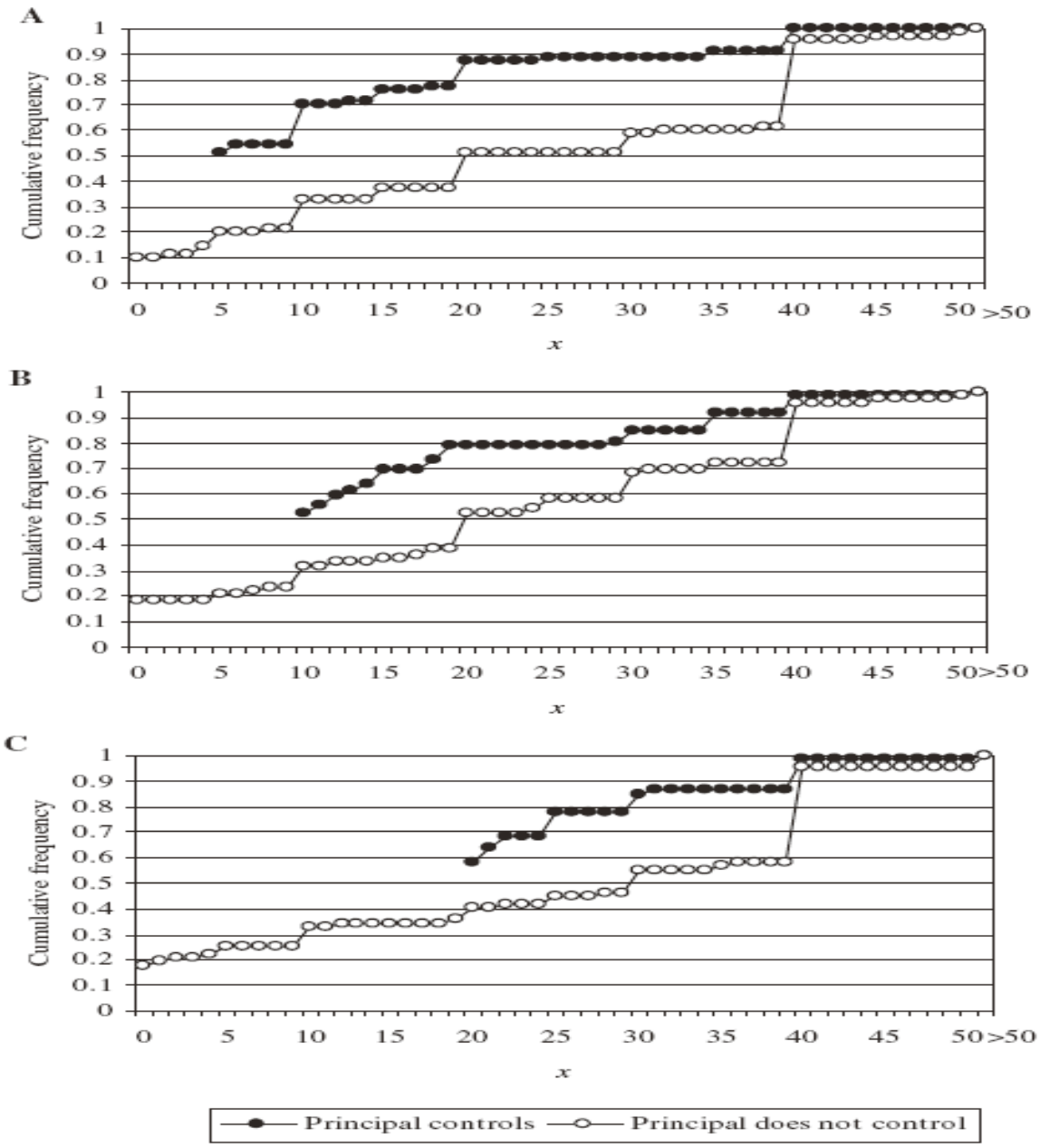

FIGURE 1. CUMULATIVE DISTRIBUTION OF AGENTS' CHOICES IN TREATMENT C5 (PANEL A), C10 (PANEL B), AND C20 (PANEL C)

TABLE 1—AGENTS' CHOICES DEPENDENT ON THE PRINCIPAL'S DECISION

		Treatment		
		C5	C10	C20
Principal controls	Average	12.2	17.5	25.4
	Median	5	10	20
Principal does not control	Average	25.1	23.0	26.7
	Median	20	20	30

Note: Number of observations: $n = 70$(C5), $n = 72$(C10), $n = 67$(C20).

TABLE 2—HETEROGENEITY OF AGENTS' BEHAVIORAL REACTION TO CONTROL

	Treatment								
	C5			C10			C20		
	Positive	Neutral	Negative	Positive	Neutral	Negative	Positive	Neutral	Negative
Number of agents	14	11	45	18	13	41	25	14	28
Relative share	0.20	0.16	0.64	0.25	0.18	0.57	0.37	0.21	0.42
Average x if controlled	10.2	22.3	10.3	11.1	22.7	18.7	21.9	39.4	21.5
Average x if not controlled	4.8	22.3	32.1	1.9	22.7	32.3	4.9	39.4	39.8

TABLE 3—PRINCIPALS' BEHAVIOR AND BELIEFS

	Treatment					
	C5		C10		C20	
	Control	Trust	Control	Trust	Control	Trust
Relative share	0.26	0.74	0.29	0.71	0.48	0.52
Average belief of x	17.8	29.6	19.4	25.7	25.3	34.1
Average counterfactual belief of x	12.8	14.9	—	—	10.3	23.0
Average x actually chosen	12.2	25.1	17.5	23.0	25.4	26.7
Are beliefs "correct"?	Yes	Yes	Yes	Yes	Yes	No

Notes: Counterfactual beliefs were elicited only in treatments C5 and C20. Beliefs are "correct" if the Mann-Whitney test does not reject the hypothesis that actual choices and corresponding beliefs are the same ($p > 0.1$).

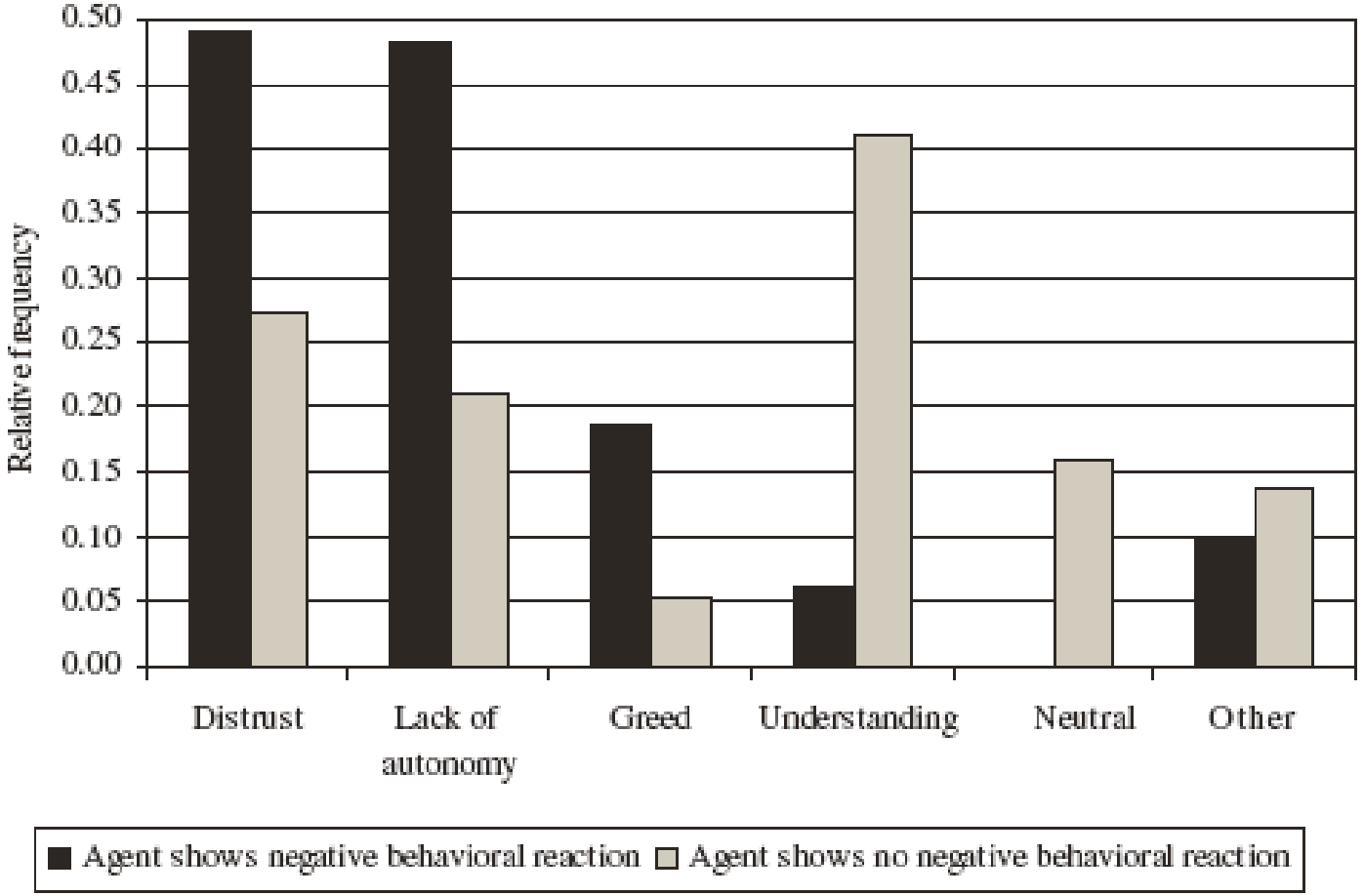

FIGURE 2. AGENTS' EMOTIONAL PERCEPTION OF CONTROL

Notes: Response to: "What do you feel if participant B (principal) forces you to transfer at least x points?" (C5, C10, and C20; data pooled over treatments; $n = 209$).

Hidden Costs of Fines (Fehr and List JEEA 2004)

Setting: A trust game between two anonymous persons; with an option to punish low back-transfers from the trustee. The investor and trustee referred to as “principal” and “agent” in the paper (but neutral framing used in the experiment).

Data collected in two samples: a student sample in Costa Rica (n=126) and a sample of CEOs (n=76; from the coffee industry gathered at a conference in Costa Rica). Money units converted to $0.2 in the student sample and $2.0 in the CEO sample. Subjects participate in both treatments and in the same role (i.e. a within-subject design); the order of the treatments varied in different sessions.

Treatments:

Trust treatment: Both players endowed with 10 money units. The principal decides how much of her 10 money units to transfer to the agent and also announce a desired back-transfer; transfers are tripled and the agent decides how much of the tripled amount to back-transfer to the principal.

Trust with punishment (TWP) treatment: The same as the trust treatment, but with the addition that the principal has to decide whether to impose a fine of 4 money units to be paid by the agent if the back-transfer was below the desired back-transfer (the fine is not given to the principal, but just reduces the earnings of the agent).

What is the equilibria for rational and payoff maximizing players in the TWP treatment? (fine will always be imposed; two-equilibria: the principal invests 1 and desires a back-transfer of 3 and the agent back-transfer 3; the principal invests 2 and desires a back-transfer of 4 and the agent back-transfer 4).

TABLE 1. Comparison of trust and trust with punishment treatment

	Average (over all observations)	
	Trust	Trust with punishment
Transfer (investment) x to the agent	4.0 (2.6) **5.9 (2.3)**	5.0 (2.9) **7.3 (2.3)**
Desired payback in percent of tripled investment $\hat{y}/3x$	76.9 (41.0) **65.1 (20.5)**	69.9 (24.0) **66.1 (23.2)**
Actual payback in percent of tripled investment $y/3x$	31.6 (26.3) **44.1 (22.3)**	38.7 (33.6) **44.0 (23.3)**
Principals' payoff	10.5 (3.0) **11.8 (3.7)**	11.0 (4.9) **12.6 (4.9)**
Agents' payoff	17.5 (5.9) **20.1 (5.6)**	17.4 (7.5) **20.5 (5.1)**
Number of observations (pairs)	126 (63 pairs) **76 (38 pairs)**	126 (63 pairs) **76 (38 pairs)**

Notes: CEO data in bold. Standard deviations in parentheses. Figures are in shanks.

Average results in each treatment for the two samples (CEO results in bold text). Similar results on average in both treatments; somewhat higher transfers and back-transfers in the CEO sample translating into higher earnings in the CEO sample.

TABLE 3. Splitting up the trust with punishment treatment

	Average (over all observations)		
		Trust with punishment	
	Trust	No punishment	Punishment
Transfer (investment) x to the agent	4.0 (2.6)	7.4 (1.7)	4.4 (2.8)
	5.9 (2.3)	**8.5 (2.1)**	**6.5 (2.1)**
Desired payback in percent of tripled investment ($\hat{y}/3x$)	76.9 (41.0)	60.4 (22.3)	72.5 (24.0)
	65.1 (20.5)	**66.8 (19.3)**	**65.6 (26.0)**
Actual payback in percent of tripled investment ($y/3x$)	31.6 (26.3)	52.9 (22.1)	34.9 (35.2)
	44.1 (22.3)	**61.4 (15.6)**	**32.7 (20.5)**
Principals' payoff	10.5 (3.0)	14.1 (5.0)	10.2 (4.7)
	11.8 (3.7)	**16.5 (2.7)**	**10.0 (4.3)**
Agents' payoff	17.5 (5.9)	20.8 (6.2)	16.5 (7.6)
	20.1 (5.6)	**20.4 (4.9)**	**20.6 (5.2)**
Number of observations (pairs)	126 (63 pairs)	26 (13 pairs)	100 (50 pairs)
	76 (38 pairs)	**30 (15 pairs)**	**46 (23 pairs)**

Notes: CEO data in bold. Standard deviations in parentheses. Figures are in shanks.

Dividing the trust with punishment treatment into pairs where the principal imposed the fine (Punishment) and pairs where the principal did not impose the fine (No punishment). Higher transfers and back-transfers when the fine was not imposed compared to when it was imposed and also compared to the trust treatment; leading to higher earnings for especially the principals. Note that in spite of this a majority of principals imposed the fine (79% in the student sample and 60% in the CEO sample).

Theoretical Explanations for Crowding Out

Extrinsic and intrinsic motivation (e.g. Frey and Oberholzer-Gee AER 1997): Individuals have an intrinsic value of performing some activities (e.g. helping others, civic duty) and external monetary compensation reduce the intrinsic value.

Incomplete contracts (Gneezy and Rustichini Journal of Legal Studies 2000): The introduction of a monetary payment changes the perception of the incomplete contract (e.g. the introduction of a fine for coming late changes the perception of the consequences of frequent delays).

Reciprocity (Fehr and Rockenbach Nature 2003): The introduction of a fine is viewed as an hostile/unfair act, and is therefore punished by reduced generosity.

Social esteem and signaling (Bénabou and Tirole AER 2006; Ellingsen and Johannesson AER 2008).

SIGNALING MODELS OF SOCIAL ESTEEM

Bénabou and Tirole model (AER 2006): An individual choose a to maximize:

$(v_a + v_y y)a - C(a) + \mu_a E(v_a|a,y) - \mu_y E(v_y|a,y)$

a=amount of prosocial activity
C(a)=cost of prosocial activity
y=material incentive per unit of a
v_a= marginal intrinsic value of a (altruism)
v_y= marginal intrinsic value of y (greed)
$E(v_a|a,y)$ = observers' belief about the altruism of the agent
$E(v_y|a,y)$ = observers' belief about the greed of the agent
μ_a = importance of social esteem (altruism)
μ_y = importance of social esteem (greed)

The prosocial activity is undertaken partially for signaling purposes (to increase social esteem). Material incentives decrease the signaling value of the prosocial activity. The model can explain why agents react negatively to increased monetary incentives, but cannot explain why it matters if an incentive scheme is chosen by the principal or exogenously imposed (as in e.g. Falk and Kosfeld AER 2006).

Ellingsen and Johannesson model (AER 2008):

A two-stage game between a principal and an agent. Individual i maximize the utility function:

$u_i = m_i + \theta_i m_j + E_{\theta_j}[\sigma(\theta_j)\theta_{ji}|\theta_i]$

m= material payoff

θ= degree of altruism (two types: high (H) or low (L))
$\sigma(\theta_j)$= salience of the opponent's esteem ($\sigma_H > \sigma_L$; esteem from a player with high altruism is more important).
θ_{ji}=player j's belief about the altruism of player i (based on the posterior belief of agent i's type).

The principal chose the incentive scheme partially for signaling purposes and the agent choses the effort partially for signaling purposes. The model can explain why it matters if the principal chose the incentive scheme (trust is perceived as a signal of an altruistic principal that is worth impressing).

Testing the Social Esteem Model (Ariely et al 2009)

Setting: Subjects can donate to charity by sequentially clicking two keys (X and Z) on a computer keyboard for up to 5 minutes. For each pair of clicks an amount is donated to an assigned charity (1 cent per pair for the first 200 pairs; and then a decreasing marginal payment scale for additional pairs).

Treatments (the below four treatments were carried out both for the Red Cross as the assigned charity and the National Rifle Association (NRA) as the assigned charity):

1. Private without incentive: the number of clicks was anonymous and the subjects had no private incentive.

2. Private with incentive: the number of clicks was anonymous and the subjects had a private incentive (the same private payment as the donation to the charity).

3. Public without incentive: the subjects informed the other lab participants about their assigned charity and incentive condition, their number of clicks, their donation, and their private payment. The subjects had no private incentive.

4. Public with incentive: the subjects informed the other lab participants about their assigned charity and incentive condition, their number of clicks, their donation, and their private payment. The subjects had a private incentive (the same private payment as the donation to the charity).

Subjects were also asked about how they would predict that Princeton students would identify with the charities (from a scale between “not at all identify” (-5) to “very much identify” (+5). This question is used to determine if the subjects considers the Red Cross and the NRA as good (a positive value on the scale) or bad (a negative value on the scale) charities.

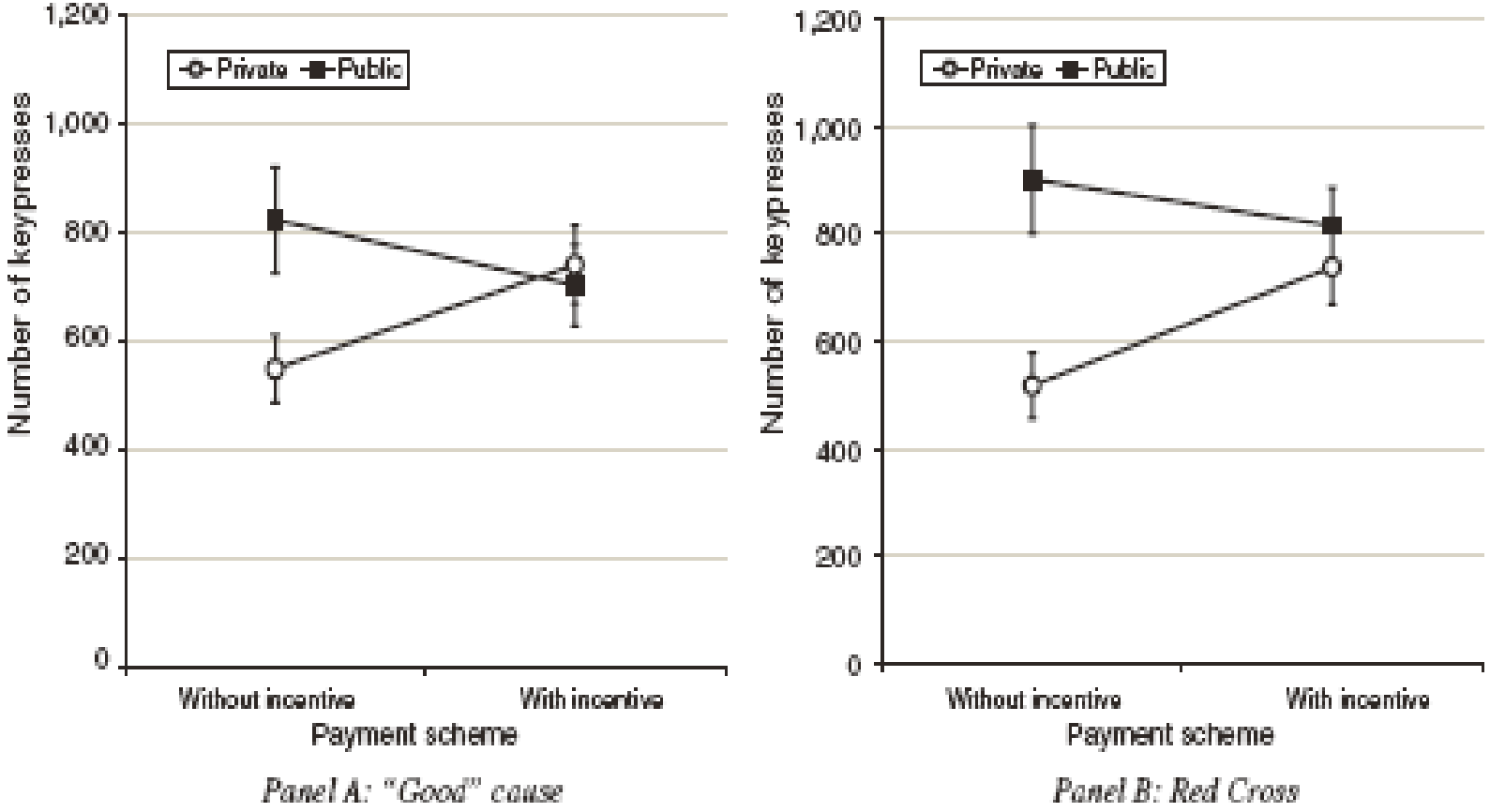

FIGURE 1. EFFECT OF INCENTIVES ON PROSOCIAL BEHAVIOR

Notes: Error bars are standard errors of the mean. Panel A shows effort for a "good" cause according to individual participant's perception of other students' identification at Princeton. Panel B shows effort for the Red Cross (the majority of Princeton undergraduates positively identifies with this charity).

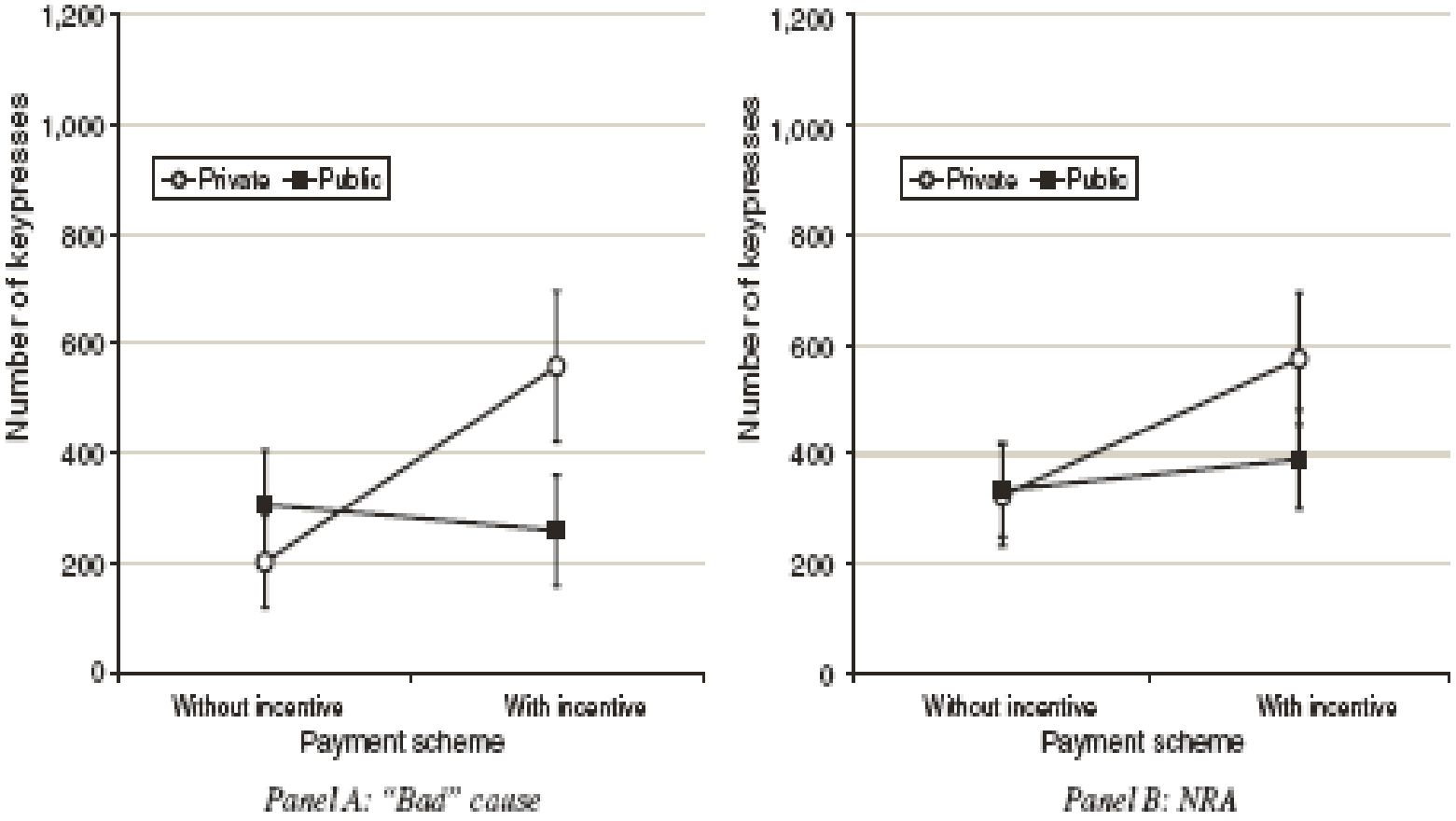

FIGURE 2. EFFECT OF INCENTIVES ON EFFORT FOR A "BAD" CAUSE

Notes: Error bars are standard errors of the mean. Panel A shows effort for a "bad" cause according to individual participant's perception of other students' identification at Princeton. Panel B shows effort for the NRA (the majority of Princeton undergraduates does not identify with this charity).