An experimental test of the crowding out hypothesis

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Abstract

We report the results of laboratory experiments that examine whether third-party contributions crowd out private giving to charity. Subjects play a single dictator game with a charity as the recipient. The subject chooses his preferred charity from a list. There are four treatment combinations: two initial allocations and two frames. Initial allocations are either US$18 for the subject and US$2 for the charity, or US$15 and US$5, respectively, and the subject is then given the opportunity to allocate additional funds if desired. The decision frame is also varied to affect subjects' perceptions of the task. In one frame, subjects are simply informed of the initial allocations between themselves and their chosen charity. In the other, subjects are told that their US$20 allocation has been taxed, and the amount allocated to their chosen charity. The structure of payoffs is identical in both frames. In the first frame, we see a level of crowding out that is close to zero, far less than other experimental studies; in the second frame, we observe nearly 100% crowding out.
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1. An experimental test of the crowding out hypothesis

How is private giving affected by government or third-party provision of a public good? Theorists, empiricists, and experimentalists have addressed this question, with no

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clear resolution. We present evidence that, in laboratory experiments, the extent of crowding out may depend on the decision-maker's perceptions about the source of the funding. Our design varies the framing of a dictator game, and is based on the procedure in Bolton and Katok (1998). Subjects are paired with a charity of their own choosing selected from a list of 10. In one pair of treatments, we use a neutral frame, where third-party support for the charity is implemented in the form of a difference in initial allocations between the subject and his chosen charity. This frame allows for fiscal illusion; there is no explicit indication of the source of funding for the third-party transfer to the charities. The second frame introduces fiscal transparency: The source of the funding for the third-party transfer is an explicit tax on the subject's own endowment. This frame approximates the assumptions of theoretical models where agents know the source and target of third-party funding. Because the transfer comes from the subject's own initial endowment, our second frame represents an extreme form of fiscal transparency. We find no evidence of crowding out in the first frame, but rather an indication of a small amount of crowding in. In the second frame, we report almost complete crowding out.

In the next section, we briefly review the theoretical and empirical studies. In Section 3, we review in greater detail the previous experimental studies. We then discuss the procedures of our experiment, Section 4, and our findings, Section 5. We conclude in Section 6.

2. Background and motivation

Theoretical research suggests that government giving should be neutral in its effect on net contributions to nonprofit institutions under the condition that no one is taxed more than his pretax contribution to the charity (Warr, 1982, 1983; Roberts, 1984, 1987; Bergstrom et al., 1986). Under these conditions, the effect of any third-party transfer to the nonprofit can be neutralized by the donor's response. This conclusion is premised on the assumptions of fiscal transparency (i.e., donors are fully aware that government giving is financed by the taxes they pay) and that donors' benefit from the public good arises solely from the nonprofit's activity.

Government giving need not be neutral in the absence of fiscal transparency, (i.e., when there is fiscal illusion). Fiscal illusion results when donors/taxpayers do not understand the sources and opportunity costs of funding for activities that they support. Oates (1988) defines fiscal illusion as "…the notion that the systematic misperception of key fiscal parameters may significantly distort fiscal choices by the electorate" (p. 65). Such misperceptions can result in a public sector that is either too small (Downs, 1960) or too large (Brennan and Buchanan, 1980).[1] Giving by taxpayers suffering from fiscal illusion need not be completely crowded out by government giving.

Crowding out also may be incomplete if the donor cares not only about total contributions, but also about his own contribution. Andreoni (1989, 1990) shows that a

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[1] Empirical studies tend to support the conclusion that fiscal illusion contributes to an excessive public sector (see, for example, Dollery and Worthington, 1999; Gemmell et al., 2002; Grossman, 1990; McGillivray and Morrissey, 2001; Mitias and Turnbull, 2001; Oates, 1991; Turnbull, 1998).

warm glow from giving (imperfect altruism) can lead to incomplete crowding out.[2] We draw on the models of Bergstrom et al. (1986) and Andreoni (1989, 1990), modifying their approach to include the possibility of fiscal illusion.

Following these models, let x_i=private consumption; $G=C+T$ is total public good provision consisting of C=voluntary contributions and T=tax revenue; and $g_i=c_i+\alpha t_i$ is the consumer's perceived contribution, consisting of voluntary contribution c_i and perceived tax support t_i. The parameter on perceived tax support is α, with $0 \leq \alpha \leq 1$, reflecting the degree of fiscal illusion.[3] This is a departure from previous models, which assumed that warm-glow utility depended only on the voluntary contribution c_i. In our model, if α=0, there is complete fiscal illusion, and the consumer is unaware that his tax supports the public good. On the other hand, if α=1, there is no fiscal illusion, reflecting the consumer's awareness that his tax is supporting the public good. With no fiscal illusion, the consumer is aware that his taxes support the charity, and receives warm glow from his support.

The consumer's maximization problem is written as

$$\max U = U_i(x_i, G, g_i) \tag{1}$$

Subject to the budget constraint

$$x_i + c_i = e_i - t_i \tag{2}$$

where e_i is the consumer's pre-tax endowment, and t_i is a lump sum tax. Consumer i's contribution c_i combines with the contributions of others C_{-i} and tax revenue $T=\sum_i t_i$ to form total support for the public good:

$$G = c_i + C_{-i} + T \tag{3}$$

The budget constraint (2) can be rewritten by adding $C_{-i}+T$ to both sides.

$$x_i + G = Z_i \text{ where } Z_i \equiv e_i - t_i + C_{-i} + T \tag{4}$$

Z_i can be thought of as the consumer's social income.

Substituting (3) for c_i and using the budget constraint in (4), the consumer's maximization problem can be rewritten:

$$\max U = U_i(Z_i - G, G, G - C_{-i} - T - \alpha t_i, \varepsilon) \tag{5}$$

Under the usual convexity assumptions, the first-order conditions can be solved for implicit demand functions for the total amount of the public good:

$$G^* = q_i(Z_i, C_{-i} + T - \alpha t_i). \tag{6}$$

Subtracting from both sides:

$$c_i^* = q_i(Z_i, C_{-i} + T - \alpha t_i) - C_{-i} - T. \tag{7}$$

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[2] In addition, if social status is a motive for giving, then donations may be insensitive to third-party provision (Harbaugh, 1998). The relationship between imperfect altruism and crowding out is also investigated by Ribar and Wilhelm (2002).

[3] Another interpretation of this construct is to think of α as the extent to which the giver takes "credit" for the tax transfer to the charity.

Andreoni (1989) shows that the partial derivative of q_i with respect to its first and second arguments, q_{i1} and q_{i2}, incorporates the altruistic and warm glow motives for giving. Pure altruism is captured in the first term, which comes from the public good argument of the utility function. Pure altruism thus implies that $q_{i1}>0$ and $q_{i2}=0$. The second term captures the egoistic or warm glow aspect of giving. If both the private and public goods are normal, then $0<q_{i1}<1$. If warm glow is the only motive for giving, then $q_{i1}+q_{i2}=1$.

Proposition 1. *The degree of crowding out is shown below (the proof is available upon request). dG=dT implies zero crowding out, and dG=0 implies full crowding out. Using superscripts to indicate combinations of motivation and fiscal illusion we can conclude:*

$$0 = dG^A = dG^{WG,NFI} = dG^{IA,NFI} \leq dG^{IA,FI} \leq dG^{WG,FI} \leq dT.$$

Our model differs from previous models only in the presence of a term reflecting the degree of fiscal illusion. If donors are motivated only by altruism, so that $q_{i2}=0$, and under the additional assumption that no consumer is taxed more than his initial pre-tax contribution, then we show in the appendix that any increase in t will be just offset by a decrease in C, resulting in complete crowding out, regardless of the degree of fiscal illusion (see Andreoni, 1989; Bergstrom et al., 1986). Ribar and Wilhelm (2002) also show that when the total number of donors is large, then the effect of the altruism motive on crowding out converges to zero, and so any net impact of a subsidy for the public good must be due to the warm glow motive for giving. Thus, if only altruism motivates giving, complete crowding out is predicted for any third-party payment to the public good.

We next consider the case of pure warm glow giving, where $q_{i1}+q_{i2}=1$. Andreoni (1989) shows that in this case, if the consumer cares only about his own voluntary contribution ($\alpha=0$), crowding out will be zero under the assumptions above. However, if we allow for fiscal illusion, the outcome is different. If there is no fiscal illusion ($\alpha=1$), crowding out is again complete. Incomplete fiscal illusion results in partial crowding out.

A third factor may also affect contributions: Giving by a third party may increase the perceived value of giving to the donor. This "endorsement effect" may be due to perceived superior information on the part of the third-party giver, as analyzed in Vesterlund (2003). List and Lucking-Reiley (2002) field test the effect of seed money by an initial contributor, and find a positive impact. Alternatively, as Rose-Ackerman (1986) argues, the third party (especially government) may act as a monitor, improving the information available to donors about their activities and performance. In any case, the impact of the endorsement effect is to increase giving. Depending on the magnitude of this effect, third-party giving can result in "crowding in." See Table 1 for a summary of the predictions on crowding out.

Empirical tests offer little support for the theoretical prediction of complete crowding out. Steinberg (1991) reviews 13 studies of crowding out and concludes that a dollar of government spending crowds out between US$0.005 and US$0.35 of private donations. More recent studies find levels of crowding out that include: nil for public radio matching grants (Straub, 2003); US$0.23 for government funding of international relief

Table 1
Theoretical prediction of the impact of a tax-financed donation on crowding out

Motivation for giving	Fiscal illusion	No fiscal illusion
Altruism	Full crowding out	Full crowding out
Warm glow	Partial to zero crowding out	Full crowding out
Impure altruism	Partial crowding out	Full crowding out
Endorsement effect	Higher donations with endorsement	Higher donations with endorsement

organizations (Ribar and Wilhelm, 2002); and about US$0.50 for shelter, human services and similar organizations (Payne, 1998).[4]

The possibility of crowding in is supported by several recent studies. Khanna et al. (1995) find crowding-in of 9.4% in a study of UK nonprofits. Khanna and Sandler (2000) likewise find some evidence of crowding in for government grants in the health and social welfare sectors. Payne (2001) reports evidence that federal research grants cause both crowding in and crowding out of private donations to universities. Federal research funding increases private donations by US$0.65/US$1 for research universities and decreases private donations by US$0.45 for liberal arts colleges and US$0.09 for non-research universities.

Thus, previous empirical research suggests that agents' responsiveness to third-party transfers may be quite different depending on the motive for giving, the information about the nonprofit, and knowledge about the source of funding for the third-party transfer.

Laboratory experiments provide an important source of information to distinguish between alternative hypotheses about the pattern of contributions that is observed in the field. Andreoni (1993) tests the crowding out hypothesis within a public good game with three players that has an interior Nash equilibrium that is below the Pareto efficient level of contributions. The no-tax treatment has no minimum contribution; the tax treatment sets a minimum investment in the public good that is below the equilibrium contribution level. The treatment is not framed as a tax, but rather the payoff matrix is set up so that there is a two-token minimum. The complete crowding out hypothesis predicts that total contributions to the public good in both the no-tax and tax treatments (including the two-token tax) would be the same, except for random variations due to differences in the samples drawn for each of the two treatments. Andreoni reports an average across all rounds of 71.5% crowding out in this setting.

Andreoni recognizes limitations of his approach. First, the relatively small group size may affect the likelihood of an altruism motive for giving. Second, the setup rules out factors important to individuals' contribution decisions, such as "...sympathy, political or social commitment, peer pressure, institutional considerations, or moral satisfaction associated with particular causes..." (p. 1326). We show in an earlier study that subjects donate significantly more when the recipient of their donation is a charitable organization rather than an anonymous subject (Eckel and Grossman, 1996). In terms of the factors we consider in the model above, Andreoni's setup probably eliminates any endorsement

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[4] Andreoni and Payne (2003) take a slightly different approach, examining the effect of government grants on non profits fund-raising expenditures. They report that government grants reduce fund-raising expenditures, on average, 32–52%.

effect, but incorporates the possibility for both altruism and warm glow giving. The design does not allow testing of fiscal illusion.

The endorsement effect is supported by the results of Potters et al. (2001), who examine the effect of announcing a first-mover's contribution on giving by a second-mover in a two-person public goods game with uncertain quality. When only the first mover is informed about the quality of the public good, the first mover's decision to contribute increases giving by the second mover. However, when both players are informed, about 2/3 of the second mover's contribution is crowded out.[5] In terms of our study, this experiment supports the possibility of a contribution-increasing endorsement effect if subjects perceive the experimenter's gift as an implicit endorsement.

Bolton and Katok (1998), whose work is closest to our own, test the crowding out hypothesis using a dictator game. In the first of two treatments, subjects begin with an initial distribution of US$18 to Player A and US$2 to Player B. Player A then may pass some of his US$18 to Player B. In each session, a subject plays both roles, paired with a different person; one game is chosen randomly for payment. In the second treatment, the procedures are identical except that the initial distribution is US$15 to Player A and US$5 to Player B. While there is no significant difference across the two treatments in the proportion of subjects who give zero, voluntary donations are significantly higher in the US$18–US$2 treatment. Overall, 73.7% of private giving is crowded out by the US$3 forced redistribution. In terms of the factors we consider, Bolton and Katok allow for the possibility of altruism and warm glow as motives for giving. It is also possible that fiscal illusion plays a part in the result they obtain of partial crowding out: subjects may be unaware that the experimenter has taken the subsidy from their endowment, but are only aware of the net endowment they are given. The initial contribution by the experimenters may also serve as an implicit endorsement of giving, causing subjects to give more than they otherwise would.

3. Experimental design and procedure

3.1. Experimental design

The experiment has a two-factor, between-subjects design. The factors are the frame (tax vs. no-tax) and the initial allocations (US$15–US$5 vs. US$18–US$2), producing four treatment combinations. The recipient is a charity, chosen by the subject from a list, shown in the appendix. Subjects play only one role, in one treatment combination, with subject/subject and subject/experimenter anonymity. In the US$18–US$2 no-tax treatment, subjects begin with an endowment of US$18 and are informed that their selected charities will receive US$2 from the experimenters plus any additional money allocated by the subjects. In the US$15–US$5 no-tax treatment, subjects begin with an endowment of US$15 and are informed that their selected charities will receive US$5 from the experimenters plus any additional money allocated by the subjects. In essence, the

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[5] Potters et al. (2001) do not discuss their results in terms of crowding out; this is our interpretation of their results.

experimenter has leveled a US$2(US$5) per person tax on subjects in the US$18–US$2(US$15–US$5) treatments, with the revenues to be distributed to the different charities, though as in Bolton and Katok, it is not framed as a tax. This treatment mimics the conditions of fiscal illusion: The subject is unaware of the source of the funding for the initial allocation to the charity.

In the tax treatment, the payoff structure is identical, but the difference in initial allocations is described as resulting from a tax on the subject's own endowment. Subjects are told that the experimenters have levied a "tax" of US$2 (US$5) on their initial endowment of US$20, which will be forwarded to their selected charities along with any additional money allocated to the charities by the subjects from their endowments. This treatment eliminates fiscal illusion by making it clear that the tax has been taken from the subject's endowment. Indeed, by making the forced contribution come explicitly from the subject's own endowment, the frame makes the source and opportunity cost very clear. Thus, referring back to our model, we set the experiment up so as to make α as close to 1 as possible.

This design holds constant, as much as possible, the effect of endorsement across treatments. The charity is chosen by the subject from a list that is the same in all treatments. In each case some giving is forced, whether by the experimenter's contribution or by the "tax".

If subjects are motivated only by altruism, total giving (including forced) should be constant across all four treatment combinations, assuming the tax does not exceed any subjects' initial contribution. If they are motivated by warm glow alone, crowding out should be near zero in the presence of fiscal illusion and zero with no fiscal illusion. Imperfect altruism implies intermediate results: partial crowding out under fiscal illusion and zero under no fiscal illusion. If public giving crowds out private giving, the total contributions received by the charities should be the same across the two endowment levels, excluding those who give less than US$5 total in the 18/2 treatment. If public giving does not crowd out private giving, total contributions received by the charities should average US$3 more in the US$15–US$5 treatment than in the US$18–US$2 treatment.

3.2. Procedure

One hundred sixty-eight subjects were recruited at Saint Cloud State University by email notices and flyers posted in dormitories.[6] The email and flyers directed interested persons to appear at a designated place and time. The first 21 persons appearing for each of eight sessions were selected to participate. No show-up fee was paid. Table 2 reports summary socio-economic statistics for the subjects by treatment.

Once subjects were seated, consent forms were distributed, signed and collected. A group monitor was chosen at random and paid US$20 to observe and assist in conducting

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[6] Email notices were sent out to all persons on a mailing list generated by announcements in a variety of classes during the first weeks of each semester. Interested parties signed up for the mailing list by sending an email to a posted address.

Table 2
Subject characteristics

	All subjects (N=160)	No-tax treatment		Tax treatment	
		US$18–US$2 sessions (N=40)	US$15–US$5 sessions (N=40)	US$18–US$2 sessions (N=40)	US$15–US$5 sessions (N=40)
Age (S.D.)	20.39 (2.70)	20.53 (1.96)	21.00 (3.49)	20.13 (3.16)	19.93 (1.72)
Male	94	23	19	25	27
Attend religious services					
Never	35	9	7	9	10
Less than once a month	70	18	16	18	18
At least once a month	32	7	11	7	7
Once a week	17	2	6	5	4
More than once a week	6	4	0	1	1
White/Caucasian	127	31	31	36	29
Class					
Freshman	56	11	14	20	11
Sophomore	46	11	12	10	13
Junior	34	9	7	6	12
Senior	18	7	4	3	4
Graduate	6	2	3	1	0
Employment status[a]					
Not employed	67	17	14	18	18
Part-time job	87	21	25	22	19
Full-time job	5	2	0	0	3
Economics classes taken					
One or fewer	109	21	29	32	27
Two to four	43	16	8	7	12
More than four	8	3	3	1	1
Charity					
American Cancer Society	49	19	9	13	8
American Red Cross	23	5	5	8	5
Big Brothers Big Sisters	10	1	4	1	4
Big River Sierra Club	9	2	1	4	2
Central Minnesota Task Force on Battered Women	12	1	9	2	0
Doctors Without Borders	10	2	4	1	3
Feed The Children	29	6	5	7	11
Minnesota AIDs Project	7	1	2	2	2
Oxfam America	7	1	1	2	3
YMCA	4	2	0	0	2
Mean response (S.D.)					
Procedures preserved anonymity?	4.53[b] (0.94)	4.72[c] (0.72)	4.43 (0.84)	4.32[d] (1.28)	4.67[c] (0.84)
Your donation went to your charity?	4.49[b] (0.90)	4.67[c] (0.66)	4.53 (0.64)	4.11[d] (1.33)	4.67[c] (0.70)
Instructions were clear?	4.69[b] (0.84)	4.85[c] (0.67)	4.78 (0.62)	4.34[d] (1.26)	4.77[c] (0.58)
Recipients of donation are deserving?	4.67[b] (0.88)	4.74[c] (0.75)	4.85 (0.53)	4.47[d] (1.13)	4.59[c] (0.99)

[a] One subject in the US$15–US$5 no-tax treatment did not report employment status.
[b] Four subjects did not complete the questions.
[c] One subject did not complete the questions.
[d] Two subjects did not complete the questions.

the experiment. The experimenter distributed a packet of materials containing: written instructions; a slip of paper with a random five-digit code (to facilitate the anonymous procedure); an allocation form; and an envelope (see Appendix A for the instructions). The allocation form included a list of 10 charities from which a subject selected a charity to receive his contribution. These were selected to reflect as broad a range of services and client groups as possible. The sample included geographically differentiated charities (international, national and local) and covers health, environmental and social service charities. A brief description of services each charity provides was given to the subjects.

The experimenter read the instructions aloud. After questions were answered, a subject selected his charity, and indicated how much of the endowment he wished to keep for himself and how much to pass to his designated charity. After completing the allocation decisions, all papers were folded and placed inside the envelope, which was then sealed. The envelopes were placed in a box at the front of the room. While the experimenters determined subjects' earnings and contributions to the charities, subjects completed a survey of socioeconomic characteristics and a four-item manipulation check questionnaire.[7] The subject's earnings were sealed in an envelope marked with the subject's specific code number. After all envelopes were completed, they were placed on a table to be picked up by the subjects. After completing the surveys, subjects placed them in the box at the front of the room, collected their earnings envelopes and exited the room. Contributions to each charity were totaled and the experimenter wrote checks to the charities and sealed them in stamped envelopes. The monitor signed a statement verifying the procedures. Monitor and experimenter walked to a mailbox and deposited the envelopes.

4. Results

To facilitate comparison of the data from the US$15–US$5 and US$18–US$2 treatments, and to force our data to conform to the assumptions of the model, we have censored the data for the US$18–US$2 treatments, aggregating all contributions below US$5 up to the US$5 minimum. Since the complete crowding out hypothesis predicts total contributions to be the same across treatments in the US$5–US$20 range, contributions less than US$5 in the US$18–US$2 treatment are set to US$5. This adjusted distribution is used in all of the following analyses. Data from other studies are similarly censored for comparison.

4.1. No-tax frame

The no-tax frame design mimics fiscal illusion: Subjects are not told where the initial contribution to their charity comes from. Participants are unaware that the US$2/US$5 contributed to the charities by the experimenters is, implicitly, a tax on their initial endowments. Fig. 1 is a histogram of the individual total (inclusive of the forced amounts) contributions for the US$15–US$5 and US$18–US$2 no-tax treatments. (While subjects

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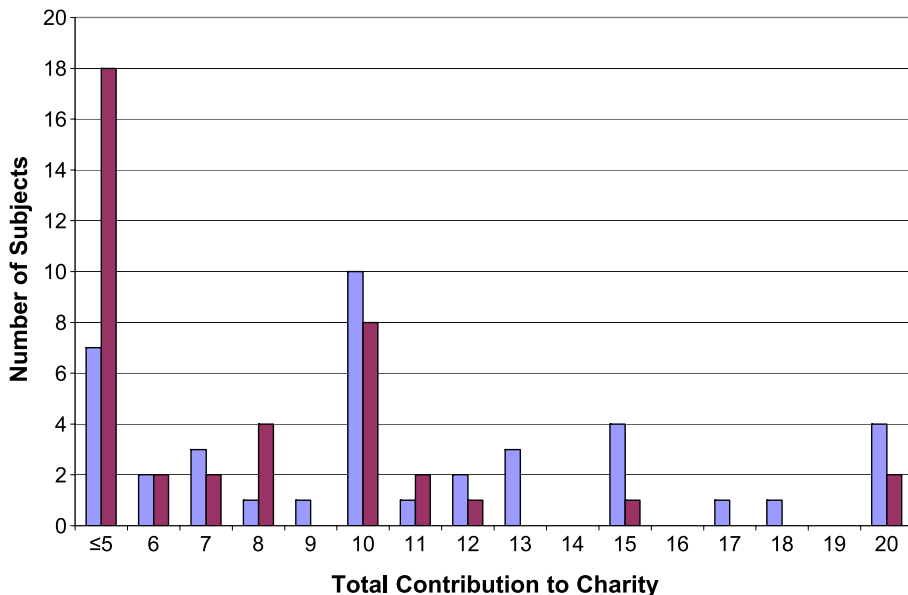
[7] The survey is available upon request.

Fig. 1. Comparison of total contributions—no-tax treatment.

were not restricted to using whole dollar divisions of their endowments, all but two did so.) The mean contributions are US$10.83 for the US$15–US$5 treatment and US$7.93 for the US$18–US$2 treatment, and these amounts bracket the equivalent calculation for data from our previous experiment with a charity recipient (Eckel and Grossman, 1996).[8] The crowding out hypothesis would predict no difference in mean giving. We are able to reject that hypothesis (p-value<0.002, one-tailed test). Furthermore, the difference in mean contributions (US$3.10) is insignificantly different from the US$3 difference in tax, suggesting zero crowding out in the presence of fiscal illusion. On average, crowding out is zero for the no-tax frame.

However, the distribution of contributions is not constant across the two initial allocations, as shown in Fig. 1. While both show a bimodal distribution of contributions with modes at US$5 or below and at US$10 (an equal division between the subject and the charity), a larger fraction of subjects gives US$5 or less in the 18/2 treatment (45% vs. 17.5% of subjects are at the lower mode). Eighty-five % of the subjects in the US$18–US$2 treatment keep at least half of the total US$20 pie for themselves; 60% do so in the US$15–US$5 treatment.

Complete crowding out also implies no difference in the number of subjects donating more than US$5 in the two treatments. However, the results show that a larger number of

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[8] These amounts are somewhat higher than the equivalent Bolton–Katok amounts of $7.48 and $6.83. Averages are inferred from Fig. 2, p. 322 in Bolton and Katok, imposing the same censoring procedure as we imposed on our own data.

Table 3
Results of nonparametric tests of the crowding out hypothesis

Test	No-tax frame		Tax frame	
	Test statistic	p-Value	Test statistic	p-Value
Mann–Whitney	3.02	0.002	0.49	0.62
Epps–Singleton [$\chi^2(4)$]	10.7	0.03	1.39	0.85
Kolmogorov–Smirnov	1.45	0.03	0.55	0.92

subjects donate more than US$5 in the US$15–US$5 treatment (82.5% vs. 55%). The null hypothesis of no difference in proportions contributing more than US$5 is rejected ($p<0.003$, two-tailed test).

We also conduct three nonparametric tests of differences in distributions, shown in Table 3.[9] Complete crowding out implies a null hypothesis of identical distributions. Results for all three tests reject the null hypothesis of identical distributions for the US$15–US$5 and US$18–US$2 treatments in the no-tax frame.

4.2. Tax frame

For the tax frame treatments, mean contributions are US$9.23 for the US$15–US$5 treatment and US$10.20 for the US$18–US$2 treatment. (Again, we have censored the 18/2 data, aggregating all contributions below US$5 up to US$5.) All but three subjects made whole dollar divisions of their endowments. A means test is unable to reject the hypothesis that the two means are equal (p-value<0.22, one-tailed test). The distribution of contributions (inclusive of forced amounts) is shown in Fig. 2. For both treatments, the distributions are strongly unimodal, with 47.5% of all subjects contributing at or below US$5 in each treatment. The remaining subjects are relatively uniformly distributed. Results for all three nonparametric tests fail to reject the null hypotheses of identical distributions. These results offer support for full crowding out when fiscal illusion is eliminated.

In Table 4, we report results from censored Tobit regression analysis testing for crowding out while controlling for other factors that might influence individual contributions. The regressions pool data from all treatments. We estimate models with and without controls for individual characteristics of the decision makers. Model 1 includes a treatment variable (US$15–US$5=1 for the US$15–US$5 treatment, and 0 otherwise), a frame variable (Tax=1 for the tax frame, and 0 otherwise), and an interaction variable (US$15×Tax). If the motive for giving is pure altruism or there is zero fiscal illusion, our model predicts full crowding out. This amounts to predicting a coefficient of 0 for US$15–US$5, Tax and US$15×Tax. If motivation is pure warm glow or impure altruism and fiscal illusion present, the coefficient on US$15–US$5 should be positive. If the no-tax treatment induces fiscal illusion, and the Tax treatment eliminates it, then the coefficient on the US$15×5Tax variable treatment should be negative, offsetting the

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[9] The Mann–Whitney test is based on the rank order of the observations. The Epps–Singleton test and the Kolmogorov–Smirnov two-sample tests compare the distributions of the two samples.
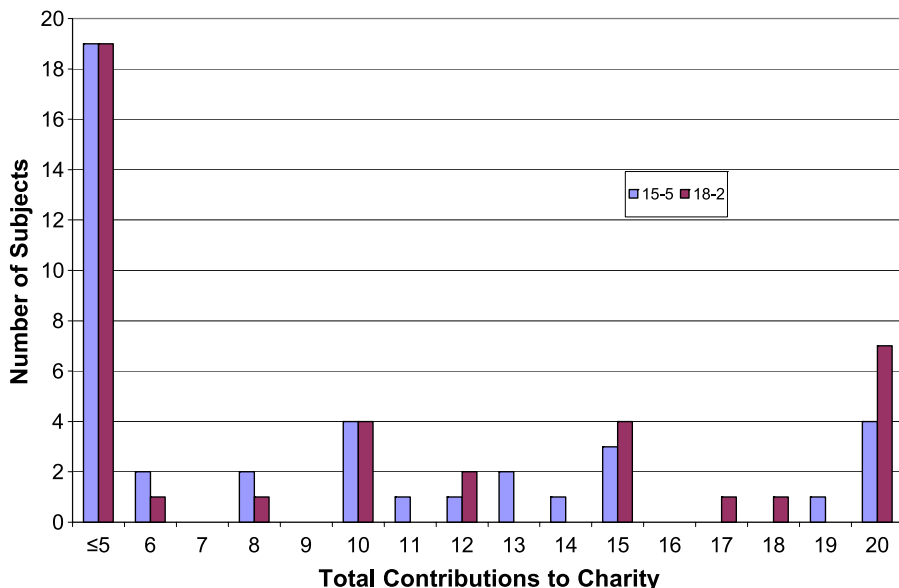
Fig. 2. Comparison of total contributions—tax treatment.

positive coefficient on 15–5. If these two coefficients are equal, then crowding out is complete in the tax treatment.

Model 2 adds controls for the subjects' sex (Male), subjects' age (Age), and the number of economics classes taken (Econ).[10] Previous studies of sex differences in giving suggest a negative coefficient for Male (see Eckel and Grossman, in press, for a review of the literature). Likewise, previous studies have suggested economists are less altruistic than others (Marwell and Ames, 1981; though Ledyard, 1995, expresses doubts about the findings), so we predict a negative coefficient for Econ. We have no priors regarding Age and Contributions.

The regression results reaffirm the nonparametric results. The coefficients for US$15–US$5 in both models are positive and significantly different from zero, rejecting the complete crowding out hypothesis and supporting the presence of fiscal illusion and warm glow motivation. The marginal effects are US$2.87 (Model 1) and US$2.35 (Model 2). The results offer no support for the crowding out argument that subjects adjust their voluntary contributions to offset forced contributions.

The coefficients for Tax are insignificantly different from zero in both models. However, the coefficients for the interaction term US$15×Tax are negative and significant in both models. We cannot reject that the coefficients of US$15–US$5 and US$15×Tax are the same magnitude, implying that the tax treatment fully offsets fiscal illusion. This

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[10] In preliminary regressions we included charity dummy variables. The individual coefficients were all insignificant. Furthermore, we could not reject the null hypotheses that, jointly, the charity coefficients were all equal to zero. Results are available from the authors.

Table 4
Censored Tobit regression results (dependent variable is total contribution to charity)

Variable	Coefficient, *marginal effect* (*t*-statistic)	
	Model 1	Model 2
US$15–US$5	5.43*, *2.87* (2.53)	4.37*, *2.35* (2.09)
Tax	3.13, *1.65* (1.43)	2.72, *2.35* (1.20)
US$15×Tax	−6.96*, *−3.67* (2.27)	−5.27*, *−2.84* (1.76)
Male		−3.52*, *−1.90* (2.31)
Age		0.79*, *0.43* (2.39)
Econ		−1.45*, *−0.78* (2.43)
Constant	4.88*, *2.58* (3.08)	−7.26*, *−3.91* (1.10)
L.L.F.	−358.16	−351.59
N	160	160

[+]One subject did not complete the question of employment status and was dropped for these regressions.
 * Significant at the 5% level, one-tailed test.

result is consistent with the notion that giving is motivated at least in part by warm glow, and that taxes are considered by subjects to be part of their contribution. The insignificant coefficient on Tax implies that while the impact of the forced contribution of US$2 is the same regardless of whether it is financed by an explicit or hidden 10% tax, an explicit tax of 25% significantly reduces giving relative to a hidden tax of the same magnitude. Model 2 predicts donations by session type to be: US$15–US$5 No-Tax=US$11.20; US$18–US$2 No-Tax=US$8.34; US$15–US$5 Tax=US$9.10; and US$18–US$2 Tax=US$9.90.

The coefficients for Male are negative as expected and significant. Giving is positively, and significantly, correlated with Age. Finally, giving significantly decreases with the number of economics courses taken, Econ. These effects are consistent with previous findings.

To understand the difference in crowding out in the two treatments, we examine the comments that subjects made in response to question 15 in our survey: "Please explain your thought process in making your decision today. What motivated you to make the decision you made? Please explain as carefully and as fully as possible." In particular, we were interested in the extent to which subjects took credit for the forced part of the contribution to the charity. In general, answers in both frames justified giving by stressing the importance of the activities of the charity, or justified not giving by referring to their own financial situations. However, a handful of subjects in both treatments referred to the forced contribution as resulting from their own actions (by choosing a particular charity) or coming from their own endowment. One subject in a tax frame session wrote:

> "I considered the total amount that 'I made=$20'. Since taxes already took $2 and gave it to the organization I considered that [to be] a contribution from me even though it was involuntary."

A subject in a no-tax frame session wrote:

> "I thought of it as if it were really my money. Technically I had $20, five of which automatically went to a charity."

These types of comments are about equally frequent for the two frames.[11] Thus, it appears that eliminating fiscal illusion has a more complex effect than simply making subjects take ownership of the forced contribution.

5. Conclusion

In this paper, we report evidence from a laboratory experiment that examines the effect of the two contextual factors on crowding out. First, the recipient of contributions in our setup is a charitable organization chosen by the participant. Second, we vary the frame of the decision to make the source of funding explicit, eliminating fiscal illusion. Our results indicate that government transfers (forced contributions) do not crowd out private giving when the source of the funding of the forced transfers is not apparent to the subjects, and the recipient is a charitable organization. This finding is largely consistent with much of the empirical work on this question. With the exception of Payne (1998), empirical studies have found crowding out to be relatively minor (5–25%) or have found evidence of some small amount of crowding in.

This contrasts sharply with most theoretical models, and with the findings of previous experimental studies. One important difference between this study and previous laboratory experiments is the nature of the recipient of a subject's largess. Previous studies had contributions going to other anonymous subjects; recipients for which there is little basis for engaging altruistic preferences. By substituting a charity of choice for the previously anonymous subject, potential donors' altruistic preferences can be activated. The satisfaction from giving, and therefore the incentive to give, is greater if the donor has reason to believe that the recipient is deserving of assistance.

We find no evidence of positive impact of third-party giving on contributions. Since the charities are held constant across all treatments, and the experimenters force contributions in all treatments, there is little reason for this sort of crowding in to occur. This finding is not inconsistent with arguments for crowding-in, since the experimenter provides neither the informational nor monitoring functions that lead to crowding in.

Our data show that forced contributions crowd out private giving when the source of the funding of the forced transfers is apparent to the subjects, consistent with the assumptions of theoretical models that predict full crowding out of contributions. The distribution of giving in the high-tax treatment was not significantly different from the distribution of giving in the low-tax treatment. Subjects adjusted their level of giving to reflect the higher level of forced transfers in the high-tax sessions. We conclude that when the situation in the lab mimics the assumptions of the theoretical models, full crowding out is observed, as predicted.

More generally, our results have two important general implications. First, lab experiments can be used to test theories of charitable giving in situations where the

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[11] Additional comments are available upon request.

assumptions of the theory can be enforced. Second, the framing of a decision can lead to very different outcomes in the lab. This leads to a cautionary note that neutral framing does not necessarily lead subjects to think about a problem in a way that is consistent with the assumptions of the model. Sometimes, a small amount of nonneutral framing can change subjects' perceptions of the situation to bring them more in line with the model in the mind of the theorist or experimenter.

Acknowledgements

Appendix A. Instructions (US$18–US$2 no-tax treatment, with changes for the 15/5 treatments <u>underlined</u> and the changes for the tax treatment in *bold italics* in parentheses)

You have been asked to participate in an economics experiment. In the course of this experiment, you may earn money, which will be paid to you in cash. One of the persons in this room will be chosen to be the monitor for today's experiment. The monitor will be paid US$20. The monitor will be in charge of the envelopes as explained below. In addition, the monitor will verify that the instructions have been followed as they appear here. In this experiment, each of you will be paired with a charity of your own choosing selected from a list of 10 different charities. The charity you select will receive US$2.00 <u>(US$5.00)</u> from the experimenter.

The experiment is conducted as follows.

You have each been given an unmarked envelope, a piece of paper with a five-digit code number, and a CHARITY SELECTION SHEET. The code number should be the same as the number on your CHARITY SELECTION SHEET. *Please note that no one else, including the experimenter, will know the personal decisions of people in this room.* Keep the paper with the code number. This number is designed to allow you to maintain your anonymity. You will use this number to collect your earnings at the end of this session. First, please indicate your charity of choice by placing an X in the box next to that charity on the CHARITY SELECTION SHEET.

The following paragraph is for the no-tax treatment only.

The charity you select will receive US$2 <u>(US$5)</u> from the experimenter plus any additional money you allocate to it. You have US$18.00 <u>(US$15.00)</u> to be divided between yourself and your designated charity. You must decide how much of the US$18.00 <u>(US$15.00)</u> to keep for yourself and how much to pass to your selected charity. You may elect to keep it all for yourself and give nothing to the charity, keep nothing for yourself and pass it all to the charity, or keep some for yourself and pass the remainder to the charity.

The following paragraph is for the tax treatment only.

The experimenter has imposed a 10% *(25%)* income tax (US$2.00) *(US$5.00)* on you. The proceeds of the tax will be transferred to the charity you have selected to be paired with. You have after-tax income of US$18.00 *(US$15.00)*. You are to decide how this US$18.00 *(US$15.00)* is to be divided between yourself and your designated charity. You must decide how much of the US$18.00 *(US$15.00)* to keep for yourself and how much to pass to your selected charity. You may elect to keep it all for yourself and give nothing to the charity, keep nothing for yourself and pass it all to the charity, or keep some for yourself and pass the remainder to the charity. The amount you choose to send to your charity will be in addition to the tax revenue of US$5.00 that has already been earmarked for your charity.

Indicate in the spaces at the bottom of the CHARITY SELECTION SHEET how much of the US$18.00 (US$15.00) you elect to keep for yourself and how much you elect to pass to the charity. Note that the amount you elect to keep for yourself, plus the amount you elect to pass to the charity must sum to US$18.00 (US$15.00). Once you have made your decision you seal your CHARITY SELECTION SHEET in the envelope provided. Place the envelope inside the box at the front of the room and then retake your seat.

Once everyone has deposited their envelopes, the experimenters will open them, calculate your earnings and contributions to the charities. Your earnings will be placed in an envelope marked with your five-digit code number. Your may pick up your envelope as you exit the room. While the experimenters are making up your envelopes, you will receive a SURVEY form. Please enter your code number in the space provided and complete the survey questions. When you have completed the SURVEY, deposit it in the box at the front of the room. You are then free to go.

The experimenters will calculate the total donations to each charity. The total donation to a charity equals the amount allocated to a charity plus US$2.00 (US$5.00) for every subject who designated that as his/her charity of choice. The experimenter will make out checks for these amounts. The monitor will place the checks in addressed and stamped envelopes. The monitor and the experimenter will go together to the nearest mailbox and drop the envelopes in the mailbox. After signing a form verifying that the experiment was conducted according to the instructions, the monitor is free to leave. The experiment is then over.

CHARITIES

American Cancer Society
Provides many services to cancer patients and their families such as information, medical equipment, transportation to treatment locations, and a support system
American Red Cross
Offers blood donation information and services, disaster relief, many helpful educational classes, as well as HIV/AIDS support groups
Big Brothers Big Sisters
Provides one-to-one mentoring for youth and children residing in a one parent family for the purpose of creating caring, confident and competent young adults

Big River Sierra Club
Protects and preserves environmentally sensitive areas
Central Minnesota Task Force on Battered Women
Offers safe shelter to battered women and their children, as well as food and clothing, assistance with legal, medical and financial problems, and information/support groups
Doctors Without Borders
Doctors and nurses volunteer to provide urgent medical care in some 70 countries to civilian victims of war and disaster regardless of race, religion or politics
Feed The Children
One of America's most effective charities providing food, clothing, medical care, education and emergency relief to children in the United States and overseas since 1979
Minnesota AIDs Project
Provides referrals to HIV sensitive physicians, helps obtain/maintain medical coverage, support groups, legal services, life enhancement programs, toll free information and referral line, and transportation services
Oxfam America
Invests privately raised funds and technical expertise in local organizations around the world that hold promise in their efforts to help poor move out of poverty; committed to long-term relationships in search of lasting solutions to hunger, poverty and social inequities
YMCA
Provides parent visitation monitoring services and physical fitness services

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