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Rebate versus matching: does how we subsidize charitable contributions matter?

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Abstract

A rebate subsidy of rate s_r is functionally equivalent to a matching subsidy of rate $s_m = s_r/(1 - s_r)$. Other things equal, an individual should respond identically to the two subsidies. We test the effect on charitable giving of the framing of a subsidy as a rebate or as a match. Subjects make a series of 'dictator' allocation decisions, dividing an endowment between themselves and their chosen charities. Allocation decisions vary by the endowment level, the net price of giving, and the form of the subsidy. We find that contributions are significantly higher with matching subsidies than with rebate subsidies.
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1. Introduction

In this paper we test the effect on individual donations of the framing of a subsidy for charitable contribution as either a rebate or a match. A rebate subsidy of rate s_r is functionally equivalent to a matching subsidy of rate $s_m = s_r/(1 - s_r)$. Other things equal, an individual should respond identically to the two subsidies, transferring the same net amount to the charity under both systems. An individual's gross contribution under the rebate subsidy would be $1/(1 - s_r)$ times larger than his gross contribution under the matching subsidy. We report the results

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of laboratory experiments that show a significant difference in individual behavior under the two subsidy schemes. Contributions under a matching subsidy are between 1.2 and 2 times contributions under an equivalent rebate subsidy.

Our experiments employ a modified 'dictator game' environment, where a subject makes a series of allocation decisions to divide an endowment between himself and a charity he chooses from a list.[1] Allocation decisions vary according to: (1) the level of the endowment, (2) the net price of donating $1 to the charity, and (3) whether donations are subsidized in the form of a rebate, a match, or not at all. In addition, socioeconomic information is collected after the allocation decisions are made.

This research is relevant for evaluating the numerous proposals to reform the United States federal personal income tax, and for understanding the popularity of matching gift programs that are operated by corporations in both the United States and Canada. Two tax reform proposals that receive media attention are a flat-rate income tax and a consumption tax. Both proposals would eliminate many, if not all, deductions that are allowed under the current tax code. Tax-exempt, nonprofit organizations and charitable organizations might suffer should such reforms be adopted. Under current law, the federal government rebates to the taxpayer an amount equal to the marginal tax rate for every dollar contributed, reducing the cost of making a dollar contribution by that rate. Removal of this subsidy will tend to reduce contributions to nonprofit and charitable organizations leaving such organizations under-funded.[2] Assuming public sentiment favors the continued support of nonprofit and charitable organizations, alternative methods of subsidizing charitable giving should be explored.[3] Our research suggests the tax deduction could be replaced with a matching subsidy scheme, achieving the same level of contributions at a lower cost.

Matching gift programs are increasingly common features of corporate philanthropy. In its 1995, 1997, and 1999 surveys of approximately 1,000 corporations, the Council for Advancement and Support of Education (1999) reports that almost 100% have programs that match employee contributions to colleges and universities (at rates of up to 5 to 1). The number of corporations with matching gift programs for non-educational non-profit organizations has increased over the four years from 41 to 51%. A 1997/98 survey of 116 Canadian corporations reports

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[1]Our procedure is similar to that used in Eckel and Grossman (1996, 1998), with modifications along the lines of those adopted by Andreoni and Miller (1998) and Andreoni and Vesterlund (2001).

[2]Barry (1996) presents arguments that such organizations will benefit from reform. He and others argue that since donations as a percent of personal income have remained relatively constant over time, and since tax reform will increase personal income, reform will lead to greater donations. These proponents apparently believe that this income effect will dominate the price effect resulting from the elimination of the deduction.

[3]The results from a November 1997 CNN/USA Today/Gallup Poll suggest that the public is not in favor of eliminating the deduction for charitable contributions (Cable News Network, 1997). Fifty-three percent of those polled opposed a flat tax with no charitable deduction.

that 56% administered employee matching gifts programs (Canadian Centre for Philanthropy, 1998).[4] Our research suggests that such programs are particularly effective ways to transfer funds to charitable organizations.

2. Experimental procedure and design

2.1. Subject recruiting

We recruited 181 subjects from undergraduate and graduate courses in economics, finance, management, psychology, and sociology at the University of Texas at Arlington. Eighty-six subjects participated in four sessions conducted during class time.[5] Subjects entering the classroom were informed that, in lieu of their normal class lecture, an experiment would be conducted. They were told that their participation was voluntary, and if they did not wish to participate, they were free to leave. Care was taken to make it clear that the experiment was not related to the class and that participation would have no effect on the person's performance in the class. We explained that participants could earn money, paid in cash at the end of the experiment, with the amount to be determined by the subject's decisions. Anyone who did not wish to participate was excused. Ninety-five additional subjects were recruited through announcements made in introductory social science and business classes, and were told to appear at a specified room at a specified time and date. Two sessions — one of 41 subjects and one of 54 subjects — were conducted using this recruiting method.[6] Other than recruitment method, all sessions were conducted in an identical manner.

2.2. Procedure

The experiments followed standard procedure. Subjects were seated, consent forms were distributed, signed by the subjects, and collected. A group monitor was chosen at random to observe and assist in conducting the experiment. (The monitor received a flat fee of $10.) The experimenter distributed a packet of materials containing written instructions, a slip of paper printed with a random five-digit code number, an allocation problem decision sheet, a charity recognition

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[4] Many non-profit institutions maintain websites to inform potential donors of matching programs that might be available to them. These websites provide further evidence of the growing importance of matching gift programs. For example, the University of Florida maintains a list with more than 6,000 companies that might match contributions to the University; Wellesley College, more than 1000 companies; the University of Michigan, more than 700; and the Rochester Philharmonic Orchestra, more than 100.

[5] Three were classes in economics, one in psychology.

[6] See Eckel and Grossman (2000) for a discussion of differences in the behavior of subjects by subject pool.

form, a description of services provided by the various charities, and a blank envelope.[7] Subjects were told to retain the paper with the code number. The allocation problem decision sheet included a list of ten charities and twelve allocation problems. The experimenter read the instructions aloud. After questions were answered, a subject selected a charity from the list to receive any contributions he wished to make, and completed each of the twelve allocation decision problems, deciding how many of the tokens in his endowment to hold and how many to pass to his charity partner. After completing the allocation decisions, the subject was given the opportunity to complete the charity recognition form, if he wished to receive acknowledgment for any contribution made. All papers were folded and placed inside the envelope, which was then sealed. Next, the monitor rolled a 12-sided die to determine which of the allocation decision problems would determine the subject's earnings.

After the die roll, the Self-Report Altruism Scale (Rushton et al., 1981), a survey of socioeconomic characteristics, and a five-item manipulation check questionnaire were distributed along with a second, larger, envelope. Students were told that the information collected from the surveys was for research purposes only. After completing the survey, the subject placed all materials inside the second envelope and sealed it. The envelope was collected and the subject's earnings and contributions to the charities were calculated. 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 the contributions to each charity were totaled, the experimenter wrote checks to the charities and sealed them in envelopes along with the information provided by those subjects who chose to receive acknowledgment for their contributions. The monitor signed a statement verifying the payments made and the procedures. Both monitor and experimenter walked to a mailbox and deposited the envelopes.

2.3. Allocation decision problems

The allocation problem decision sheet (APDS) presented the subject with twelve allocation problems. There were eight forms of the decision sheet, each with a different random ordering of the decision problems. The decision problems differed by: endowment (40, 60, 75, or 100 tokens); the cost to the subject of contributing $1 to the charity ($1, $0.80, $0.75, and $0.50); and whether the reduction in cost is a result of a rebate of a portion of any contribution or of a matching of any contribution. Contributions were rebated at the rates of 20, 25,

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[7]The instructions, allocation problem sheet, charity recognition form, and description of charities are available from Eckel's website: http://www.econ.vt.edu/~eckelc.

and 50%; contributions were matched at the rates of 25, 33, and 100%. In every case, a token had the monetary value of $0.10.

2.4. Charities

Each subject chose a charity from a list of ten. The charities were selected to reflect as broad a range of services and client groups as possible. The sample included international charities (African Christian Relief, Doctors Without Borders USA, and Feed The Children); national charities (I Have A Dream Foundation); and local organizations (Women's Haven of Tarrant County and American Red Cross, Tarrant County Chapter). The charities covered health (AIDS Outreach Center and Cancer Care Services); environmental (Earth Share Texas); and social service charities (YMCA of Arlington). Charities were selected from the Texas State Employee Charitable Campaign booklet for 1997, which was provided to state employees during the workplace charity campaign. All charities included in the booklet meet state tax eligibility standards. A brief description of each charity was given to the subjects, taken verbatim from the Texas State Employee Charitable Campaign booklet.

3. Results

In total, 168 subjects made complete, useable decisions in the two conditions, 81 in the classroom condition and 87 in the recruited condition.[8] There were four monitors for the classroom sessions and two for the recruited sessions. Table 1 provides a summary of the socioeconomic characteristics for the combined subject pool and for each separately. The average age of subjects was 23 (the University of Texas at Arlington is primarily a commuter college with a high percentage of part-time, mature-aged students). Men comprised 57% of the sample. One-eighth of the subjects were married and one-tenth have children. A majority of the subjects was majoring in economics or business, and approximately 80% had two or fewer economics courses.

Responses to manipulation check items were on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), and are summarized in Table 2. Subjects' responses indicate that they believed their decisions in the experiment were anonymous (the mean response is $\mu = 4.14$ out of a maximum score of 5). In addition, subjects strongly believed that the donated money was sent to the

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[8]An additional seven subjects were dropped, six from the recruited condition and one from the classroom condition. Dropped subjects had either failed to complete the Allocation Decision Problem Sheet, failed to understand instructions received, or failed to answer the required questions on the survey form. The subject dropped from classroom sessions claimed to be an 87-year-old, unmarried female of Slavic/Mongol descent.

Table 1
Subject characteristics

	All sessions (%) (n=168)	Classroom sessions (%) (n=81)	Recruited sessions (%) (n=87)
Age	23.33	23.85	22.85
(S.D.)	(6.82)	(6.81)	(6.83)
Male	95	49	46
	(56.5%)	(60.5%)	(52.9%)
Married	27	15	12
	(16.1%)	(18.5%)	(13.8%)
Children[a]	18	10	8
	(10.9%)	(12.5%)	(9.4%)
Attend religious	65	30	35
services regularly	(38.7%)	(37.0%)	(40.2%)
Race:			
Asian–American/	35	8	27
Oriental	(20.8%)	(9.9%)	(31.0%)
Black/African	23	9	14
American	(13.7%)	(11.1%)	(16.1%)
White/Caucasian	81	48	33
	(48.2%)	(59.3%)	(37.9%)
Hispanic–Black/	1	1	0
Spanish-speaking Black	(0.6%)	(1.2%)	(0.0%)
Hispanic–White/	15	9	6
Spanish-speaking White	(8.9%)	(11.1%)	(6.9%)
Other	13	6	7
	(7.7%)	(7.4%)	(8.0%)
Class:			
Freshman	16	9	7
	(9.5%)	(11.1)	(8.0%)
Sophomore	56	26	30
	(33.3%)	(32.1%)	(34.5%)
Junior	38	13	25
	(22.6%)	(16.0%)	(28.7%)
Senior	54	31	23
	(32.1%)	(38.3%)	(26.4%)
Graduate	4	2	2
	(2.4%)	(2.5%)	(2.2%)
Major:			
Economics/Business	101	52	49
	(60.1%)	(64.2%)	(56.3%)
Other	67	29	38
	(39.9%)	(35.8%)	(43.7%)
Economics classes taken:			
Zero	33	7	26
	(19.6%)	(8.6%)	(29.9%)
One or Two	102	57	45
	(60.7%)	(70.3%)	(51.7%)
More Than Two	33	17	16
	(19.6%)	(21.0%)	(18.4%)
Altruism score	39.45	38.56	40.28
(S.D.)	(12.21)	(13.62)	(11.58)
Recognition	36	13	23
(filled in recognition form for charity)	(21.4%)	(16.0%)	(26.4%)

[a] One male subject in the classroom sessions and two male subjects in the recruited sessions did not complete this question.

Table 2
Manipulation check questionnaire summary statistics

	Manipulation check questions	Mean (S.D.)[b]		
		All $(n=168)$[a]	Classroom $(n=81)$[a]	Recruited $(n=87)$
1.	The procedures followed in this experiment preserved your anonymity.	4.14 (1.06)	4.10 (1.19)	4.18 (0.93)
2.	The tokens you passed to your designated charity will be converted to dollars and be sent to the charity.	4.39 (0.95)	4.47 (0.96)	4.31 (0.93)
3.	The instructions for the experiment were clear and easy to follow.	4.18 (1.04)	4.03 (1.21)	4.32 (0.84)
4.	The recipients of donations to your designated charity are deserving of support.	4.71 (0.78)	4.68 (0.79)	4.74 (0.77)

[a] One subject failed to answer question 1 and one subject failed to answer question 4.

[b] In all cases, the difference between classroom and recruited sessions on the manipulation check questions is statistically insignificant.

designated charities ($\mu=4.39$), and that clients served by their designated charities were deserving of support ($\mu=4.71$). Finally, subjects found the instructions clear and easy to follow ($\mu=4.18$).[9]

3.1. Rebate versus matching

Table 3 shows the gross contributions to the charity by treatment, for parameter combinations that include both rebate and matching treatments (no-subsidy treatments are not shown). The first two columns contain the treatment parameters — endowment level and the net price of giving. Column 3 reports the gross tokens contributed to the charity under the rebate frame (not adjusting for the rebate). In column 4 we calculate the (gross) percent of tokens that would be contributed to result in the same net allocation between the subject and the charity under the alternative frame — the matching subsidy. Column 5 contains the actual gross contributions under the matching subsidy. Column 6 reports the means test for

[9]Although we did not test subjects' understanding of the instructions at the time, at the suggestion of a referee we subsequently tested the instructions with 41 subjects in classes taught by the authors at Virginia Polytechnic Institute and State University and St. Cloud State University. Subjects were given the instructions, the instructions were read, and then the subjects were asked to calculate what their earnings and the charity's earnings would be in different no-subsidy, rebate subsidy, and matching subsidy scenarios (a total of six questions). Twenty-six subjects correctly calculated their own and the charity's earnings in all six questions; 11 made only one mistake and the remaining four subjects made two mistakes. Of the 19 mistakes made, seven were overestimations of the amount to be received by the charity in the match scenario and ten were overestimations of own earnings in the rebate scenario. These types of mistakes would bias decisions in the opposite direction from the differences we report. Thus, we believe that differences between treatments are not due to differences in subjects' understanding of the problem.

Table 3
Gross token contributions to charity (%) (sample size = 135)

(1) Endowment	(2) Price of giving $1 to charity	(3) % tokens contributed under rebate subsidy	(4) % tokens that would be contributed for equivalent allocation under matching subsidy[a]	(5) % tokens actually contributed under matching subsidy	(6) Rebate vs. equivalent matching means test *P*-value[b] (4) vs. (5)
$4.00	$0.50	55.4 (28.8)	27.7 (14.4)	51.9 (31.8)	0.001
	$0.80	50.5 (32.8)	40.4 (26.2)	52.9 (33.0)	0.001
$6.00	$0.75	50.8 (30.3)	38.1 (22.8)	47.0 (31.4)	0.001
$7.50	$0.50	52.3 (30.4)	26.2 (15.20)	51.4 (31.5)	0.001
	$0.75	51.8 (30.9)	38.9 (23.2)	47.1 (31.0)	0.001

[a] Calculated as $(1 - s_r)$ multiplied by the % of tokens passed under the rebate subsidy (3).
[b] One-tailed tests.

equivalence of (4) and (5). In no case did subjects make equivalent allocations under the two subsidy frames; subjects donate 'too many' tokens under the matching frame.

Table 4 contains net allocations for all parameter and treatment combinations. In every comparable case, the dollar value of the donation is significantly greater under the matching subsidy than under the rebate subsidy (*P*-values ≤ 0.003; column 3 versus column 4, Table 4). This result is illustrated in Fig. 1, which shows the average allocations between self and charity for the seven budgets and the subsidy types. For example, with an endowment of $7.50 (75 tokens) and a price of giving of $0.75, charities received approximately 21% more, on average, under the matching subsidy than under the rebate subsidy ($4.71 vs. $3.89). It is also evident from Fig. 1 that, on average, the pattern of giving is otherwise consistent with economic theory. Giving is price-sensitive, increasing as the cost of giving declines; and charitable services is a normal good, increasing with income.

In Table 5 we estimate the demand for charitable giving, using the commonly applied log-linear specification.[10] The equation estimated is:

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[10]See, for example, Clotfelter (1980, 1990). In addition, we also estimated a linear expenditure demand model (LEM). Comparing the estimated elasticities, evaluated at endowment = $6 and price = $0.75 for the LEM, to those reported in Table 5, we find strong similarities. Two-thirds of the LEM elasticities are within one standard error of the comparable elasticity estimates reported in Table 5, and all but one of the remainder are within two standard errors.

Table 4
Net dollar contributions to charities (sample size = 135)

(1) Endowment	(2) Price of giving $1 to charity	(3) Rebate subsidy	(4) Matching subsidy	(5) No subsidy	(6) Matching vs. rebate Means test P-value[a]
$4.00	$0.50	$2.22 (1.15)	$4.10 (2.55)	–	0.001
	$0.80	$2.02 (1.31)	$2.64 (1.65)	–	0.001
$6.00	$0.75	$3.05 (1.82)	$3.76 (2.51)	–	0.001
	$1.00	–	–	$2.84 (1.96)	–
$7.50	$0.50	$3.92 (2.28)	$7.71 (4.73)	–	0.001
	$0.75	$3.89 (2.32)	$4.71 (3.10)	–	0.003
$10.00	$1.00	–	–	$4.87 (3.22)	–

[a] One-tailed test.
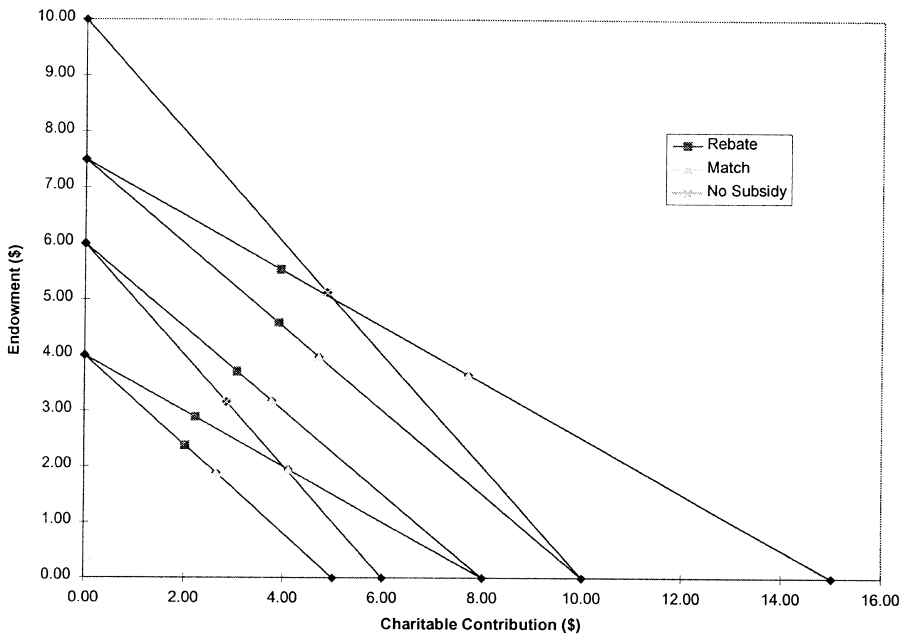
Average Allocations Between Self and Charity

Fig. 1. Average allocations between self and charity.

Table 5
Regression results: random effects tobit maximum likelihood

Dependent variable=ln(dollars contributed to the charity+$0.10)

Variable	(1) Coefficient (*t*-statistic) [Elasticity]	(2) Coefficient (*t*-statistic) [Elasticity]	(3) Coefficient (*t*-statistic) [Elasticity]
Constant	−1.095* (7.83)		
Constant (no subsidy)		−1.557* (3.40)	−2.662* (5.81)
Constant (rebate subsidy)		−1.101* (4.74)	−2.216* (8.67)
Constant (match subsidy)		−0.987* (3.62)	−2.099* (7.45)
Endowment	0.883* (12.78) [0.821]		
Endowment (no subsidy)		1.100* (4.94) [1.030]	1.098* (5.04) [0.905]
Endowment (rebate subsidy)		0.895* (7.00) [0.838]	0.897* (7.01) [0.739]
Endowment (match subsidy)		0.820* (5.96) [0.767]	0.821* (6.01) [0.677]
Price	−0.777* (10.09) [−0.723]		
Rebate price		−0.364* (1.95) [−0.340]	−0.365* (1.98) [−0.301]
Match price		−1.140* (6.17) [−1.067]	−1.137* (6.25) [−0.938]
Age			0.060* (16.23)
Sex			−0.207* (4.66)
Religious			0.798* (17.99)
L.L.F.	−2436	−2399	−2370
n	2016	2016	2016

* Significant at the 5% level, one-tailed test.

$$\ln(\text{CONTRIBUTIONS})_{ij} = a_0 + a_1\ln(\text{ENDOWMENT})_{ij} + a_2\ln(\text{PRICE})_{ij}$$
$$+ a_3 X_i + \epsilon_{ij} \tag{1}$$

where $i = 1, \ldots, 168$ (an index of subjects) and $j = 1, \ldots, 12$ (an index of allocation problems) and:

CONTRIBUTIONS = dollar value of contribution received by the charity + $0.10[11]

ENDOWMENT = dollar value of tokens in the endowment ($4, $6, $7.50, or $10)

PRICE = price of giving $1 to the charity ($0.50, $0.75, $0.80, or $1.00)

X is a vector of individual characteristics affecting charitable giving, including:

AGE = age of the subject

SEX = sex of the subject (1 = male)

RELIGIOUS = does subject regularly attend religious services (1 = yes)

CONTRIBUTIONS are expected to increase with ENDOWMENT and decrease with PRICE. Increases in AGE, assuming it acts as a proxy for income, should increase contributions. Men are hypothesized to be less altruistic than are women (see Eckel and Grossman, 1998). CONTRIBUTIONS are predicted to increase with regular attendance at religious services. Evidence from the fundraising literature indicates that people active in religious organizations are more likely to give than those who are not (e.g. Flanagan, 1991, p. 18).

We estimate (1) using random effects, tobit maximum likelihood to account for the panel nature of the data (168 subjects each making twelve decisions) and for the censoring of the subjects' choices from both below and above (i.e. $\ln(0.1) \leq \ln(\text{CONTRIBUTIONS}) \leq \ln(\text{maximum possible CONTRIBUTIONS})$. Several versions of the model are estimated and results are reported in Table 5.[12]

We first test whether the coefficients vary with the nature of the subsidy (column 1 vs. column 2). A likelihood ratio test of the joint null hypothesis of no difference

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[11]Because the logarithm of zero is not defined, it is customary in studies of the effect of the tax system on charitable giving to add a small amount ($10 is common) to the contribution, thereby allowing the dependent variable to be expressed as a logarithm. We have added only $0.10 rather than $10 to adjust for the fact that in our study the subjects' endowments are quite small, rather than being their after-tax net income.

[12]We tested for heteroskedasticity but were unable to reject the null hypothesis that the error term was homoskedastic. We also tested for order effects, controlling for the order of decisions by including a variable which gave the order of each of the 12 decisions on each of the eight different allocation problem decision sheets. This variable was insignificantly different from zero in all versions of the model and subsequently dropped.

in the coefficients across subsidy treatments is rejected ($\chi^2(5) = 75.7$, P-value $<$ 0.01). The marginal effects of ENDOWMENT and PRICE can be interpreted as the income and price elasticities of charitable giving, respectively. As predicted, charitable giving is increasing in the endowment and decreasing in price. Column 2 shows income elasticities between 0.77 and 1.03 (depending on the type of subsidy), and rebate matching price elasticities of -0.34, and -1.07, respectively. The significance of, and significant difference between, the price elasticities for the two subsidy types indicate that the form the subsidy takes has an important effect on the total amount received by the charities.[13] Giving under a matching subsidy is approximately three times more responsive to changes in the price of giving than is giving under a rebate subsidy. Framing the subsidy as a cooperative endeavor elicits more giving and greater responsiveness to the size of the subsidy, *ceteris paribus*.

   In comparing our estimated income and (rebate) price elasticities with previous, non-experimental studies it is necessary to consider the context in which they are generated. Our subject pool is relatively young, and contains few who are married, and even fewer who have children (see Table 1). Although we did not collect income data it seems reasonable to assume that our typical subject has relatively low income (reflecting her non-peak income-earning age and student status). Furthermore, as a young single, either living in a parent's home, alone or with other students, our subject is unlikely to itemize deductions for federal income tax purposes. The estimated elasticities reflect a one-time contribution to a specific charity rather than total giving over one or more years. While there exist no directly comparable estimates using non-experimental data, there are a number of studies with common characteristics with elasticity estimates consistent with our estimate.

   Clotfelter and Steuerle (1981) report evidence that both income and price elasticity of giving increases with income level. Using data from the 1975 Treasury tax file, they estimate a price elasticity of approximately -0.4 for taxpayers in the lowest income category, ($4,000–$10,000) and approximately -0.7 for the next highest income category ($10,000–$20,000).[14] Clotfelter and Steuerle's income elasticity estimates are approximately 0.55 for the two lowest income categories in both estimating equations. Clotfelter (1980) estimates a partial adjustment specification of a charitable giving function and reports short-run price elasticities (between -0.241 and -0.938) and income elasticities

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[13]The null hypothesis of equality of price coefficients across treatments could be rejected at traditional levels ($\chi^2(1) = 15.28$, P-value $<$ 0.01).

[14]They estimate both a standard log model with an interaction term (ln Y*ln P) and a translog model with price elasticities of -0.382 and -0.423, respectively, for the lowest income category and -0.657 and -0.732, respectively, for the next highest income category. Feldstein and Clotfelter (1976, p. 17) find that price elasticity decreases with income.

(between 0.243 and 0.466) consistent with our findings.[15] Clotfelter (1980) also reports evidence that suggests new itemizers may be less sensitive to price changes than former itemizers. Finally, in the one study that examines giving to a specific charitable organization (public radio), Kingma (1989) estimates income and price elasticities to be 0.99 and −0.43, consistent with our estimates. As Kingma (1989 p. 1204) notes:

> . . . all other authors use the traditional aggregate measures of charity to make their estimates. Their estimates of the income and price elasticities are for a composite good only a part of which is contributions to public radio. On the basis of this, there need not be any relationship between the different estimates of the price and income elasticity.

Column 3 reports an expanded model that includes other possible determinants of charitable giving, assuming coefficients on these variables do not vary across subsidy treatment.[16] Giving is positively associated with age; this may be a reflection of the different economic circumstances of a typical college-age student relative to a mature-aged student. The first is more likely to be a full-time student with fewer sources of income, while the second is more likely to be a part-time student with either a part- or full-time job or a supporting spouse.

The negative coefficient for SEX indicates that men are less generous than women. There is a considerable literature examining sex differences in cooperation or altruism (see Eckel and Grossman, 2001b, for a review). In general, across a variety of different experiment types, the findings are inconsistent, providing no clear implications. However, for dictator experiments there is considerable consistency in the finding that women are more altruistic than men. When the decision is non-strategic and risk free, women are found to be more generous than their male counterparts.[17]

One possible confounding factor is the choice of charities presented to the subjects. Women may have given more because the charities offered better reflected their preferences than they did the men's.[18] In Table 6, we report the distribution of charity choices and the average contributions made by both men

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[15]Clotfelter (1980) estimates the model for 1968–70, 1970–72, and 1972–73 data. He finds ' . . . that only about half of the percentage difference in long-run giving caused by a tax policy change will be realized over a two-year period . . . ' (1980, p. 332).

[16]A likelihood ratio test of the null hypothesis that the coefficient for each of the other determinants equals zero is rejected ($\chi^2(5)=57.45$, *P*-value<0.01). The test of the hypothesis that the coefficients are unvarying across treatment cannot be rejected ($\chi^2(6)=4.00$, *P*-value<0.41).

[17]See Andreoni and Vesterlund (2001) and Eckel and Grossman (1996, 1998, 2001a,b). Andreoni and Vesterlund find that the relative altruism of women depends on the slope of the budget constraint (or price) between own payoffs and other's payoff, with men more altruistic only at higher prices.

[18]We thank the referee for suggesting this line of analysis.

Table 6
Number of contributors and mean contribution by charity

Charity	Number of contributors (% of Total)		Mean contribution (S.D.)		Men's vs. women's contributions: Means test *t*-statistic (*P*-value)
	Men	Women	Men	Women	
American Red Cross, Tarrant County Branch	8 (8.4)	5 (6.8)	$3.63 (2.08)	$2.64 (1.67)	0.89 (0.39)
Earth Share of Texas	3 (3.2)	2 (2.7)	$1.87 (0.67)	$2.51 (0.25)	1.24 (0.30)
Doctors Without Borders USA	10 (10.5)	7 (9.6)	$4.19 (1.81)	$6.10 (1.92)	2.08* (0.05)
Cancer Care Services	21 (22.1)	11 (15.1)	$2.97 (1.68)	$3.96 (2.19)	1.43 (0.16)
AIDS Outreach Center	5 (5.3)	8 (11.0)	$4.14 (1.64)	$3.80 (2.04)	0.31 (0.76)
YMCA of Arlington	10 (10.5)	2 (2.7)	$2.60 (1.59)	$5.86 (1.85)	2.60* (0.03)
African Christian Relief	8 (8.4)	4 (5.5)	$4.58 (2.95)	$4.29 (3.13)	0.16 (0.88)
Feed The Children	18 (18.9)	18 (24.7)	$3.52 (1.99)	$3.85 (1.70)	0.53 (0.60)
Women's Haven of Tarrant County	4 (4.2)	9 (12.3)	$4.36 (2.32)	$4.91 (2.18)	0.41 (0.69)
I Have A Dream Foundation	8 (8.4)	7 (9.6)	$4.41 (2.02)	$3.50 (2.02)	0.87 (0.40)

and women. Men and women exhibited a high degree of similarity in their charity choice. A χ^2 contingency test of the null hypothesis that charity choice is independent of sex could not be rejected [$\chi^2(9) = 11.21$, *P*-value = 0.26]. As for contributions, women were more generous on average than men in six of the ten cases; in two of those cases women's contributions were significantly higher than men's. In the four cases where men's mean contributions were more generous, none were significantly so.

The positive and significant coefficient for RELIGIOUS is consistent with the evidence that one of the most important determinants of charitable giving is active membership in religious organizations. Flanagan (1991) reports that 80% of those who are active in religious organizations give, versus 55% of people who are not active. Barry (1996) reports that weekly attendees donate an average of 3.3% of their income versus 1.4% for monthly attendees and 1% for those who attended

only once or twice a year. The reported positive correlation is even more noteworthy absent any overtly specific, church-sponsored religious organizations among the list of charities subjects could select from. It might have been expected that religious persons might be more generous with respect to organizations supported by their churches, but not with secular charities of the type included in this study.[19]

Finally, we consider whether our results have been skewed by the decisions of just a small sub-sample of our subjects.[20] We consider this question from two perspectives. First, a hypothesis of rational behavior would predict that while some subjects will contribute more under the rebate subsidy than under the matching subsidy, and vice versa for other subjects, the overall distribution should be symmetric with mean zero. For any subject, let $z = 1$ if contributions with matching subsidy (CM) is greater than contributions with rebate subsidy (RM); $= 0$ if CM$=$RM; and $= -1$ if RM $>$ CM. For the 840 paired decisions, $z = 1$, 0, and -1 in 604, 94, and 142 cases, respectively. The mean was 0.55 (standard deviation$=0.77$) and was significantly different from zero (P-value<0.001). Table 7 reports the distribution of z by subject. The distribution is symmetric for only fourteen subjects. Of the remaining 154 subjects, 140 had a distribution of contributions skewed in favor of the matching subsidy.

We next consider, by endowment/price pairs, the distribution of mean differences in dollar contributions across subjects. Let $y = m - r$, where $m =$ dollar contribution with matching subsidy and $r =$ dollar contribution with rebate subsidy. Rational behavior predicts that the distribution of y should be symmetric with a mean of \$0.00. In Table 8 we report the distribution of y by endowment/price pairs. For all five pairs, the mean difference was positive and significantly different from zero, rejecting the null hypothesis of symmetry.

4. Framing effects

Why might the form of a subsidy influence its effectiveness? One possibility is that the form acts like a framing difference, affecting subject's perceptions of the subsidy. Experimental studies have shown that the framing of a decision may influence a subject's behavior. For example, Andreoni (1995) finds a significant difference in subjects' behavior between strategically-equivalent public good (PG) games and common-pool-resource (CPR) games. PG games have a 'positive frame'; the act of contributing to the public good creates positive externalities for

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[19]Empirical studies seldom include a variable like RELIGIOUS due to lack of data. Federal tax authorities do not collect such information.

[20]This line of analysis was suggested by the referee.

Table 7
Distribution of contributions by subject

Distribution: −1/0/1[a]	Number of subjects	Mean (S.D.)
5/0/0	3	−1.0 (0.00)
4/1/0	1	−0.8 (0.45)
4/0/1	1	−0.6 (0.89)
3/1/1	5	−0.4 (0.89)
3/0/2	3	−0.2 (1.10)
2/2/1	1	−0.2 (0.84)
2/1/2	9	0.0 (1.00)
1/3/1	2	0.0 (0.71)
0/5/0	3	0.0 (0.00)
2/0/3	12	0.2 (1.10)
1/2/2	3	0.2 (0.84)
1/1/3	20	0.4 (0.89)
0/3/2	2	0.4 (0.55)
1/0/4	26	0.6 (0.89)
0/2/3	5	0.6 (0.55)
0/1/4	14	0.8 (0.45)
0/0/5	58	0.0 (0.00)
n	168	

[a] = −1 if charitable contribution with rebate subsidy > charitable contribution with matching subsidy. = 0 if charitable contribution with rebate subsidy = charitable contribution with matching subsidy. = 1 if charitable contribution with rebate subsidy < charitable contribution with matching subsidy.

Table 8
Distribution of differences in contributions with rebate subsidy and contributions with matching subsidy, by subject

Endowment ($)	Price	$y < 0$[a]	$y = 0$	$y > 0$	All
		Number Mean (S.D.)	Number Mean (S.D.)	Number Mean (S.D.)	Mean (S.D.) P-value
$4.00	$0.50	17 −1.371 (1.00)	24	127 2.669 (1.72)	1.879 (2.09) <0.001
$4.00	$0.80	29 −0.887 (0.91)	17	122 1.069 (0.88)	0.621 (1.13) <0.001
$6.00	$0.75	41 −1.176 (1.18)	22	105 1.605 (1.05)	0.716 (1.57) <0.001
$7.50	$0.50	13 −2.138 (2.22)	18	137 4.8497 (3.08)	3.789 (3.64) <0.001
$7.50	$0.75	42 −1.603 (1.31)	13	113 1.820 (1.31)	0.823 (1.94) <0.001

[a] $-y = m - r$, where $m =$ contribution with matching subsidy and $r =$ contribution with rebate subsidy.

other members of the group. CPR games have a 'negative-frame'; the act of withdrawing from the commons creates negative externalities for other members of the group. Andreoni (1995 p. 2) reports that cooperation in the PG game was approximately twice that in the CPR game, indicating '... that the warm-glow of creating a positive externality appears to be stronger than the cold-prickle of creating a negative externality.'[21]

Kahneman and Tversky (1989) discuss the idea of the 'isolation effect' to help explain the impact of framing. They argue that '[I]n order to simplify the choices between alternatives, people often disregard components that the alternatives share, and focus on the components that distinguish them' (1979; p. 271). This may explain the behavioral differences observed here and reported by Andreoni (1995). Subjects ignore the strategic commonality, instead focusing on the differences: in his case contributing to, versus withdrawing from, the public good. In the situation being examined in this paper, subjects appear to disregard the common component (the equivalent own-price of giving), instead focusing on the

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[21]Kahneman and Tversky (1989), Sonnemans et al. (1998), Elliott et al. (1998), and Johnson et al. (1993) offer additional evidence of the impact of framing.

distinguishing component (the individual endeavor versus the cooperative endeavor).

Rebates and matching subsidy frames also differ in the interpretation of the third party's donation. The rebate subsidy has a 'reward-frame': the act of creating the public good is rewarded by some third party, with a transfer to the person making the contribution. However, creation of the public good is an isolated, individual endeavor; the subject is not assured that others are also contributing. The matching subsidy has a 'cooperation frame': the act of creating the public good is a cooperative endeavor between the person contributing and some third party. With a matching subsidy, the subject is assured that at least some others, in this case the experimenter, also will be doing 'their share'. As the matching rate increases, the share of the burden borne by the other party, the experimenter, increases. People may be more willing to give to a public good if others are also doing their share.[22]

Several writers have recognized that giving by one person may influence giving by others. Psychological studies by Kreps (1970) and Bryan and Test (1967) find that subjects are more giving if they recently have observed an altruistic act by others. In studies of reference groups, sociologists find that charitable giving appears to be influenced by the behavior of others with similar socio-economic characteristics (Schwartz and Howard, 1981). This effect is consistent with professional fundraisers' recognition of the importance of peer pressure (Edles, 1993, p. 19). Among economists, Vickrey (1962) notes the positive impact of one person's contribution on giving by others and further notes that ' . . . in some instances, this interdependence of giving is formalized by the device of conditional or matching gifts . . . ' (pp. 40–41). In our setting, perhaps subjects consider that their own contributions induce the experimenter to also give to the charity. The implication that the experimenter is willing to behave altruistically induces greater giving on the part of the subject.

Studies by Andreoni and Scholz (1998) and Feldstein and Clotfelter (1976) have found little or no evidence to support interdependence of preferences. However, these studies are somewhat limited; they rely on measures of overall charitable contributions, and their ability to define the appropriate reference groups is constrained. In order to study interdependence of preferences, giving patterns of individuals and members of their reference groups must be identified, but available data do not provide this level of detail. While our study was not designed to examine the role of peer effects in giving, the contrast between the two subsidies hints at a reference-group effect. Under a matching subsidy, as opposed to the rebate subsidy, a subject knows that her giving will result in some level of giving *to the same charity* by another person (the experimenter) with whom they can

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[22]We thank Robert Sugden for suggesting this explanation.

identify. While experimenter may or may not be considered a part of the subject's reference group, he may be considered a role model or authority figure.

5. Conclusion

We report the results of an experiment designed to test the impact of alternative ways to subsidize charitable giving. A rebate subsidy of s_r and a matching subsidy of rate $s_m = s_r/(1 - s_r)$ present a donor with the same net cost of giving to the charity and therefore should result in the same level of giving. We find that giving to the charity is sensitive to whether the subsidy takes the form of a rebate or a match. Contributions are significantly higher with matching subsidies than with rebate subsidies.

This result could be due to several factors. First, subjects may not understand the problem, and this could bias their decisions in the direction that we observe. However, misunderstanding does not appear to be a significant problem. In the post-experiment survey, subjects report a high degree of understanding. Furthermore, a test of the experiment instructions on a second subject pool reveals a high degree of comprehension. Finally, subjects are responsive in the predicted way to endowment and price, further indicating that they *do* understand the problem.

Another explanation is that subjects do not perceive the two subsidies to be strategically equivalent. Andreoni (1990) has suggested that donors receive utility both from the public good provided by the charity as well as from their own contribution; i.e. the act of giving has a 'warm-glow' effect. Donors care not only about the level of a public good that is produced, but also about their own (gross) contribution to the cause. This effect would tend to produce results such as the ones we observe. This effect would be further enhanced if donors perceive their donation to be the sum of their own contribution and the resulting matching gift resulting from their donation.

Assuming our results are confirmed, the findings have important implications for government policies towards subsidization of non-profit and charitable organizations. They suggest that replacing the current system of tax rebates with an equivalently-costly matching subsidy system could increase contributions to charitable organizations.

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