Tax Framing in Matching and Rebate Subsidy

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Abstract

We conduct a laboratory experiment to study individual decision on donating to a charity in response to changes in the tax rate and income in the presence of matching and two types of rebate subsidies: deterministic and stochastic. Private consumption is taxed, and contributions are subsidized in a way that preserves the relative price of giving across the fundraising mechanisms. We find that tax framing and rebate subsidy elicit less charitable contribution than neutral framing and matching subsidy; the negative effect on donation is smaller for stochastic than deterministic rebate subsidies. Data suggest that charitable giving is a normal good and that donations and private consumption are complements.

Keywords: charitable giving, tax deduction, rebate subsidy, matching subsidy, experiments

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1. Introduction

The action of giving is prevalent in everyday life. It is common to see people giving food to the homeless in the streets, dropping off used objects to Goodwill, and donating money to areas hit by natural disasters or disease outbreaks. In the year 2019, Americans donated $449.64 billion (Giving USA, 2020). Such voluntary giving behavior benefits the economy. It relieves hardship (Agenor, Bayraktar, Aynaoui, 2008), acts as insurance to unanticipated events (Stromberg, 2007) and provides social service to areas the government might underinvest (Leslie and Ramey, 1988; Hughes and Lukssetich, 1999). The economic and social benefits of charitable giving call for the identification of policies that encourage giving. This paper studies payoff equivalent scenarios within a tax framework and compares the efficacy of rebate and matching subsidy on charitable giving.

We study behavioral responses to fundraising mechanisms through a controlled laboratory experiment. In our experiment, an individual faces several allocation choices of a certain amount of money into a private fund and a charity fund that benefits a third party under a different type of fundraising mechanism. We aim at getting some insights on the empirical performance of two types of fundraising mechanisms within a tax framework: matching and rebate subsidy.

The relative price of giving decreases when tax is imposed on the portion of income individuals keep for their own use but not on the charitable contribution. This is a current practice in the United States: taxpayers can deduct charitable contributions from their taxable income. We focus on two subsidy fundraising mechanisms that decrease the relative price of giving by subsidizing contributions to charity, either in matching subsidy or rebate subsidy. In the matching subsidy treatment, the experimenter matches the subject's donation at a specific rate and adds to the contribution, while in the rebate subsidy treatment, the individual receives a certain percentage of the donation back from the experimenter after contributing to charity. The

experimental design is such that the opportunity set in the tax and matching subsidy treatments is the same. The opportunity set in the rebate subsidy treatment is a subset of it unless subjects are allowed to donate their refund.

All of these policies reduce the effective price of giving but have different consequences, which incentivizes individuals to donate more. A tax deduction is different from matching and rebate subsidy because the price of giving is decreased in the form of reduced tax liability to the government. The government receives less tax revenue in exchange for more donations to charity. With matching subsidies, additional donations to charity come out of the pocket of lead donors. The difference between rebate and matching subsidy is when the discount in the price of giving takes effect. The reduction in the price of giving from rebate subsidy takes place sometime in the future, whereas the discount is instant with matching subsidy. As a result, even when the policies are equivalent with regard to reduction in the effective price of giving, behavioral responses to these policies may be different. Donors may care about other features such as who is funding the subsidy or whether the price reduction is instant.

Previous studies on matching and rebate subsidies (Eckel and Grossman, 2003; 2006a; 2006b; 2008) suggest that matching subsidy performs better than a payoff-equivalent rebate subsidy, but little is known about the performance of the two mechanisms when donations are integrated into income tax claims. According to Chatterjee et al. (2020), tax credits shift donations from non-qualifying charities to qualifying charities. We are interested in the efficacy of rebate and matching subsidy fundraising procedures when embedded within a tax framework and variations in the rebate subsidy and stochastic rebates to explore further forms of rebate subsidy.

The paper makes several contributions. First, we study how tax framing affects giving behavior. Second, we compare the performance of stochastic rebate subsidy and determining rebate subsidy on raising donations. Third, we provide time preference as an alternative

explanation for why matching subsidy raises more donations than payoff equivalent rebate subsidy. Fourth, we find that donations are normal goods and are complements with private consumption.

The paper is organized as follows; section 2 provides a literature review of studies that compare rebate and matching subsidy fundraising mechanisms, as well as papers that examine the effect of taxes on charity donations. Section 3 introduces the design of the experiment. Section 4 presents the results from the experiment. Lastly, the paper ends with a conclusion.

2. Literature Review

Studies on the effect of different fundraising mechanisms have been conducted through laboratory experiments, field experiments, and observational data. Table 1 provides a summary of several experimental research papers that compared rebate and matching subsidies. Empirical studies focused on measuring the effect of taxes on charitable giving.

Eckel and Grossman (2003) was the first controlled study of two alternative donation subsidies: a matching subsidy and a rebate subsidy. The two types of subsidies are equivalent regarding the relative price of giving when the matching subsidy rate, s_m and the rebate subsidy s_r satisfy $s_m = \frac{s_r}{1- s_r}$. Contrary to theoretical predictions (assuming conventional preferences), subjects allocated more money to the charity fund in matching subsidy than rebate subsidy overall. This result is replicated in Eckel and Grossman (2006a, 2006b, 2008). Authors argue that the matching subsidy may be more appealing than the rebate subsidy, for it may signal enhanced altruism at the population level. Results from Huck and Rasul (2011) and Huck et al. (2015) are consistent with the explanation. Both papers find that donation is larger when just the presence of a lead gift is announced without any matching offer.

Other researchers also conducted similar experiments to examine the reasoning behind the higher donation in matching subsidy than payoff equivalent rebate subsidy. One robust finding is that change in framing can produce different behavioral responses between a matching condition and equivalent rebate condition (Davis Millner, 2005; Davis, Millner, and Reilly, 2005). The second consistent result is that subjects tend to pass the same percentage of the endowment under matching subsidy and rebate subsidy (Davis, Millner and Reilly, 2005; Davis, 2006).

Davis and Millner (2005) changed the decision problem in the context of private consumption (buying a chocolate bar) instead of putting the decision problem in the context of charitable contributions. Rebate subsidy was framed as receiving a partial refund from the original price. The matching subsidy was framed as getting one more chocolate for free when purchasing one chocolate. Participants bought the most under the matching condition than under the equivalent rebate condition. This result seems to reject Eckel and Grossman's (2003) hypothesis on the "more cooperative" nature of matching driving higher contributions. Additionally, Davis, Millner, and Reilly (2005) used a neutral context by studying the allocation decision as an investment problem. The purpose was to investigate whether framing matters in explaining the pattern of allocations. The pattern of higher net contribution under matching subsidy was again observed in the data revealing that the pattern is robust to decision problems in the context of private consumption or investment.

Davis, Millner, and Reilly (2005) examined whether the "constant contribution" rule explains the data. They find that individuals tend to contribute a fixed percentage of their endowment on average, suggesting that "constant contribution" would be the reason why matching subsidy results in higher net contribution. The intuition behind this reasoning is that the decision problems look the same to individuals if they do not understand the difference among each decision problem, whether it is a matching condition, no subsidy, or rebate condition. Confused or distracted individuals see

the different decision problems as identical. Since all decision problems appear the same, individuals give the same contribution to the problems instead of adjusting the amount of giving based on the total contribution receipt by the charity. The authors also looked at whether "constant contribution" behavior can be eliminated by providing subjects with detailed information on the net consequences of rebate and matching subsidies. The extra information did adjust the pass rate (percentage of endowment individuals choose to contribute) closer to the theoretical prediction, but total contribution under matching remained higher than rebate subsidy.

In a later study, Davis (2006) investigates whether higher charity receipts under matching subsidy are attributable to an isolation effect. The isolation effect proposes that individuals tend to focus on the salient aspect of a decision problem (McCaffery and Baron, 2006). Thus, when subjects are presented with matching or rebate subsidies, the focus is on the more salient part, which is the direct consequence of a decrease in income when donating to charity. They fail to account for the amount of money actually received by the charity. To test for the isolation effect, the author provided the subject with information on the maximum possible contribution. Individuals decided how much of the maximum possible contribution goes to charity. The treatment allowed the subject to donate part of the refund as well. The result supported that higher contribution under matching subsidy is attributable to isolation effect and not a preference for matching subsidy.

Alternative explanations for higher donation in matching were studied in Eckel and Grossman (2006a) and Eckel and Grossman (2006b). Eckel and Grossman (2006a) provided subjects with the opportunity to choose the type of subsidy game to play, to test whether subjects have a priory preference over the two equivalent subsidy games and how the selection affects play. Their finding was that voluntary giving remains greater under matching subsidy than the rebate subsidy. The rates of self-selection across the two games were similar, suggesting indifference between the two

types of subsidies at the population level. The finding was replicated in a field experiment (Eckel and Grossman, 2008). In Eckel and Grossman (2006b), a between-subject experiment, an individual either gets a rebate subsidy or matching subsidy but not both. The purpose of the between-subject design was to reduce possible confusion created by having subjects decide under both types of subsidies. Although the relative price elasticity of giving was closer to the theoretical prediction in this between-subjects design (compared to the within- subjects study), differences in contributions between the two subsidies persisted.

Overall, four conclusions can be drawn from the above studies. First, the pattern of higher charity receipts under a matching subsidy is robust to framing and context. Second, the "cooperative nature of matching game" hypothesis suggested by Eckel and Grossman (2003) seems to be contradicted by Davis and Millner (2005). Third, the isolation effect hypothesis from Davis (2006) is better at explaining why charity receipts are higher under a matching subsidy compared to the hypothesis that individuals prefer a matching subsidy. This conclusion is consistent with Eckel and Grossman (2006a), who also find a similar rate of self-selection across matching subsidy and rebate subsidy. Lastly, the "constant contribution rule" from Davis et al. (2005) also seems to explain the higher total contribution in matching subsidy. The isolation effect and the "constant contribution rule" appear to be related. Individuals might contribute a constant percentage of their endowment across decision problems because of the isolation effect. If they focus only on the salient aspect of giving, then all decision problems may be perceived the same. While alternative explanations for why the total contribution is higher in matching subsidy exist, the answer is still unclear. More research is needed to understand giving behavior.

Several studies use observational data to study how taxes influence giving behavior. Taxes influence giving behavior through two channels: price effect and income effect. The general result is that demand for charitable contributions is price elastic and income inelastic in response to after-

tax income (Feldstein, 1975; Feldstein and Clotfelter, 1976; Boskin and Feldstein, 1977; Feenberg; 1987). These traditional estimates are not robust to different data and empirical methods. Depending on the data and empirical model used, demand for charity giving is price inelastic and varies in some studies (Broman, 1989; Barrett et al., 1997; Randolph, 1995) across different income levels (Clotfelter and Steuerle, 1981; Feldstein and Taylor, 1976).

The possibility of omitted variable bias and confounding effects can drive these seemingly inconsistent findings. This paper controls for such limitations and cofounds and examines how giving is affected when a tax is imposed on income allocated to private funds but not allocations to a charity fund in a controlled laboratory environment.

3. Experiment Design

3.1 Decision Problem

Subjects are initially given an endowment and face nine decision problems. In each decision problem, subjects decide how to allocate the endowment between the private fund and the charity fund of their choice under a given condition. The portion of the endowment allocated to the private fund was for the participants to keep, and the portion allocated to the charity fund was donated to the designated organization. The subjects can participate in one unpaid practice round for each decision before they make the actual decision. The nine decision tasks differ by the tax rate, framing, type of subsidy, and whether or not the rebate rate is stochastic. After everyone completes all the allocation decision tasks, the experimenter draws one bingo ball from a bag with bingo balls numbered one to nine to decide the final earnings and contribution to charity.

Each subject participates in three baseline treatments, three tax framing treatments, and three subsidy treatments (either matching, rebate, or stochastic rebate). Within the treatments, tax rate and endowment are varied.

Table 2 provides a summary of the treatments. The experiment has five treatments, each treatment consists of three tasks, including variation in tax rates and endowment amount. The treatments involve baseline treatments, tax framing treatments (taxes on allocations in the private fund but not on donations), matching treatments (same as the tax framing treatments but with matching on the donation), and two rebate treatments (same as the matching treatment but matching is replaced by either instantaneous or deterministic rebate).

3.2 Baseline

Tax is not imposed on money allocated to the private fund, and subsidies are not provided for the donation at the baseline. As shown in Table 2, each treatment has three tasks: A, B, C. In task A, each subject is endowed with 18 tokens. Every token allocated to the private fund is worth $1 to the subject. Every token allocated to a charity fund is worth $2 to the charity. If the subject allocates all 18 tokens in the private fund, then the subject receives $18. On the other hand, if the subject places all 18 tokens to charity, the charity receives $36.

In task B, we reduce the endowment amount to 12 tokens and increase the worth of each token in the charity fund to $3. The maximum amount the subject could take home was $12, but the maximum about the subject could donate was the same.

In task C, we change the number of tokens endowed to the subjects. The amount depends on the subject's choice in the first baseline treatment. We select the endowment such that the budget line from task B shifts parallel until the allocation selected by the subject in task A is on the budget line of task B. Hence, the endowment amount will be different from subject to subject since it depends on each participant's choice made in baseline 1. Suppose x_{b1} is the number of tokens the subject allocates to the charity fund in baseline 1, then the endowment amount, y_{b3}, in task C satisfies the following equation.

$$y_{b3} = 18 - \frac{1}{3}x_{b1} \quad (1)$$

3.3 Tax Framing

Tax is imposed on private fund in the tax framing treatment. In task A, each subject is endowed with 24 tokens and every token allocated to the private fund is taxed 25%. This makes each token in the private fund worth \$0.75. However, every token donated to the charity fund is not taxed and is worth \$1.50 to charity. Similarly, to task A, if the subject allocates all 24 tokens in the private fund, then the maximum money the subject can get is \$18. If the subject donates all 24 tokens to charity, then the maximum donation the charity receives is \$36. Hence, the budget line faced by the subjects is the same across baseline task A and tax framing task A.

We increase the tax rate to 50% in task B, which makes each token in the private fund worth \$0.50. The maximum amount the subject can take home is \$12 and the maximum amount the subject can donate is \$36. The budget line faced by the subjects is the same across baseline task B and tax framing task B.

In task C we again select the endowment such that budget line from task B shifts parallel until the allocation point selected by the subject in tax framing 1 is on the budget line of task C. Therefore, the endowment amount is dependent on the donation amount in task A. The following is the equation for the endowment amount in task C, y_{t3}, given the number of tokens the subject allocated to the charity fund in task A, x_{t1}.

$$y_{t3} = 36 - \frac{1}{2}x_{t1} \quad (2)$$

3.4 Matching Treatment

Each token donated to the charity fund is matched by the experimenter in the matching treatment.

Same as tax framing task A, each token allocated to the private fund is taxed 25% and is worth $0.75 in matching task A. Unlike tax framing task A, each token donated to charity fund is worth $1 to charity and not $1.50. However, each token donated to charity is matched with the rate of 50% by the experimenter in addition to the donation by the subjects. Consequently, the total amount the charity receives is $1.50 for every token donated. Hence, the budget line faced by the subjects in task A is the same across baseline, tax framing, and matching.

In task B, each token allocated to the private fund is taxed 50% same as tax framing task B and the matching rate is kept the same at 50%. The budget line of task B is the same across task B in baseline, tax framing, and matching.

Similar to the task C in baseline task and tax framing, the amount of endowment in matching task C depends on the subject's donation. The following is the equation for the endowment in matching task C, y_{m3}, given the number of tokens the subject donated to the charity fund, x_{m1}.

$$y_{m3} = 36 - \frac{1}{2} x_{m1} \tag{3}$$

3.5 Rebate Treatment

The rebate treatment returns a portion of the donation to the individuals as a refund. We have two different rebate treatments: deterministic rebate and stochastic rebate. In the deterministic rebate treatment, the subject gets back 25% of the donation as a refund for sure in task A. On the other hand, in stochastic rebate task A, the subjects receive all donation back with 25% probability and nothing 75% probability. In stochastic rebate task B and C, the subjects receive all donation back with 17% probability and nothing with 83% probability. In both deterministic and stochastic cases, the expected rebate rate is 25% in task A and 17% in task B and C. We use bingo balls to determine the outcome of the refund in stochastic rebate treatments. In a black bag we place numbered bingo balls from 1 to 12. If a bingo ball numbered 1 to 9 is drawn, then no refund is

given to the subjects. If a bingo ball numbered 10 to 12 is drawn, then the subjects get their donation fully refunded. The monitor draws the bingo balls.

In rebate and stochastic rebate task A, each subject is endowed with 24 tokens. Tokens allocated to the private fund is taxed 25% so each token allocated to the private fund is worth \$0.75 after tax. Every token allocated to a charity fund is worth \$1 to the charity. In rebate task A, the subject receives a refund of \$0.25 for every token donated to charity. The maximum amount the subject can take home is \$18 and the maximum amount the subject can donate is \$24. In stochastic rebate task A, the refund amount is either zero or the full donation amount, depending on the outcome of the bingo ball draw. The maximum amount the subject can take home is \$24 if the subject donates all the tokens and get fully refunded. The budget line in rebate task A is a subset of the budget line of task A in baseline, tax faming, and matching task. For stochastic rebate task A, the expected budget line is equivalent to the subset budget line of task A in baseline, tax framing, and matching.

Tax rate is increased to 50% in rebate and stochastic rebate task B, so each token allocated to the private fund is worth \$0.50. The budget line of task B in rebate and the expected budget line of task B in stochastic rebate are subsets of the budget line of task B in baseline, tax framing, and matching.

In task C of rebate and stochastic rebate, we change the endowment amount in similar pattern of task C in baseline, tax framing, and matching. Given the token amount donated in rebate and stochastic rebate task A, x_r, the endowment amount in rebate and stochastic rebate task C, y_r, follows the equation below.

$$y_r = 36 - \frac{1}{2}x_r \tag{4}$$

3.6 Hypotheses

Suppose individuals only care about the relative price of giving, and the parameters, γ, s_m, $and\ s_r$ are chosen such that the relative price of giving is the same across all treatments. Since the relative price of giving is the same, the total charity receipt will be equal in all treatments. However, if price of giving is not the only factor that determines giving behavior the total charity receipt will not be the same across the fundraising mechanisms.

The preferred allocation of a risk-neutral individual is predicted to be invariant between a subsidy with deterministic rebate rate and stochastic rebate rate that yields the same expected value. On the other hand, a risk-averse individual is predicted to donate more under a deterministic rebate rate than a stochastic rebate rate. A risk loving individual is predicted to donate more under a stochastic rebate rate than determinist rebate rate. Mathematical proof is provided in the Appendix.

3.7 Risk Elicitation Task

After the allocation tasks, the participants are given the opportunity to invest their earnings for more money. If they choose to invest, they have a 50% chance of receiving 50% more of their investment and a 50% chance of receiving 50% less of their investment. The process is determined with a coin flip, and the monitor flipped the coin. Earnings that are not invested is kept by the subjects. We expect risk averse subjects to not invest, risk neutral to be indifferent, and risk loving to invest.

3.8 Procedure

The experiment was conducted at the Experimental Economics Center (ExCEN) at Georgia State University. All six experimental sessions were run by z-Tree (Fischbacher, 2007). A total of 140 students attending Georgia State University voluntarily participated in the experiment as subjects,

and among them, six students served as session monitors. Each subject was able to participate only in one session in this experiment. The experiment consisted of two parts. In the first part, subjects were given nine allocation decision tasks in which they need decide how much of the endowment to donate and take home. In the second part, the subjects participated in a risk preference elicitation task.

The experiment instructions were placed on each cubicle before the subjects entered the lab. The subjects were given time to read the instructions while waiting for the experiment to begin. After the subjects were done reading the instruction, the experimenter went over the instruction again for clarification. Talking between the participants was prohibited throughout the experiment. Before starting the allocation decision task, individuals were provided with a list of donation designations[3], each with a sentence description of how the donated money is used. The experimenter selected the donation designations such that the money was donated to organizations within Georgia State University. We wanted the distance between the recipient of the donation and the students to be close and relevant.

One monitor was randomly selected from the subjects before the experiment began to assist the experimenter throughout the experiment. The role of the monitor was to ensure that the donations received from the subjects were delivered to Georgia State University Foundation Office at One Park Place South. After the experiment, the monitor and the experimenter walked together to the Foundation Office to deliver the donation. Each monitor received a $20 flat payment after signing a statement verifying the donation amounts of the subjects.

The experiment ended after the subjects filled out a survey, which included some variation of

[3] The donation designations provided to subjects were: Panther's Pantry, Rialto Center for the Arts, Panther Retention Grant, Panther Athletic Club, Georgia State University Library, Keep Hope Alive Scholarship, University-wide Scholarships, Honors College, GSU Fund for Excellence, and Bio-Bus Program.

the Self-Report Altruism Scale (Rushton et al., 1981), and questions on demographic characteristics. Participants had the choice to be acknowledged or remain anonymous for the donation. Donations were calculated after the experiment and delivered to the Georgia State University Foundation Office by the student monitor and the experimenter.

4. Results

4.1 Summary Statistics

A total of 134 students voluntarily completed the decision tasks, and six students participated as session monitors. The summary of demographic characteristics of the subject pool is provided in Table 3. Overall, 61.7% of the subjects were females, 61.9% were Black or African Americans, 47.0% were Freshmen, and 24.63% were majoring in Business or Economics related majors.

Table 4 provides a summary of the subjects' responses to the questionnaires on tax view and altruism. The subjects' answers to the questionnaires indicated that most of them donated money to a charity (80.60%), gave money to a stranger (91.04%), or volunteered before (94.03%). They disagreed that most people would stop and help a person whose car is disabled (64.18%) and agreed that it is important to pay all the taxes to be a good citizen (82.09%). The response had four categories which ranged from disagree strongly to agree strongly.

The average gross contribution for each treatment is shown in Table 5. With disposable endowment of $18 and price of giving of $0.50, matching subsidy had the highest gross contribution of $9.89 and rebate subsidy had the lowest gross contribution of $4.29. With disposable income of $12 and price of giving of $0.33, the baseline had the highest gross contribution of $7.60 and rebate subsidy had the lowest gross contribution of $3.54. With conditional maximum take home earning and price of giving of $0.33, the baseline had the highest gross contribution of $9.96 and rebate subsidy had the lowest gross contribution of

$4.56. The common pattern we observe is that rebate subsidy raises the least amount of gross contribution to charity.

4.2 Tax Framing versus No Framing

Table 5 also shows the difference in gross contributions to charity between tax framing and the baseline. We first subtract gross contribution in tax framing from gross contribution in the baseline for each subject, then we calculate the mean of the differences for each task.

We compare gross contributions to charity between all treatments with tax framing and the baseline to examine whether giving behavior is consistent across payoff equivalent scenarios. In tax framing treatments, we impose taxes on endowments allocated to the private fund. On the other hand, endowments allocated to the charity fund are not taxed. The relative price of giving is the same across the baseline and tax framing. Overall, subjects did not make equivalent allocations. Charities received less money under tax framing compared to the baseline. For example, with disposable income of $18 and a price of giving of $0.50, charities receive $0.65 less on average in tax framing. The difference is starker with a lower endowment. With a disposable income of $12 and a price of giving of $0.33, charities receive $1.31 less on average in tax framing. With conditional endowment and a price of giving of $0.33, charities receive $2.03 less on average in tax framing.

4.3 Subsidy versus No Subsidy

We also estimate the difference in gross contributions to charity between tax framing without any subsidies and tax framing with subsidies. The estimations are shown in Table 5. We first subtract gross contribution in either matching, rebate, or stochastic rebate from gross contribution in tax framing for each subject. We then calculate the mean of the differences for each task.

Matching subsidies did not generate a statistically significant difference in gross contribution compared to tax framing without subsides. For example, Matching subsidies generated $0.33 more gross contribution to charity with an endowment of $18 and a price of giving of $0.50. However, it was not statistically significant. The result was robust to different endowments and the price of giving. On the other hand, we observed a decrease in gross contribution for rebate subsidies and stochastic rebate subsidies. With a disposable endowment of $18 and a price of giving of $0.50, we observed a decrease in the gross contribution by $1.17 in rebate subsidy and a decrease in the gross contribution by $1.08 in stochastic rebate subsidy compared to no subsidy. The outcome was robust to different endowments and the price of giving.

4.4 Matching versus Rebate

Between matching subsidy and rebate subsidy, we find rebate subsidy generated less gross contribution to charity. Across all matching treatments, the matching subsidy generated on average $0.39 more gross contribution than tax framing without subsidies. However, rebate subsidy generated on average $1.41 less gross contribution than tax framing without subsidies. The difference in the two estimates was $1.80 ($p<0.001$). This result aligns with previous studies (Davis and Millner, 2005; Davis et al., 2005; Davis, 2006; Eckel and Grossman, 2003; Eckel and Grossman, 2006a; Eckel and Grossman, 2006b; Eckel and Grossman, 2008).

4.5 Rebate versus Stochastic Rebate

Stochastic rebate subsidy generated more gross contribution to charity than rebate subsidy, but the difference was not statistically significant. Rebate subsidy decreased gross contribution by $1.41 on average and stochastic subsidy decreased gross contribution by $1.17 on average compared to no subsidies. According to these two estimates, stochastic rebate subsidy performed better than

rebate subsidy in raising money for donation by $0.24 (p=0.103).

4.6 Tax Rate and Income

Table 6 presents the effect of different tax rates and income on gross contribution for each treatment. Column 3 shows the impact of the higher tax rate on gross contribution, and column 4 shows the effect of higher income on gross contribution. Overall, gross contribution decreased when the tax rate increased from 25% to 50%. This increase in tax rate is equivalent to a decrease in the price of giving from $0.50 to $0.33 and a decrease in disposable endowment from $18 to $12. The decrease in gross contribution was statistically significant for the baseline, tax framing, and matching ($p<0.05$). The change in the gross contribution from the increase in the tax rate was the highest for matching subsidy. Gross contribution decreased by $2.46 on average when the tax rate increased in matching subsidy. Subjects were least sensitive to increases in the tax rate in stochastic rebate subsidy and rebate subsidy. In rebate and stochastic rebate subsidy, gross contribution decreased by $0.75 and $0.74, respectively. Both estimates were not statistically significant.

In general, gross contribution to charity increased with income. The largest change in gross contribution was observed in the baseline. In the baseline, gross contribution increased by $2.37 on average when subjects received higher income. Similar patterns can be observed in other treatments, and the estimates were statistically significant except for stochastic rebates. In tax framing, without subsidies, gross contribution increased by $1.65 with income. In matching subsidy, gross contribution increased by $1.75, and in rebate subsidy, gross contribution increased by $1.02. Subjects were least sensitive to an increase in income in stochastic rebate subsidy. In stochastic rebate subsidy, gross contribution increased by $0.28, and the value was not statistically significant.

5. Regression Analysis

Table 7 estimates the marginal effects on contributions received by the charity, using maximum likelihood tobit regression with random effects. The results from the regression analysis support the findings from our descriptive statistics. The following is the equation estimated,

$$\text{CONTRIBUTIONS}_{ij} = \beta_0 + \beta_1 \text{TAXFRAMING}_{ij} + \beta_2 \text{HIGHERTAX}_{ij} + \beta_3 \text{HIGHERINCOME}_{ij} + \beta_2 X_i + \alpha_i + \epsilon_{ij} \quad (5)$$

where $i = 1, \dots, 134$ (index of subjects) and $j = 1, \dots, 9$ (index of allocation problems). CONTRIBUTIONS is the dollar value of contribution received by the charity, TAXFRAMING is a vector of indicators for treatments with tax framing, including: Tax framing without subsidy, tax framing with matching, tax framing with rebate, and tax framing with stochastic rebate. HIGHERTAX is an indicator for treatments with tax rate of 50%. The value of HIGHERTAX is 1 if the treatment belongs to task B. The value of HIGHERTAX is 0 for the rest of the treatments. HIGHERINCOME is an indicator for treatments with income shift. If the treatment belongs to task C, the value of HIGHERINCOME is 1 and is 0 for the rest of the treatments. X is a vector of individual characteristics which includes gender (1 = female), religious (1 = if have at least one religion), major (1 = if the major is related to either business or economics), and past donation experience (1 = if donated to a charity at least once before).

We first estimate the average marginal effects of all types of tax framing on charitable giving compared to the baseline, which is reported in column (1). The donation amount under all types of tax framing was lower than the donation amount under the baseline. However, the effect was smaller and statistically less significant when tax framing was combined with matching subsidy. When tax framing was combined with matching subsidy, the average marginal effect was a \$0.65 decrease in charitable contribution compared to the baseline. The biggest effect was when tax framing was combined with rebate subsidy. The average marginal effect was a \$2.73 decrease in

charitable contribution compared to the baseline.

In column (2), we estimate the average marginal effects of tax framing with subsidies on charitable giving compared to tax framing without subsidies. We exclude observations from the baseline treatment in our analysis. When comparing among treatments with tax framing, we did not observe statistically significant effects for matching subsidy. We found that rebate subsidy and stochastic rebate subsidy have negative marginal effects on donation compared to tax framing with no subsidy. The average marginal effects rebate subsidy and the stochastic subsidy were $1.51 and $0.87 reduction in donation, respectively, compared to tax framing with no subsidy. Our result also supports that stochastic rebate subsidy performs better than rebate subsidy in raising money for charity.

Both estimations from columns (1) and (2) find that contribution to charity decreased when tax was raised, and contribution to charity increased when income was increased. This result is expected. Although an increase in tax on private consumption decreases the price of giving, the higher tax also means a decrease in disposable endowment. None of the individual characteristics had a statistically significant effect on contribution to charity.

6. Conclusion

This paper studies how different institutions affect giving behavior and evaluate the efficiency of these institutions. The fundraising mechanisms evaluated in this paper are private consumption tax, matching subsidy, rebate subsidy, and stochastic rebate subsidy. The net cost of giving is kept equivalent across the mechanisms but, subjects respond differently to each mechanism. Consistent with previous literature, our experimental results show that the net cost of giving is not the only factor that influences giving behavior. Different theories predict different outcomes for fundraising mechanisms that seem equivalent on the surface.

We find that tax framing and rebate subsidy elicit less charitable contribution than neutral framing and matching subsidy. The negative effect on donation was smaller for stochastic than deterministic rebate subsidies. This result is not consistent with our hypothesis that if individuals are risk adverse individuals, then the donation amount would be less if rebate rates are stochastic than when rebate rates are deterministic. One explanation could be that individuals are risk loving towards money donated to charity. Our data also suggests that charitable giving is a normal good and that donations and private consumption are complements.

In the experiment, the donor that is matching the donations from the subjects is the experimenter. The experimenter is also the one that gives the subjects the refund in the rebate subsidy. Our findings may change depending on the reputation of the donor that is doing the matching. If a more reputable donor is doing the matching, then more donations will be raised. The deterministic rebate rate subsidy tested in our experiment is similar to a tax deduction on charitable giving. The taxpayer who claims tax deduction on charitable donations receives a refund paid by other taxpayers. Further research should explore how the nature of the matching and rebate subsidies contributor impacts giving behavior.

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Tables

Table 1. Summary of Existing Studies on Matching and Rebate Subsidy

Author (Year)	Research Question	Findings
Eckel & Grossman (2003)	Matching subsidy vs (equivalent) Rebate subsidy.	Matching elicits larger net donation.
Davis et al. (2005)	Test of constant contribution rule.	Consistent with constant contribution rule.
Davis & Millner (2005)	Matching and rebate subsidy on consumer purchases (chocolate bars).	Matching elicits more purchases.
Eckel & Grossman (2006a)	Preferences over matching and rebate subsidy.	Equally preferred.
Eckel & Grossman (2006b)	Between vs within subject design.	Matching elicits larger net donation.
Davis (2006)	Test of isolation.	Fail to reject.
Eckel & Grossman (2008)	Matching vs (equivalent) Rebate subsidy in a field experiment.	Matching elicits larger net donation.

Table 2. Experimental Design

Treatments		Initial endowment	Value of one token in		Rebate	Price of giving	Value of all tokens in	
			Private	Charity			Private	Charity
Baseline Order of tasks A and B random. Task C after A and B.	A	18	\$1	\$2	No	1/2	\$18	\$36
	B	12	\$1	\$3	No	1/3	\$12	\$36
	C	e	\$1	\$3	No	1/3	e	e
Tax Frame Tax on allocations to the private fund but not to charity.	A	24	\$1, t=0.25	\$1.5	No	1/2	\$18	\$36
	B	24	\$1, t=0.5	\$1.5	No	1/3	\$12	\$36
	C	e	\$1, t=0.5	\$1.5	No	1/3	e	e
Matching Subsidy Donation to charity is matched.	A	24	\$1, t=0.25	\$1 s_m=0.5	No	1/2	\$18	\$36
	B	24	\$1, t=0.5	\$1, s_m=0.5	No	1/3	\$12	\$36
	C	e	\$1, t=0.5	\$1, s_m=0.5	No	1/3	e	e
Deterministic Rebate Part of donation to charity is refunded.	A	24	\$1, t=0.25	\$1	s_r=0.25	1/2	\$18	\$24
	B	24	\$1, t=0.5	\$1	s_r=0.17	1/3	\$12	\$24
	C	e	\$1, t=0.5	\$1	s_r=0.17	1/3	e	e
Stochastic Rebate Total donation to charity is refunded with some probability.	A	24	\$1, t=0.25	\$1	$E(s_r)$=0.25	1/2	\$18	\$24
	B	24	\$1, t=0.5	\$1	$E(s_r)$=0.17	1/3	\$12	\$24
	C	e	\$1, t=0.5	\$1	$E(s_r)$=0.17	1/3	e	e

Notes: The matching subsidy, deterministic rebate and stochastic rebate conditions are assigned between subjects. The baseline and tax frame conditions are assigned within subjects. In the case of task C, e is given in statement (1) for baseline, in statement (2) for tax framing, in statement (3) for matching, in statement (4) for rebate and stochastic. No tax is paid on rebate.

Table 3. Demographic Summary Statistics

	Matching	Rebate	Stochastic Rebate	All
Number of Subjects	49	43	42	134
Age (mean)	20.76	19.58	20.26	20.2
Female (%)	73.47	58.14	50	61.65
Parent Income (mean group)	$60K-$75K	$60K-$75K	$60K-$75K	$600K-$75K
Black/African American (%)	55.1	74.42	57.14	61.94
Religion (%)				
Christianity	42.86	74.42	61.9	58.96
Nonreligious/Other	18.37	11.63	14.29	14.93
Prefer not to answer	10.2	6.98	7.14	8.21
GPA (%)				
Below 3.00	14.29	20.93	16.67	17.16
3.00 to 3.69	59.18	48.84	54.76	54.48
Above 3.69	18.37	30.23	26.19	24.63
Freshman (%)	44.9	48.84	47.62	47.01
Business/Economics Major (%)	18.37	34.88	21.43	24.63
Participated in an Election (%)	42.86	34.88	45.24	41.04
Liberal (%)	44.9	60.47	50	51.49

Table 4. Attitudes Towards Paying Taxes and Altruism

	Matching	Rebate	Stochastic Rebate	All
Tax View				
"It is important to pay all the taxes you owe in order to be a good citizen."				
Agree Strongly	26.53	18.6	28.57	24.63
Agree Slightly	59.18	62.79	50	57.46
Disagree Slightly	10.2	16.28	21.43	15.67
Disagree Strongly	4.08	2.33	0	2.24
Altruism				
"Most people would stop and help a person whose car is disabled."				
Agree Strongly	6.12	4.65	4.76	5.22
Agree Slightly	30.61	34.88	26.19	30.6
Disagree Slightly	51.02	41.86	45.24	46.27
Disagree Strongly	12.24	18.6	23.81	17.91
"I have given money to a stranger who needed it (or asked me for it)."				
Never	12.24	13.95	0	8.96
Once	12.24	13.95	21.43	15.67
More than Once	36.73	51.16	69.05	51.49
Often	28.57	18.6	4.76	17.91
Very Often	10.2	2.33	4.76	5.97
"I have done volunteer work for a charity."				
Never	6.12	6.98	4.76	5.97
Once	10.2	4.65	21.43	11.94
More than Once	42.86	60.47	30.95	44.78
Often	26.53	13.95	21.43	20.9
Very Often	14.29	13.95	21.43	16.42
"I have given money to a charity before this experiment."				
Never	24.49	25.58	7.14	19.4
Once	16.33	20.93	21.43	19.4
More than Once	38.78	34.88	50	41.04
Often	12.24	13.95	19.05	14.93
Very Often	8.16	4.65	2.38	5.22

Notes: Questionnaire on views on taxes and altruism.

Table 5. Gross Contribution Across Treatments

Treatment	N	Task A E=18, p=1/2	Task B E=12, p=1/3	Task C E=e, p=1/3
Baseline	134	8.48 (6.01)	7.60 (5.77)	9.96 (8.46)
Tax Framing	134	7.83 (6.44)	6.29 (5.56)	7.94 (7.85)
Matching Subsidy	49	9.89 (6.34)	7.43 (5.02)	9.18 (5.69)
Rebate Subsidy	43	4.29 (3.74)	3.54 (2.72)	4.56 (4.29)
Stochastic Rebate	42	7.17 (6.27)	6.43 (5.87)	6.71 (6.54)
Differences				
Tax Framing[a]	134	-0.65**	-1.31***	-2.03***
Matching[b]	49	0.33	0.12	0.71
Rebate[b]	43	-1.17***	-0.81**	-2.25***
Stochastic Rebate[b]	42	-1.08**	-0.66**	-1.75***

Notes: [a] compared to the baseline, [b] compared to Tax framing. E denotes the initial endowment of tokens, p is the relative price of giving measured as cost of giving $1 to a charity. The value of e varies across subjects and it is determined by choice in Task A. Standard deviations in parentheses. Statistical significance is based on Mann-Whitney U test. *** p<0.01, ** p<0.05, * p<0.1. Gross contribution is the total amount contribution received by the charity.

Table 6. Change in Gross Contribution from Higher Tax Rate or Higher Income

Treatment	N	Task B−Task A (mean)	Task C−Task B (mean)
Baseline	134	-0.88**	2.37***
Tax Framing	134	-1.54***	1.65***
Matching	49	-2.46***	1.75***
Rebate	43	-0.75	1.02**
Stochastic Rebate	42	-0.74	0.28

Notes: Statistical significance is based on Mann-Whitney U test. *** p<0.01, ** p<0.05, * p<0.1

Table 7. Average Marginal Effects from Tobit Maximum Likelihood with Random Effects

Dependent variable=Contribution received by the charity in dollars		
Variable	(1)	(2)
Tax Framing - No Subsidy	-1.142***	
	(0.257)	
Tax Framing - Matching	-0.649*	0.501
	(0.381)	(0.359)
Tax Framing - Rebate	-2.727***	-1.508***
	(0.419)	(0.395)
Tax Framing - Stochastic Rebate	-1.902***	-0.868**
	(0.420)	(0.397)
Higher Tax	-1.105***	-1.262***
	(0.258)	(0.277)
Higher Income	1.408***	1.108***
	(0.259)	(0.276)
Female	0.261	-0.125
	(0.901)	(0.883)
Religious	-0.425	-0.820
	(1.012)	(0.990)
Business/Economics	0.479	0.641
	(1.018)	(0.997)
Gave Money to Charity Before	0.763	0.489
	(1.116)	(1.092)
N	1,206	804
Left Censored Ob.	131	83
Un Censored Ob.	1,064	713
Right Censored Ob.	11	8

Notes: Lower bound is 0, upper bound is either $36 or $54 depending on the treatment. In column 1, control is baseline. In column 2, control is tax framing with no subsidy. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1