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Do Subsidies Increase Charitable Giving in the Long Run? Matching Donations in a Field Experiment

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Abstract

Offering incentives to promote charitable giving (for example, to encourage donations to aid victims of natural disasters) is very popular among governments and private organizations. Many companies, for example, match their employees' charitable contributions, hoping that this will foster a strong willingness to donate. However, systematic analyses of the effect such a matching mechanism has upon voluntary giving are largely absent from the literature.

Using a randomized field experiment, this paper tests the short-term and the long-run effects of matching charitable giving. The donations of a randomly selected group were matched, for one period, by contributions from an anonymous donor. The results support the hypothesis that a matching mechanism increases contributions to a public good. However, in the periods after the experiment, when matching donations have ceased, the contribution rate declines for the treatment group. In the end, the matching mechanism leads to a negative net effect on the participation rate. The field experiment therefore provides evidence suggesting that donors' willingness to contribute may be undermined by a matching mechanism in the long run.

Keywords: public goods, field experiment, matching mechanism, charitable giving
JEL codes: C93, D64, H00

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A number of firms in the United States and Europe match their employees' charitable contributions.[1] On an *ad hoc* basis—for example, after large natural catastrophes—governments also match individuals' donations. Matching charitable giving is seen as an alternative to subsidizing giving through a rebate mechanism, since it also decreases the price of giving. We should therefore expect that when donations are matched, the willingness to contribute will increase. However, to analyze the long-run effect of a *temporarily* applied subsidy is probably as important as it is to evaluate the effect of the subsidy when it is in place. In fact, many fundraisers offer temporary incentives, for example, matching contributions, to increase donations in the short run, but we know very little about what happens when the incentive is removed. Individuals might just return to their previous level of giving before the match was offered. Matching donations might also have a positive effect on giving if it, for example, helps contributors to establish a habit of giving. But matching incentives might have negative effects on long-run giving as well, as an individual's pro-social behavior can be distorted by [temporary] incentives (for example, Frey, 1997; Gneezy, 2003; Bénabou and Tirole, 2005). In the end, it is an empirical question whether a matching mechanism increases, decreases, or leaves unaffected pro-social behavior in the long-run.

Evaluating the short-term and long-run effects of a matching mechanism (and subsidies in general) in a field study is very difficult, as many confounding factors make it hard to isolate the single effect of matching. For example, a higher contribution rate in a corporation that matches employees' donations might not be due to the presence of the matching mechanism, but instead due to the hiring of employees inclined towards pro-social behavior into a firm that offers such a mechanism or due to the firm's adopting the mechanism *because* there is a donor ethos among the employees. An experimental intervention that offers a matching donation to randomly selected individuals can elicit clearly whether matching has an effect on increasing donations. Additionally, in order to investigate the effect removing the match may have on

[1] For example, Hewlett-Packard matches employee donations dollar for dollar up to $1,000 (www.hp.com/hpinfo/grants/us/cash_matching.html).

subsequent donations to the same cause, it is important to analyze this incentive effect by observing the *same* individual giving to the *same* charity.

This paper presents some of the first evidence of the matching donations mechanism outside of a laboratory setting. Using a randomized field experiment, this paper tests whether matching charitable contributions affects donations in the short term and in the long run. Contributions to two social funds at a university are studied. Each semester, students have to make anonymous decisions whether or not to contribute to two funds. In the treatment group, the donations of 600 randomly selected students are matched if they contribute to *both* funds. Their subsequent behavior is compared with a control group, whose donations are not matched.

The results of this randomized field experiment support the hypothesis that matching donations increases the immediate contributions to a public good. Since such an intervention might influence the underlying motivation to behave pro-socially, it is important to analyze participants' behavior after the temporary incentive has been temporarily removed. The results of the field experiment provide evidence that people's willingness to contribute to the two funds is *reduced* in the period after a matching donation is offered. The *overall* effect of the matching mechanism on the contribution rate is even negative. This result contributes to the growing literature on the potential negative effects of incentives.

Yet despite the many incentives offered to increase charitable donations, there has been little formal research on matching charitable giving.[2] Eckel and Grossman (2003) present the first laboratory experiment that systematically analyzes matching donations (for a replication and comments, see Davis, Millner, and Reilly, 2005). They show that the rebate and the matching mechanism lead to different behavioral effects in the short run. Matching donations leads to a higher amount of charitable giving than a rebate, and is therefore more effective (although from a theoretical point of view, the two mechanisms should yield the same results). According to Eckel and Grossman, a matching mechanism is psychologically different from a pure rebate mechanism. Exactly how these mechanisms differ is crucial for explaining the long-term effects

[2] In contrast, the literature on the rebate mechanism is large, analyzing how tax deductions for charitable giving influence the size of the contributions (see, for example, Randolph, 1995; Auten, Sieg, and Clotfelter, 2002).

of a matching mechanism. In practice, rebate and matching mechanisms are often designed differently and contrast, for example, on whether they are fund-specific or not. Matching often is fund-specific, and rebate generally is not.

This paper presents some of the first pieces of evidence of the matching donations mechanism outside of a laboratory setting. Eckel and Grossman (2005) and Bekkers (2005) confirm in field experiments that rebate and matching mechanisms yield different contribution rates. Karlan and List (2006) present the most recent field experiment on matching. They mainly analyze whether the effect of matching donations to a liberal, politically-oriented non-profit has different effects for dominantly Democratic and Republican U.S. states.[3]

One aspect neglected in previous research on matching mechanisms is the long-run effect of the external interventions. Since students' later decisions enter in the data set as well, the experiment yields a panel data set, which allows for the investigation of not only the short-run treatment effect, but also the long-run effect on three decisions *after* the period in which contributions were matched. The panel structure of this data set and this paper's experimental design allow for an analysis of both the immediate reaction to the matching mechanism and the long-run behavioral consequences of such an intervention once the match is removed. Previous studies found temporary incentives had no negative effect on contribution rates to *other* charitable causes after the incentive was removed (Falk, 2004; Bekkers, 2005). A panel structure offers more precision by the probability of the *same* individuals' giving to the *same* charity to be analyzed.

The paper is organized as follows: Section II presents the design of the field experiment and the data. Section III formulates the behavioral hypothesis. Section IV shows the results on the effect of matching in the temporary matching period and how giving changes if matching is removed. The last section offers an evaluation of the results and draws some conclusions.

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[3] A number of field experiments analyze mechanisms to increase donations (for example, List and Lucking-Reiley, 2002; Falk, 2004; Shang and Croson, 2005).

II. Field Experiment and Data

The field experiment was implemented in a naturally occurring decision situation at the University of Zurich. Every semester, each student has to decide anonymously whether to contribute to two social funds. On the official letter for renewing their registration and paying the compulsory tuition fee, the students are asked whether they want to voluntarily donate a specific amount of money (CHF 7.0, about US$ 4.20) to a fund that offers cheap loans to students in financial difficulties and/or to contribute a specific amount of money (CHF 5.0, about US$ 3.0) to a second fund that supports foreign students, who study for up to three semesters at the University of Zurich. Without their explicit consent (indicated by ticking a box), students make no contributions to any fund. Students have the choice of donating to no fund, only one fund, or both funds. The panel data set is composed of the decisions made by all enrolled students for seven semesters, beginning with the 2001 summer semester up to and including the 2004 summer semester. From now on, the period when the experiment was undertaken is referred to as period t, whereas the periods before it are called period t-1, t-2, t-3 and the following periods are indicated as t+1, t+2, t+3.

In the experiment, 600 students were selected at random and provided with information about the matching mechanism for the two social funds. With the official letter for renewing registration at the University, and the decision about contributing to the two funds (for the winter semester of 2002–03), the University administration supplied the selected students with an insert containing the following information: "If you contribute to *both* social funds, an anonymous donor matches your contribution with CHF 3" (treatment "*Matching 25 percent*") or "CHF 6" (treatment "*Matching 50 percent*"). The donations were therefore matched at a rate of 25 percent or 50 percent. The inserts received by the two treatment groups differed only in the amount matched. The subjects were informed that the matching contributions would be split equally between the two funds. The two funds received the additional money after the experiment was finished.

Due to the "institutional difference" that freshmen have to pick up their registration form at the registrar's office, only returning students who had made at least one donation decision in the past were included in the experiment. Students who were freshmen during the treatment

period were also excluded from the control group. As some of the students decided not to renew their registration, the decisions of 532 subjects in the two treatment groups and 10,847 persons in the control group were observed. Students decided anonymously at home about contributing to the two social funds.

Table 1 shows the summary statistics for the control group and the treatment group. As expected, due to the random assignment of subjects in the treatment group and in the control group, no significant group differences emerged between various characteristics (number of semesters enrolled, age, gender, economics as the major undergraduate subject, and average contributions in the past).[4] Importantly, the control group was slightly more likely to have contributed to the social funds in the past; that is, their previous average donations were higher than for both treatment groups. Even though the difference is not statistically significant, it might lead to understating the potential positive effect of matching in period *t* and to overstating a potential negative effect in the periods after the experimental intervention. We will discuss the consequences of this difference and a remedy for this issue in the results section.

The data set has some special characteristics that are important for interpreting the size of the effect that matching donations has upon contribution rates, especially when comparing these analytical results to results from laboratory experiments. First, the field experiment is based on a tripartite decision; most students either decide not to contribute at all or to contribute to both funds (Frey and Meier, 2004b). As their contributions cannot be marginally adjusted by one or more monetary units, many students have to change their behavior between these extremes of choice for an experimental effect to become visible. Second, people in the treatment group faced the decision of whether or not to contribute at least once (and on average 10.8 times) before period *t*. If contribution decisions are driven by established habits, the matching donations can be expected to have a limited effect on behavior during period *t*. Third, the contribution levels prior to period *t* are already quite surprisingly high. Therefore, the effect of the matching mechanism is expected to be minor, as most people already contribute to both

[4] The variable "average donation in the past" indicates how much students gave on average in their previous decisions (before period *t*). This variable varies from 0 for people who never contributed in the past to 12 for people who always contributed the maximum amount (12 CHF) to the two funds.

funds and hence are not able to increase their contributions any further. Fourth, the decision is made twice a year. This time lag differs from laboratory experiments, in which various repetitions are taken within one single session usually lasting one or two hours. The experimental effect must be strong in order for the matching mechanism to have an effect on behavior half a year or even a year later.

III. Behavioral Hypotheses

Charitable giving is subject to the relative price effect. As for any other activity, if the price of donating is reduced, people are expected to engage more in this activity, *ceteris paribus*. The relative price of giving is only important if people are concerned not only with their own utility or payoff, but have, for example, a utility function of the following form: $U_s = u_s((1-\alpha)\pi_s, \alpha\pi_o)$, where a person's utility, U_s, depends on his or her own payoff, π_s, and the payoff of other people, π_o. The weighting factor α indicates a person's degree of altruism, where people with α equal to zero are not altruistic at all (for a detailed discussion, see Andreoni and Miller, 2002).[5] Furthermore, previous work has shown that it is important that people personally donate money, due to the "warm glow" that they experience from giving (Andreoni, 1990). Contributions made by others are therefore not a perfect substitute for one's own giving.[6] For such "impure altruists," for whom utility increases primarily with their *own* contribution, a matching mechanism should increase their contributions, as giving to a public good enters the utility function as a private good (Andreoni, 1990).

The matching mechanism lowers the price of donating one monetary unit to $1/(1+s_m)$, where s_m indicates the subsidy provided through the matching mechanism. It is a straightforward matter to show that, as this price decreases, people with utility functions as

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[5] A variety of theories on pro-social behavior exist apart from simple altruism models. For surveys of different theories and empirical evidence, see, for example, Fehr and Schmidt (2003) and Meier (2006).

[6] This assumption is supported in the empirical literature: People's donations are not completely crowded out by government contributions (for example, Ribar and Wilhelm, 2002), nor do people reduce their contributions when the contributions of others increase (for example, Frey and Meier, 2004a).

described above are more willing to donate money. For the field experiment, this leads to a clear first hypothesis for period *t*:

H1: More people in the treatment group than in the control group donate to both funds, because the price of giving is cheaper for the treatment group. And the higher the matching benefit of each monetary unit donated, the more people donate.

In the periods after the semester when the field experiment was conducted, no matching was offered to the students. The relative price of donating, therefore, returned to the same levels as before period *t*. A second hypothesis for the behavioral effect in the periods after the experiment was undertaken is less obvious than the first hypothesis. The effect of the matching mechanism on period *t*+1 is unclear, as it depends on the assumed utility function. If people decide where to allocate their money according to the relative prices of donating in each period, the level of giving should be the same before and after the matching period. In period *t*, subjects substitute giving to the two funds for private consumption or donating to another cause (for example, to a homeless person). Allocations in period *t*+1 are the same as in period *t*-1, because relative prices return to their previous levels. If giving is a storable good—implying that individuals get utility in period *t*+1 from giving in period *t*, or if they allocate a given budget to a mental account (Thaler, 1999)—this implies that spending more in period *t* may lead individuals to compensate for this "over-expenditure" in the following period (especially if they do not want their overall account to be negative for a pre-determined period, such as one year). However, even if people compensate in period *t*+1 for their higher donation in period *t*, standard economics models would not predict that this compensation would lead to a negative net effect. It is a cautious benchmark assumption to posit that people should not decrease their donations due to the matching mechanism; hence the second hypothesis:

H2: The probability of contributing to the two social funds should not be decreased by the matching mechanism. This should be true for period *t* as well as for all later periods.

However, the matching mechanism implemented—an anonymous donor in period *t* matches students' contributions if, and only if, they contribute to both funds—may have

additional behavioral consequences not predicted by the above hypotheses. In particular, incentives can have a negative effect on pro-social behavior.

There are many channels through which a monetary incentive might have detrimental effects in the long run. First, incentives to behave pro-socially can influence the intrinsic motivation to undertake such an activity. For example, happiness gained from giving can be partly "crowded out" by monetary incentives if these incentives are perceived as controlling: people may feel forced to behave pro-socially and therefore lose part of their self-determination (for example, Frey, 1997; Frey and Oberholzer-Gee, 1997).[7] However, an incentive, like the matching mechanism, can also be perceived as supportive and crowd in pro-social behavior (Thogersen, 2003). Second, incentives to behave pro-socially can disrupt the trust-based relationship between a donor and a charity. If the monetary incentive is perceived by the donor as a sign of mistrust, it might have detrimental effects on contributions (for example, Rousseau, 1995; Falk and Kosfeld, 2005). Third, the introduction of a matching mechanism increases the donor-observed benchmark for what charities can do to raise funds. Students might look for even lower cost alternatives, say voluntary funds that might continue to offer a matching donation in period t+1. Fourth, incentives to behave pro-socially can imply information about the nature of the task that leads to lower contributions (for example, Bénabou and Tirole, 2002). In the case of the matching mechanism, for example, if a charity offers a monetary incentive to donate, subjects might think that an incentive is offered because nobody donates in the absence of such an inducement. If people are willing to contribute only if others do so as well (see Frey and Meier, 2004a, for an example where this is the case), they will consequentially stop contributing. Thus, it is an empirical question whether a particular intervention increases, decreases, or leaves unaffected pro-social behavior in the long run.

Measuring the effect of a monetary incentive and detecting the detrimental effects on the motivation to behave pro-socially is often problematic. The overall effect of a change in relative

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[7] This motivational crowding effect was recognized in psychology long before economists started to seriously think about it (for example, Lepper and Greene, 1978; Deci, Koestner, and Ryan, 1999). An exception in the psychology literature is Titmuss (1970), who argues that monetary incentives for blood donors will undermine their motivation and reduce the amount of blood donated. Frey and Jegen (2001) present an extensive survey on recent empirical evidence in this area.

prices that induces a change in behavior comprises both the ordinary price effect and the effect on a person's intrinsic willingness to contribute. A negative net effect is therefore visible only if the price effect is not strong enough to obscure the effect on an individual's intrinsic willingness to contribute (Gneezy and Rustichini, 2000a; Gneezy, 2003). However, one way to measure an effect on the underlying motivation is to compare pro-social behavior before, during, and after the intervention. This is the empirical strategy used in this paper. Gneezy and Rustichini (2000b) apply the same strategy to show that incentives to pick up kids on time at daycare centers had a long-run negative effect on punctuality. They even find a negative *short-run* effect of incentives in this context.

In the following section, the hypotheses H_1 and H_2 are tested.

IV. Analysis and Results

The results are presented in three steps. First, the mean contribution rates between the control and treatment groups are compared over time. The randomization into the two treatment groups should give unbiased results of the treatment effect when the differences between the control and treatment groups are compared; however, the results might be slightly misleading when not taking differences prior to period *t* into account. Second, the individual panel structure of the data is exploited in order to estimate models that take individual unobservable heterogeneity into account. In the third step, a sub-sample of individuals is studied in order to exclude some of the potential alternative explanations for the behavior observed in the field experiment.

Mean Contributions of the Treatment and Control Groups

Figure 1 plots the behavior of the treatment and control groups over time. Specifically, Figures 1a–c show the contribution rates of the treatment and control groups on the right axis and the difference between the two groups on the left axis. Figure 1d plots the average donations in Swiss Francs for the treatment and the control groups on the right axis and the difference on the left axis.

The basic behavioral effect of the matching mechanism over time is shown by looking at Figures 1a–c. Due to the matching mechanism, many people who used to give to only one fund switched to giving to both funds in period *t* (shaded bars). The matching mechanism therefore increased contributions to both funds in the short run. However, in the time periods after the matching mechanism was undertaken, most of these people did not return to giving to only one fund, but instead stopped contributing altogether. The matching mechanism therefore increased the percentage of people in the treatment group who did not contribute to any fund at all in the long run. A more detailed analysis finds three interesting results in Figures 1a–c:

(1) *The matching mechanism increased contributions to both funds in period t.* In the control group, 66.4 (s.e. = 0.45)[8] percent contributed to both funds in period *t*, while in the treatment group, 67.9 (2.0) percent contributed. This difference is not statistically significant ($p > 0.48$).[9] However, if we look at the change in the contribution rate between period *t*-1 and period *t* instead, matching did significantly change individuals' behavior. In the control group, the percentage of people who contributed to both funds decreased 2.7 (0.39) percentage points between period *t*-1 and period *t*. This decrease was due either to repetition causing a general decrease in the willingness to contribute (Frey and Meier, 2004b) or to an unobserved general shock occurring between period *t*-1 and period *t* and influencing both the treatment and control groups. The randomization therefore proves to be important.[10] For the treatment group, however, the contribution to both funds increased 1.7 (1.8) percentage points. The difference of 4.4 percent in the change between period *t*-1 and period *t* for the control and the treatment groups is statistically significant ($p < 0.05$). However, in period *t*+1, the number of people who contributed to both funds decreased substantially in the treatment group. The difference between the contribution rates of the treatment and control groups is 4.1 percentage points ($p < 0.1$), which is larger than in the periods before the matching mechanism was implemented. In periods *t*+2 and

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[8] Unless otherwise noted, we will report standard errors in parenthesis.

[9] Unless otherwise noted, we will report *t*-tests when comparing means.

[10] It is not likely that the behavior of the control group was contaminated by participants' non-treatment group status. Responses to a survey undertaken before the experiment show that very few people talk to each other about the funds (see Frey and Meier, 2004b).

t+3, the difference seems to stabilize at a level similar to what it was before the experimental intervention.

(2) *Fewer people contributed to only one fund due to the matching mechanism*. As can be seen in Figure 1b, many subjects in the treatment group stopped contributing to only one fund in period *t* ($p < 0.05$). However, after the experimental intervention, most of these people did not return to giving to only one fund. The proportion of people contributing to one fund was lower in the treatment group after the matching than it was before.

(3) *The proportion of people in the treatment group who did not make any contributions increased after the experimental intervention*. Figure 1c shows that, although in period *t* the difference between the control group and the treatment group remained the same, in period *t*+1, the proportion of people not contributing to any fund increased for the treatment group. The period-*t* difference between the treatment and control groups of around 1 percent went up to 4.1 percentage points in period *t*+1 ($p < 0.10$). This indicates that the matching mechanism actually decreased the proportion of people who contributed to the funds, at least for the following decision period. In the periods after that one, the difference became smaller, but still remained higher than before the field experiment was undertaken.

The negative net effect of the matching mechanism can also be seen in the average donation statistics. Figure 1d presents the average donation in the treatment group and the control group over time. Before the field experiment in period *t*, the average donation in the treatment group was smaller than in the control group. In the three periods before the field experiment, people in the control group donated, on average, 8.36 (0.03) CHF, compared with 8.19 (0.14) CHF in the treatment group. The difference of 0.17 CHF is, however, not statistically significant ($p > 0.225$). The matching mechanism increased the amount donated in the treatment group compared with the control group. However, the average donations for the treatment group decreased sharply after donations were no longer matched. The difference in contributions between the treatment group and the control group was greater after the intervention took place. On average, the control group donated 8.20 (0.03) CHF in the three periods after the experimental intervention, while individuals in the treatment group donated

7.85 (0.16) CHF. This difference of 0.35 CHF is statistically significant ($p < 0.05$). Even if period t is included in the average, subjects in the treatment group donated 0.23 CHF less than individuals in the control group ($p < 0.1$). The matching mechanism therefore had a negative net effect on donations. This effect on donations is exactly determined by the negative effect on contribution rates, as the average donation conditional on contributing is the same between the control and treatment groups.

The negative difference between mean contributions after period t might be a little bit overstated, since the treatment and the control group already differed slightly before period t. Analyzing the difference between the treatment and control groups before and after the matching shows that the difference in donations in the three periods after period t is double what it was before period t; however, this change in the difference is only marginally significant ($p = 0.1$).

In sum, by comparing the mean contributions of the treatment and control groups, matching seems not to have had a huge effect in period t; however, it caused contributions to decrease substantially afterwards for both groups. Taking small pre-period-t differences into account, however, indicates that the effect of matching in period t might be bigger and the effects after period t slightly smaller than the simple comparison of means suggests. In the following section, the panel structure of the data is exploited even further in order to control for individual heterogeneity.

Short-Run and Long-Run Treatment Effects with Fixed Effects

Individuals differ in their pro-social preferences, as expressed in the values for α used in the simple utility model given above. In the decision situation at hand, this means that those people who get high satisfaction from contributing, might give CHF 12 in every period. Others get less satisfaction and might never contribute at all, while many might make heterogeneous contributions decisions across periods. Estimations with individual fixed effects control for such unobservable heterogeneity in preferences (see Harrison and List, 2004, for a discussion of fixed effects models in field experiments).

Table 2 analyzes the effect of matching donations in period *t*. Columns (a) and (b) in Table 2 present the results for two logit models with personal fixed effects. In both columns, the dependent variable is equal to one if people contributed to both funds and zero otherwise. The treatment effect is captured with the dummy variable *treatment* "*Matching*," which is zero for all subjects in the periods before the matching mechanism was implemented and one for the subjects in the treatment groups afterwards. The variables *treatment* "*Matching 50 percent*" and *treatment* "*Matching 25 percent*" are dummy variables for the two treatment groups, respectively.

The results in Table 2 confirm the effect of the matching mechanism suggested by the means analysis described above. As can be seen in column (a), the probability of contributing to both funds increased when people's donations were matched ($p < 0.05$).[11] In column (b), the difference between the two matching prices is analyzed. When subjects' contributions were matched at 50 percent, the probability that they would contribute to both funds increased 5.7 percentage points ($p < 0.05$). The effect of "Matching 25 percent" on the subjects' contribution rates was much smaller and is not statistically significant. The difference between these two coefficients is, however, not statistically significant.

These estimates suggest that the matching donation mechanism has a significant and relevant effect on peoples' willingness to behave pro-socially. People increased their charitable giving when their contribution was matched—that is, when the price of giving was decreased. But how did individuals react when the price of giving went back to normal?

Table 3 shows the results of the matching field experiment for three outcomes (contributions to both funds, no contributions at all, and average contributions in Swiss Francs). In the first column for each outcome (columns (a), (c), and (e)), a specification is presented that excludes the period when the contributions were matched. Therefore, the coefficients show the effect of the experimental intervention on contributions after period *t*, compared with average contribution behavior before the intervention. These results give a first indication of whether the level of long-run contributions changed because of the matching mechanism. A negative coefficient indicates that the contribution level of the relevant treatment group was lower after

[11] The estimated marginal effect in the logit model with fixed effects is almost 10 percentage points. The results can be obtained from the author on request.

the matching mechanism, compared with the donation level of those individuals who were never offered a matching mechanism. To analyze the net effect of matching, the second column for each behavioral outcome (columns (b), (d), and (f)) also includes the period in which the matching mechanism was effective.

The results in columns (a) and (b) show that the matching mechanism had no effect on net contributions to both funds. Column (a) shows that subjects in the treatment group reduced their contributions in the periods after the matching mechanism, compared with the periods before the experimental intervention. This reduction is, however, not statistically significant. But matching had a positive effect on contributions to both funds in period *t*. Therefore, when the period in which the matching mechanism was at work is taken into account, the net effect upon donations was slightly positive, but not statistically significant (column (b)).[12] The results indicate that, in the long run, the matching mechanism had no effect on decisions to contribute to both funds.

Columns (c) and (d) show the effect of the matching donations mechanism on choosing to make no contributions at all. The dichotomous dependent variable is equal to one if people did not contribute to any of the funds and zero otherwise. Column (c) shows that more people failed to contribute to the funds after the experiment, compared with the periods before the matching mechanism was at work ($p < 0.05$). Stated differently, the willingness to contribute to at least one fund decreased in the periods after a matching donation was offered. Column (d) shows that even the net effect of the matching mechanism on the contribution rate (including period *t*) was negative; that is, the probability increased that subjects would not contribute to either of the two funds ($p < 0.10$).

Columns (e) and (f) investigate whether the matching mechanism had a negative effect on average donations in general. The dependent variable is equal to zero, five, seven, or 12 CHF. The columns show the coefficients for OLS regressions with time dummies and individual fixed effects. It turns out that the matching donation experiment not only decreased the average

[12] The number of observations in this table varies between the columns for two reasons: first, the number of semesters differs between the columns; second, in the regression with fixed effects only, people are included only if they changed their behavior at least once. As can be seen, more people changed their minds about giving to both funds than about giving at all.

donation in the periods after the experiment (column (e)), but also had a negative net effect (column (f)). These effects come, however, with large standard errors.

Analyzing the three decisions after period *t* separately (see Table A.1 in the appendix) shows that, after period *t*+1, the negative effect of matching is no longer statistically significant. Therefore, in the very long run, people's contribution patterns seem to return to normal. But this long-term effect needs to be put into perspective: the decisions to donate were taken semi-annually. The fact that six months later the decision to contribute to the social funds was influenced by the experimental intervention six months earlier suggests that the effect of matching is very long-lasting. Every additional period after the field experiment naturally increased the time between decision and experiment by another six months; the number of individual observations also decreased after each period, as students finished their studies and left the University. It might be expected, therefore, that the effects of the experimental treatment would be somewhat imprecisely estimated.

To summarize, the behavioral reaction towards the matching donation mechanism suggests that there is more than just an ordinary price effect at work. The field experiment on matching donations has a positive effect on the period in which the mechanism is at work, due to the relative price effect. However, in the periods after the matching mechanism was rescinded, people reduced their contributions. Overall, this led to a negative effect on contribution rates.

The Subsample of Individuals Who Always Contributed Maximally in the Past

Explanations for the negative effect of matching after period *t* based on intertemporal substitution or on a more sophisticated explanation using mental accounts would predict that subjects who had always donated the maximum amount through period *t* should not then decrease their giving in period *t*+1. This subsample did not spend more money in period *t* than in previous periods, because they always donated the maximum amount anyway. Figure 2 analyzes the average donation of those students who gave the maximum amount in previous periods for both the control group and the treatment group.

Figure 2 shows that before the matching experiment there were (by construction) no behavioral differences between the control and treatment groups. In period *t*, the two groups still did not differ; that is, the same proportion of people stopped giving in the treatment group and the control group. However, in the period after a matching donation was offered, students in the treatment group dramatically reduced their donations. In the control group, people donated on average of 11.1 CHF compared with only 10.6 CHF in the treatment group ($p < 0.05$). In the following periods, the average donation in the control group and in the treatment group reverted back to the same level.[13] This pattern—that even people who always gave the maximum amount to the two funds reduced their giving in period $t+1$—is not compatible with a model that relies on intertemporal substitution or mental accounting. Specifically, as the control group's behavior was not increased by a matching mechanism, they would have had nothing for which to compensate.

However, individuals might not have mentally balanced their out-of-pocket donations, but attributed the matched amount to their donation instead and compensated accordingly in the following periods;[14] they might have smoothed over the additional amount received by the charity. If this is so, subjects in the treatment "Matching 50 percent" group should have reduced their contributions more than in the treatment "Matching 25 percent" group. In Table 4, the behavior of people in the treatment groups who before the experiment always contributed the maximum amount is analyzed in terms of the effect the two subsidies had on subsequent behavior after the match was removed. The result in Table 4 shows that among those individuals whose donations were supplemented by 25 percent, donations were reduced even more than among those whose received a 50 percent match, a result that is not compatible with the proposed explanation. This result suggests that, for people who are the most pro-socially inclined towards the two funds, offering a small matching donation has a stronger negative effect than offering a high matching donation. Gneezy (2003) and Gneezy and Rustichini (2000a) find similar results.

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[13] This result is supported in estimations that include individual fixed effects and time dummies.

[14] For a related model on "impact philanthropy," see Duncan (2004).

VI. Concluding Remarks

This paper tests the effect a matching mechanism has upon donations in a randomized field experiment. Among a set of university students who each semester must decide whether they wish to contribute to two social funds, one set received a match in two varying amounts, while a control group was not offered a match. The results are twofold: first, matching donations increased contributions to both funds in the period in which donations were matched. This result places this experiment as one of the first field tests to show a positive effect of a matching mechanism on charitable giving. Second, when the matching mechanism was removed, the proportion of people who contributed to the funds decreased, both in the treatment group and the control group. Particularly in the initial period after the field experiment, when the subsidy was removed, fewer people were willing to contribute to the two funds. This result adds to the growing evidence on the potential negative effects of incentives for pro-social behavior. These experimental results can help inform charitable organizations about the potentially negative effects of fundraising practices that may offer a temporary subsidy to increase donations. The experiment suggests that a matching mechanism does not necessarily increase donations in the long run. However, two caveats should be made regarding this conclusion: first, the decision to contribute in the field experiment was confined. It is possible that people would have increased their donations dramatically due to the matching mechanism, but they were unable to do so because of the contribution limit of CHF 12.0. The overall effect might have been positive had no ceiling limit been established. Second, the results suggest that a matching mechanism might be able to increase contributions for funding a single project (that is, a project that is a one-off and not ongoing indefinitely) or if donations are always matched (that is, a permanent, not a temporary, match). In such cases, matching is a good strategy.

One question remains open: How can the negative effect of a matching mechanism be explained? The paper discusses various explanations for a negative effect. However, this analysis cannot discriminate between the different explanations. Future research should therefore concentrate on testing these theories in the field, where the features of a matching mechanism can lead to a negative net effect in the long run. With such experiments, it may be possible to determine what ultimately motivates people to behave pro-socially and how

incentive systems have to be designed in order to avoid negative long-run effects that run counter to the original intentions.

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Table 1: Summary Statistics in Period *t*

Personal characteristics	Control group	Treatment 'Matching 25%'	Treatment 'Matching 50%'
Observations	10,847	265	267
Number of semesters	11.9 (8.5)	11.3 (8.3)	11.3 (7.4)
Age	28.3 (7.4)	28.5 (7.7)	28.0 (7.8)
Gender (=Female)	52%	53%	50%
Economists	10%	9%	12%
Average donation in the past	8.37 (4.61)	8.04 (4.75)	8.34 (4.53)

Notes: Standard deviations in parentheses.
Source: Own experiment and data provided by the accounting department of the University of Zurich.

Table 2: Effect of Matching Donations on Contributions in Period *t*

Dichotomous dependent variable: Contribution to Both Funds (=1)		
Variable	(a)	(b)
Treatment 'Matching'	0.409** (0.173)	
Treatment 'Matching 25%'		0.275 (0.236)
Treatment 'Matching 50%'		0.553** (0.247)
Individual fixed effects	incl.	incl.
Semester dummies	incl.	incl.
# of observations	13,532	13,532
# of individuals	3,657	3,657
# of periods	4	4
Prob>χ^2	0.000	0.000

Notes: Robust standard errors in parentheses. Periods *t*-3, *t*-2, *t*-1, and *t* included. Conditional logit models with individual fixed effects. Test of differences for treatment in column (b): *'Matching 25%' - 'Matching 50%* = 0: $\chi^2(1) = 0.68$, $p<0.4098$
Level of significance: * $0.1<p<0.05$, ** $0.01<p<0.05$, *** $p<0.01$

Table 3: Effect of Matching Donations Before and After Experimental Intervention

Dependent variable	Contribution to both funds (=1)		No Contribution at all (=1)		Average donation (CHF)	
Variable	(a)	(b)	(c)	(d)	(e)	(f)
Treatment 'Matching'	-0.045 (-0.132)	0.089 (0.119)	0.297** (0.143)	0.217* (0.131)	-0.177 (0.141)	-0.045 (0.125)
Individual fixed effects	incl.	incl.	incl.	incl.	incl.	incl.
Semester dummies	incl.	incl.	incl.	incl.	incl.	incl.
# of observations	23,104	29,705	20,915	26,879	58,157	69,536
# of individuals	4,426	4,830	4,001	4,365	11,377	11,379
# of periods	6	7	6	7	6	7
Prob>χ^2	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Standard errors in parentheses. Columns (a), (c), and (e) exclude the period in which the field experiment was actually undertaken. Columns (b), (d), and (f) include all seven periods. Columns (a)–(d) present conditional logit models; columns (e) and (f) present OLS regressions with individual fixed effects.
Level of significance: * $0.1<p<0.05$, ** $0.01<p<0.05$, *** $p<0.01$

Table 4: Reaction to High and Low Matching Rates by Subjects who Contributed the Maximum Amount in the Past

Dependent variable: Average donation (CHF)	
Variable	Coefficient
Treatment 'Matching 25%'	
Treatment 'M25'(t)*	-0.292
	(0.222)
Treatment 'M25'(t+1)*	-0.529**
	(0.239)
Treatment 'M25'(t+2)*	0.013
	(0.255)
Treatment 'M25'(t+3)*	-0.204
	(0.263)
Treatment 'Matching 50%'	
Treatment 'M50'(t)*	0.438**
	(0.219)
Treatment 'M50'(t+1)*	-0.329
	(0.230)
Treatment 'M50'(t+2)*	-0.253
	(0.238)
Treatment 'M50'(t+3)*	-0.211
	(0.252)
Individual fixed effects	incl.
Semester dummies	incl.
# of observations	37,611
# of individuals	6,132
# of periods	7
Prob>χ^2	0.000

Notes: Standard errors in parentheses. OLS regressions with individual fixed effects.
Level of significance: * 0.1<p<0.05, ** 0.01<p<0.05, *** p<0.01

Figure 1: Effect of Matching Donations Before and After Period *t*

Fig. 1a: Treatment Effect on Contributions to Both Funds Over Time

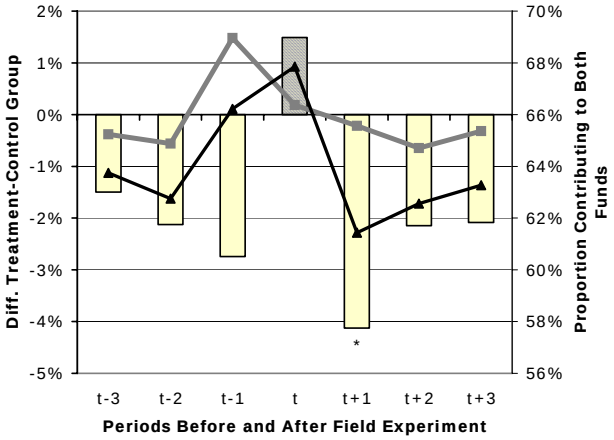


Fig. 1b: Treatment Effect on Contributions to Only One Fund Over Time

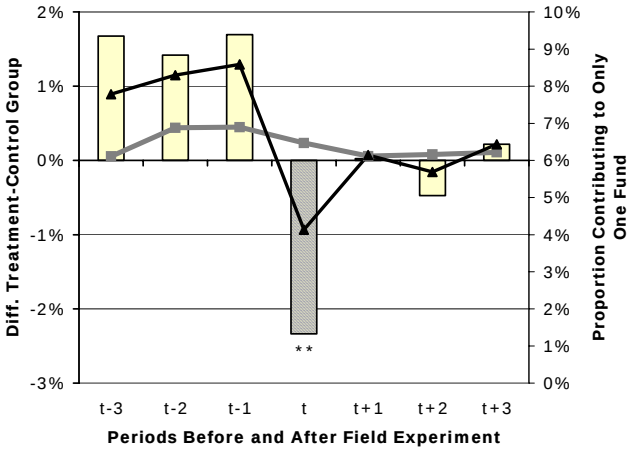


Fig. 1c: Treatment Effect on No Contributions at all Over Time

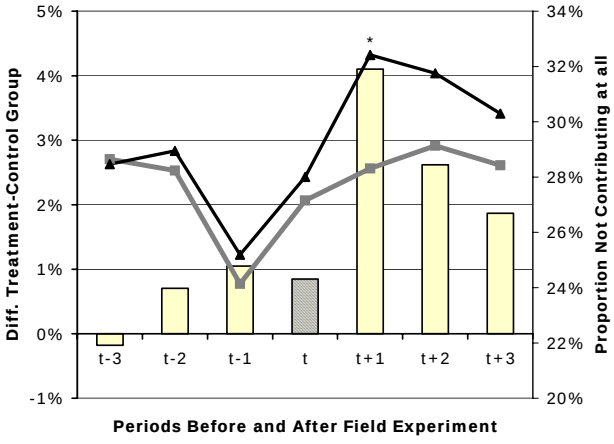
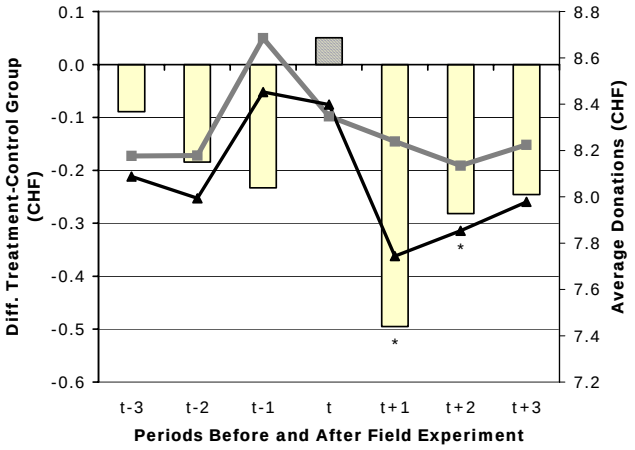
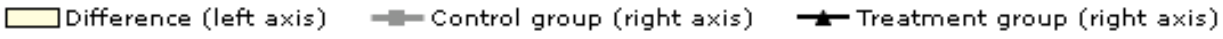


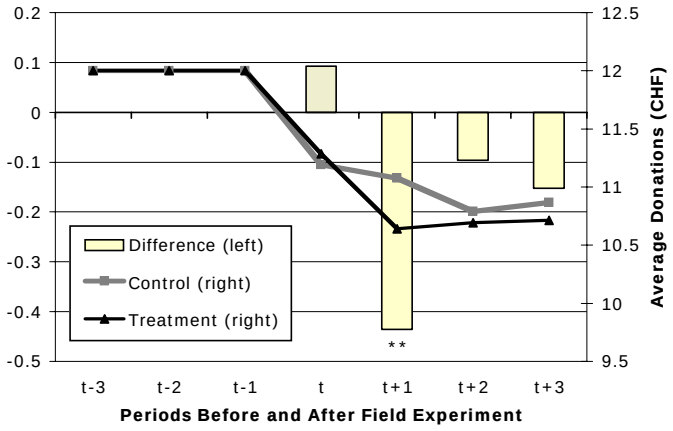
Fig. 1d:Treatment Effect on Average Donations Over Time





Data Source: University of Zurich, 2000–2004.
Level of significance of difference between treatment and control (*t* - test): * 0.1<p<0.05, ** 0.01<p<0.05, *** p<0.01

Figure 2: Average Donations for Subjects who Contributed the Maximum Amount in the Past



Data Source: University of Zurich, 2000–2004.
Level of significance: * 0.1<p<0.05, ** 0.01<p<0.05, *** p<0.01

Table A.1: Effect of Matching Donations after Experimental Intervention

Variable	Contribution to both funds (=1) (a)	No Contribution at all (=1) (b)	Average donation (CHF) (c)
Treatment(t)*	0.370**	0.056	0.204
	(0.171)	(0.184)	(0.177)
Treatment(t+1)*	-0.140	0.395**	-0.288
	(0.175)	(0.189)	(0.186)
Treatment(t+2)*	0.036	0.259	-0.095
	(0.187)	(0.202)	(0.196)
Treatment(t+3)*	0.026	0.174	-0.064
	(0.198)	(0.217)	(0.207)
Individual fixed effects	incl.	incl.	incl.
Semester dummies	incl.	incl.	incl.
# of observations	29,705	26,879	69,536
# of individuals	4,830	4,365	11,379
# of periods	7	7	7
Prob>χ^2	0.000	0.000	0.000

Notes: Standard errors in parentheses. Columns (a) and (b) present conditional logit models with individual fixed effects; column (c) presents an OLS regression with individual fixed effects.
Level of significance: * 0.1<p<0.05, ** 0.01<p<0.05, *** p<0.01