DO SUBSIDIES INCREASE CHARITABLE GIVING IN THE LONG RUN? MATCHING DONATIONS IN A FIELD EXPERIMENT

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Abstract
Subsidizing charitable giving—for example, for victims of natural disasters—is very popular, not only with governments but also with private organizations. Many companies match their employees' charitable contributions, hoping that this will foster the willingness to contribute. However, systematic analyses of the effect of such a matching mechanism are still lacking.

This article tests the effect of matching charitable giving in a randomized field experiment in the short and the long run. The donations of a randomly selected group were matched 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 been stopped, the contribution rate declines for the treatment group. The matching mechanism leads to a negative net effect on the participation rate. The field experiment therefore provides evidence suggesting that the willingness to contribute may be undermined by a matching mechanism in the long run. (JEL: C93, D64, H00)

1. Introduction

A number of corporations in the U.S. and Europe match their employee's charitable contributions.[1] And on ad hoc bases, for example after large natural catastrophes, governments match individuals' donations. Matching charitable giving is seen as an alternative to subsidizing giving through a rebate mechanism as it also decreases the price of giving. We should therefore expect that when donations are matched, the willingness to contribute increases. However, to

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

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analyze the long-run effect of a temporarily applied subsidy is probably as important as to evaluating the effect of the subsidy when it is in place. In fact, many fundraisers temporarily give incentives—for example, a matching—to increase donations, but we know very little of what happens when the incentive is removed. Individuals might just return to the same level of giving as before the matching was offered. Matching might also have a positive effect on giving as it established a habit of giving. But matching might also have negative effects on long-run giving as individuals' willingness to behave pro-socially can be undermined by incentives (e.g., Frey 1997; Gneezy 2003; Bénabou and Tirole 2006). In the end, it is an empirical question whether a matching mechanism increases, decreases, or leaves unaffected pro-social behavior in the long-run.

To evaluate the short-and long-run effect 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 effect of matching. For example, a higher contribution rate in a firm which matches employees' donations might not be due to the matching mechanism but either due to the selection of pro-social employees into a firm which offers such a mechanism or due to the firm adopted the mechanism because there is a donation culture among the employees. An experimental intervention that offers a matching donation to randomly selected individuals can give clear evidence as to whether matching has an effect on donations. In order to investigate the effect of a removal of the matching on subsequent giving to the same cause it is important to analyze the effect on the same individual giving to the same charity.

This article tests, in a randomized field experiment, whether matching charitable contributions affects donations in the short and in the long run. Contributions to two social funds at an university are studied. Each semester, students have to decide anonymously whether or not to contribute to two funds. The donations of 600 randomly selected students are matched if they contribute to both funds. The resulting behavior is compared with the control group, whose donations are not matched.

The results of the randomized field experiment support the hypothesis that matching donations increase the contributions to a public good. The panel data set allows for the investigation of not only the short run treatment effect, but also the three decisions after the period in which contributions had been matched. Because such an intervention might influence the underlying motivation to behave pro-socially, it is important to analyze the behavior after an external incentive has been temporarily applied. 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.

There has been little research on matching charitable giving.[2] Eckel and Grossman (2003) present the first laboratory experiment which 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 this result, a matching mechanism is psychologically different from a pure rebate mechanism. Such special features are in the end crucial for explaining long-term effects of a matching mechanism. However, often rebate and matching mechanisms are differently designed and differ, for example, on whether they are fund-specific or not. Matching often is and rebate isn't.

This article presents one 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 to different contributions 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 or Republican U.S. states.[3]

One aspect neglected in previous research on matching mechanisms is the long-run effect of the external interventions. The panel structure of the data set and the 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. Previous studies found no negative effect of temporary incentives on the contribution rate to other charitable causes after the incentive is removed (Falk 2004; Bekkers 2005). The panel structure allows to be more precise and to analyze the probability of the same individuals' giving to the same charity.

The article is organized as follows: Section 2 presents the field experiment and the data. Section 3 formulates the behavioral hypothesis. Section 4 shows the results for matching in the period in which the contributions are matched and how giving emerges if matching is removed. The last section offers an evaluation of the results and draws conclusions.

2. 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

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, e.g., Randolph 1995; Auten, Sieg, and Clotfelter 2002).

3. A number of field experiments analyze mechanism to increase donations (e.g., List and Lucking-Reiley 2002; Falk 2004; Shang and Croson 2005).

anonymously whether or not he or she wants to contribute to two social funds—in addition to the compulsory tuition fee. On the official letter for renewing their registration, the students are asked whether they want to voluntarily donate a specific amount of money (CHF 7.-, about US$ 4.20) to a fund which offers cheap loans to students in financial difficulties and/or a specific amount of money (CHF 5.-, about US$ 3) to a second fund supporting foreigners who study for up to three semesters at the University of Zurich. Without their explicit consent (by ticking a box), students do not contribute to any fund at all. Students have the choice of donating to no fund, only one fund, or both funds. The panel data is composed of the decisions for the seven semesters from the summer semester 2001 up to and including the summer semester 2004. From now on, we refer to the period where the experiment was undertaken as period t, where the periods before are called period $t-1$, $t-2$, $t-3$ and the periods after $t+1$, $t+2$, $t+3$.

In the experiment, 600 students were selected at random and provided with information about the matching mechanism. With the official letter for renewing the registration, and the decision about contributing to the two funds (for the winter semester 2002/2003), 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%*"); or "CHF 6" (treatment "*Matching 50%*"). The donations are therefore matched by 25% and 50%, respectively. The inserts received by the two treatment groups differed only in the amount matched. The subjects were informed that the matched money 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 the registration form at the counter of the administration office, only students who had decided at least once in the past are included in the experiment. Freshmen in the treatment period are also excluded in 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 can be observed. Students decided anonymously at home about contribution to the two social funds.

Table 1 shows the summary statistics for the control group and the treatment group. As the assignment was random, no significant differences emerged between various characteristics (number of semesters, age, gender, economics as a main subject, and average contributions in the past[4]) of subjects in the treatment group and in the control group. Importantly, the control group is slightly more likely to have contributed in the past, that is, their average donation in the past

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.

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	11.3	11.3
	(8.5)	(8.3)	(7.4)
Age	28.3	28.5	28.0
	(7.4)	(7.7)	(7.8)
Gender (= Female)	52%	53%	50%
Economists	10%	9%	12%
Average donation in the past	8.37	8.04	8.34
	(4.61)	(4.75)	(4.53)

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

is higher than for both treatment groups. Even though the difference is not statistically significant, it might lead to an understating of a potential positive effect of matching in period t and to an overstating of a potential negative effect in the periods after the experimental intervention. We will discuss the consequences and the remedy of this in Section 4.

The data set has some special characteristics, which are important for the interpretation of the size of the effect, especially when comparing the results of this analysis to results from laboratory experiments. First, the field experiment is based on a trichotomous decision and most students either decide not to contribute at all or to contribute to both funds (Frey and Meier 2004b). As no marginal adjustment in their contributions by one or more monetary units is possible many students have to change their behavior for an experimental effect to become visible. Second, people in the treatment group decided at least once (and on average 10.8 times) before period t whether to contribute or not. If contributing has become a habit, the matching donations can be expected to have a limited effect on behavior. Third, the level of contribution is already surprisingly high. Therefore, the effect of the matching mechanism is expected to be minor, as most people are not able to increase their contributions at all—because they already contribute to both funds. Fourth, the decision is taken semi-annually. This differs from laboratory experiments, in which various repetitions are taken within one single session (normally a session lasts one or two hours). If the matching mechanism has an effect on behavior half a year or even a year later, than the experimental effect must be strong.

3. Behavioral Hypotheses

Charitable giving is subject to the relative price effect. As in any other activity, if donations are cheaper, people are expected to engage, ceteris paribus, more

in this activity. The relative price of giving is only important if people are not only concerned with their own utility or payoff, but have, for example, a utility function of the following form: $U_s = u_s((1-\alpha)\pi_s, \alpha\pi_o)$. A person's utility depends on his or her own payoff, π_s, and the payoff of other people, π_o. α indicates the degree of altruism, where people with $\alpha = 0$ are not altruistic at all (for a detailed discussion, see Andreoni and Miller 2002).[5] Furthermore, it is important for individuals that they personally donate money, because then they experience the "warm glow" from giving (Andreoni 1990). The giving of others is therefore not a perfect substitute for one's own giving.[6] For "impure altruists" for whom utility increases with their *own* contribution, a matching should also increase his or her contribution as giving to a public good enters the utility function as a private good (Andreoni 1990).

The matching mechanism decreases the price of donating 1 monetary unit to $1/(1+s_m)$, where s_m indicates the subsidy through the matching mechanism. It is a straightforward matter to show that, as the price decreases, people are more willing to donate money. For the field experiment, this leads to a clear hypothesis for period t:

HYPOTHESIS 1. *More people donate to both funds in the treatment group than in the control group, because giving is cheaper in the treatment group. And the higher the matching benefit of each monetary unit donated, the more people donate.*

In the periods after the field experiment, no more matching was offered to the students. Relative prices therefore return to the same level as before period t. The hypothesis for the behavioral effect in the period after the experiment was undertaken is less clear. The effect of the matching mechanism on period $t+1$ is unclear as it depends on the assumption about the utility function. If people decide each time where to allocate their money according to the relative prices, giving should be the same before and after the matching period. In period t, subjects substitute private consumption or donating to another cause (e.g., to a beggar) by giving to the two funds. In period $t+1$, they allocate as in period $t-1$, because relative prices return to the normal level. Compensating could occur because either giving is a storable good and individuals get utility from giving in period t in period $t+1$ or because they allocated a given budget to a mental account (Thaler 1999) and if they spend more in one period, they have to compensate for this in the following period—especially if their account should not be negative in a pre-determined period (for example over a period of a year). However, even if

5. A variety of theories on pro-social behavior exist apart from simple altruism models. For surveys of different theories and empirical evidence, see Fehr and Schmidt (2003) and Meier (2007).

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

people compensate in period $t + 1$ for their higher donation in period t, standard models would not predict that this compensation leads to a negative net effect. It is therefore a cautious benchmark to assume that people should not decrease their donations due to the matching mechanism.

HYPOTHESIS 2. *The probability of contributing to the two social funds should not be decreased by the matching mechanism. This should hold for period t as well as for the periods afterwards.*

However, the implemented matching mechanism that 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 Hypotheses 1 and 2. In particular, incentives can have negative effect on (pro-social) behavior.

The channels through which a monetary incentive may have detrimental effects in the long run can be manifold. First, incentives to behave pro-socially can influence the intrinsic motivation to undertake such an activity. The joy of giving can be partly "crowded out" by monetary incentives if it is perceived as controlling and people feel forced to behave pro-socially and lose part of their self-determination (e.g., 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 relationship based on trust 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 (e.g., Rousseau 1995; Falk and Kosfeld 2006). Third, the introduction of a matching mechanism increases the benchmark for what charities can do to raise funds. Students might look for alternatives, which offer such a matching in period $t + 1$. Fourth, incentives to behave pro-socially can imply information about the nature of the task (e.g., Bénabou and Tirole 2002). In the case of the matching mechanism, if a charity offers a monetary incentive to donate, subjects might think that an incentive is offered because nobody donates. If people are only willing to contribute if others do so as well (see Frey and Meier 2004a), they will consequentially stop contributing. It is an empirical question whether a particular intervention increases, decreases, or leaves unaffected pro-social behavior in the long run.

To measure the effect of a monetary incentive on the motivation to behave pro-socially and to detect detrimental effects is often problematic. The overall

7. The motivational crowding effect was known in psychology long before economists started to seriously think about it (e.g., Lepper and Greene 1978; Deci, Koestner, and Ryan 1999). An exception 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.

effect of a change in relative prices is composed of both the ordinary price effect and the effect on intrinsic willingness to contribute. A negative net effect is therefore only visible if the price effect is not strong enough (Gneezy and Rustichini 2000a; Gneezy 2003). A way to measure an effect on the underlying motivation is to analyze pro-social behavior after the incentive is removed again. It is then possible to compare the level of pro-social behavior before, during, and after the intervention. That is the empirical strategy undertaken in this article. Gneezy and Rustichini (2000b) apply the same strategy and show that incentives in daycare centers had long-run negative effects on picking up kids on time. They even found a negative short-run effect.

In the following section, the hypotheses are tested.

4. Analysis and Results

The results are presented in three steps. First, we compare mean contribution rates between control and treatment groups over time. The randomization gives unbiased results of the treatment effect by comparing differences between control and treatment group. However, we discuss why the results might be slightly misleading when not taking pre-test differences into account. Second, we go one step further by exploiting the individual panel structure of the data and estimate models that take individual unobservable heterogeneity into account. In a third step, we look at a subsample of individuals in order to exclude some of the potential explanation for the observed behavior in the field experiment.

4.1. Mean Contribution of Treatment and Control Group

Figure 1 plots the behavior of treatment and control groups over time. Figures 1a–c show the contribution rates of 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.

Looking at Figures 1a–c, the basic behavioral effect of the matching mechanism over time is visible: Due to the matching mechanism, people who used to give to only one fund switch to giving to both funds in period t (shaded bars). The matching therefore increases contributions to both funds. However, in the periods after the matching mechanism was undertaken, these people do not return to giving to only one fund, but stop contributing altogether. The matching mechanism therefore increases the percentage of people who do not contribute to any fund at all. In a more detailed analysis, three results are interesting in the Figures 1a–c:

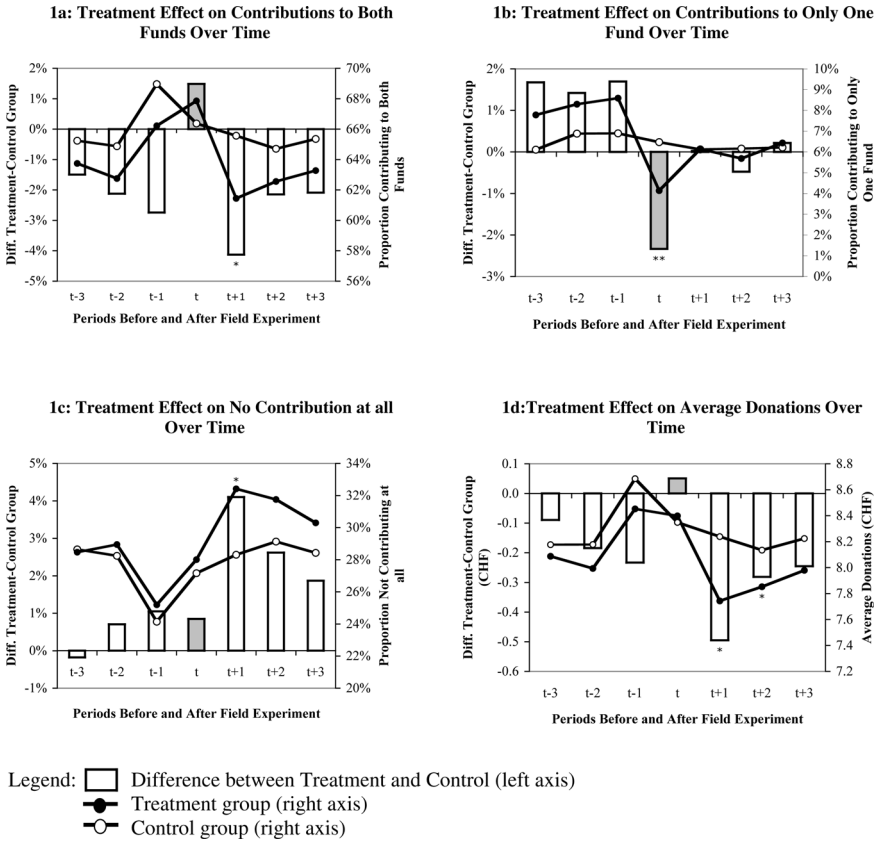

FIGURE 1. Effect of matching donations before and after period t.

Source: University of Zurich, 2000–2004. Level of significance of difference between treatment and control (t - test): Level of significance: *Significant at $0.1 < p < 0.05$. *Significant at $0.0.01 < p < 0.05$. ***Significant at $p < 0.01$.

(1) *The matching mechanism increases contributions to both funds in period t.* In the control group, 66.4% (s.e. $= 0.45$)[8] contribute to both funds in period t whereas in the treatment group 67.9% (2.0) contribute. This difference is not statistically significant ($p > 0.48$).[9] However, if the difference in the change of the contribution rate between period $t-1$ and period t is taken into account, matching does significantly change individuals' behavior. In the control group the percentage of people contributing to both funds decreases 2.7 (0.39) percentage points between period $t-1$ and period t. This is because either

8. Except otherwise noted, we will report standard errors in parenthesis.
9. Except otherwise noted, we will report t-tests in comparing means.

the willingness to contribute in general decrease with repetition (Frey and Meier 2004b) or a general shock unknown to the researcher occurred between period $t-1$ and period t, influencing both treatment and control group. The randomization therefore proves to be important.[10] For the treatment group, however, the contribution to both funds increases 1.7 (1.8) percentage points. The difference of 4.4 percentage points in the change between period $t-1$ and period t of the control and the treatment group is statistically significant ($p < 0.05$). However, in period $t+1$, the number of people contributing to both funds decreases substantially in the treatment group. The difference between the contribution rate of treatment and control group is 4.1 percentage points ($p < 0.1$) and larger than in the periods before the matching mechanism was implemented. In the periods $t+2$ and $t+3$, the difference seems to stabilize itself at a level similar to what it was before the experimental intervention.

(2) *People stop contributing to only one fund due to the matching mechanism*. As can be seen in Figure 1b, subjects in the treatment group stop contributing to only one fund in period t ($p < 0.05$). However, after the experimental intervention, those people do not return to giving to only one fund. The proportion of people contributing to one fund is lower in the treatment group after the matching than before.

(3) *The proportion of people who do not contribute at all increases for the treatment group after the experimental intervention*. Figure 1c shows that although in period t the difference between the control group and the treatment group remains the same, in period $t+1$, the proportion of people not contributing to any fund increases for the treatment group. While the difference between treatment and control is around one percent it goes up to 4.1 percentage points in $t+1$ ($p < 0.10$). This indicates that the matching mechanism actually decreases the proportion of people who contribute to the funds, at least for the following decision period. In the periods after that, the difference becomes smaller still, but remains higher than before the field experiment was undertaken.

The negative net effect of the matching mechanism can also be seen looking at the average donation. 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, CHF 8.36 (0.03), compared with CHF 8.19 (0.14) in the treatment group. The difference of CHF 0.17 is, however, not statistically

10. It is not likely that the behavior of the control group was contaminated by not being treated. Responses to a survey undertaken before the experiment shows that very few people talk to each other about the funds (see Frey and Meier 2004b).

significant ($p > 0.225$). The matching mechanism increased the amount donated in the treatment group compared to the control group. However, the average donations for the control group decrease sharply after donations are no longer matched. The difference in contributions between the treatment group and the control group is greater than before the intervention. On average, the control group donated CHF 8.20 (0.03) in the three periods after the experimental intervention, whereas the treatment group donated CHF 7.85 (0.16). This difference of CHF 0.35 is statistically significant ($p < 0.05$). Even if period t is taken into account, subjects in the treatment group donate CHF 0.23 less than the control group ($p < 0.1$). The matching mechanism therefore has a negative net effect on donations. The negative effect on donations is driven by the negative effect on contribution rates as the average donation conditional on contributing is the same between control and treatment group.

The negative difference between mean contributions after period t might be a little bit overstated if we take into account that the treatment and the control group already slightly differed before period t. Analyzing the difference between treatment and control group before and after the treatment shows that the difference in donations in the three periods after period t is double than it was before, but only marginally significant ($p = 0.1$).

In sum, by comparing mean contributions of treatment and control, matching seems not to have a huge effect in period t but decreases contributions substantially after that. Taking small pretest 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 in the simple comparison of means. In the following, we exploit the panel structure of the data even further and control for individual heterogeneity.

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

Individuals differ in their pro-social preferences, that is, in their α's in the simple model presented herein. In the decision situation at hand, that means that some get high satisfaction from contributing but are censored to give more than CHF 12. Others get less satisfaction and never contribute at all. 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 donation in period t in which donations are matched. Columns (a) and (b) in Table 2 present the results for the logit model with personal fixed effects. The dependent variable takes the value 1 if people contribute to both funds and 0 otherwise. The treatment effect is captured with the dummy variable *treatment* "*Matching*," which is 0 for all subjects in the

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 $> \chi^2$	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%*" = 0.0: $\chi^2(1) = 0.68$, $p < 0.4098$.

Level of significance: *Significant at $0.1 < p < 0.05$. **Significant at $0.01 < p < 0.05$. ***Significant at $p < 0.01$.

periods before the matching mechanism was implemented and 1 for the treatment group afterwards. The variables *treatment* "*Matching 50%*" and *treatment* "*Matching 25%*" are dummy variables for the two treatment groups, respectively.

The results in Table 2 confirm the effect of a matching mechanism. As can be seen in column (a), the probability of contributing to both funds increases if people's donations are matched ($p < 0.05$).[11] In column (b), the difference between the two matching prices is analyzed. The probability that subjects faced with the matching donation mechanism "Matching 50%" contribute to both funds increases 5.7 percentage points ($p < 0.05$). The effect of "Matching 25%" on the contribution rate of subjects in this treatment group is much smaller and is not statistically significant. The difference between the two coefficients is, however, not statistically significant.

The estimates suggest that the matching donation mechanism has a significant and relevant effect on the willingness to behave pro-socially. People increase their charitable giving when their contribution is matched, that is, when the price of giving is decreased. But how do individuals react if the price of giving goes 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 which excludes the period when the contributions were

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.

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)	
	(a)	(b)	(c)	(d)	(e)	(f)
Treatment "*Matching*"	−0.045	0.089	0.297**	0.217*	−0.177	−0.045
	(−0.132)	(0.119)	(0.143)	(0.131)	(0.141)	(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: *Significant at $0.1 < p < 0.05$. **Significant at $0.01 < p < 0.05$. ***Significant at $p < 0.01$.

matched. Therefore, the coefficients show the effect of the experimental intervention on contributions after period t, compared to average contribution behavior before the intervention. These results give the first indication of whether the level of contribution changed due to the matching mechanism. A negative coefficient indicates that the level of contribution is lower after the matching mechanism, compared to the people who were never offered a matching mechanism. To analyze the net effect, 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 has no effect on net contributions to both funds. Column (a) shows that subjects in the treatment group reduce their contribution in the periods after the matching mechanism, compared to the periods before the experimental intervention. The difference is, however, not statistically significant. But matching has a positive effect on contributions to both funds in period t. Therefore, if the period in which the matching mechanism was at work is taken into account, the net effect is slightly positive, but not statistically significant (column [b]).[12] The results indicate that, in the long run, the matching mechanism has no effect on contributions to both funds.

Columns (c) and (d) show the effect of the matching donations mechanism on no contributions at all. The dichotomous dependent variable is 1 if people do not contribute to any of the funds, and 0 otherwise. Column (c) shows that

12. The number of observations in this table vary between the columns for two reasons: first, the number of semesters differ between the columns; second, in the regression with fixed-effects only, people are of interest who 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.

people stop contributing to the funds after the experiment, compared to the periods before the matching mechanism was at work ($p < 0.05$). The willingness to contribute to at least one fund decreases 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) is negative, namely, the probability increases that subjects do not contribute to either of the two funds ($p < 0.10$).

Columns (e) and (f) investigate whether the matching mechanism has a negative effect on average donations in general. The dependent variable takes either the value 0, 5, 7, or 12 (CHF). The columns show the coefficient for an OLS regression with time dummies and individual fixed-effects. As a matter of fact, the matching donation experiment not only decreases the average donation in the periods after the experiment (column [e]), but also has a negative net effect (column [f]). The effect come, however, with a large standard error.

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 not statistically significant anymore. Therefore, in the very long run, people's contribution patterns seem to return to normal. But this has to be put in perspective: the decisions to donate are taken semi-annually. It is already a considerable effect that the decision to contribute to the social funds is influenced by the experimental intervention half a year later. But every additional period after the field experiment naturally increases the time between decision and experiment (which means years) and it also decreases the number of observations as students finish their studies in the meantime. It could therefore be expected that the effects are less precisely estimated.

To summarize, the behavioral reaction towards the matching donation mechanism suggests that there is more than just the ordinary price effect at work. Thus, 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, people reduce their contributions. This leads to a negative effect on contribution rates.

4.3. Subsample of Individuals Who Always Contributed Maximum in the Past

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

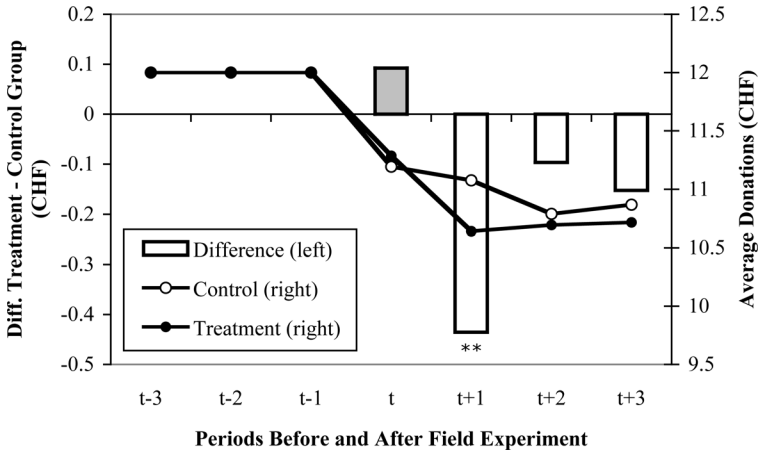

FIGURE 2. Average donations for subjects who contributed the maximum amount in the past.
Source: University of Zurich, 2000–2004.
Level of significance: *Significant at $0.1 < p < 0.05$. **Significant at $0.01 < p < 0.05$. ***Significant at $p < 0.01$.

Figure 2 shows that the behavior between control and treatment groups is by construction not different before the matching experiment. In period t, the two groups still do not differ, that is, the same proportion of people stop 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 donation. In the control group, people donated on average CHF 11.1 compared to only CHF 10.6 in the treatment group ($p < 0.05$). In the following periods, average donation in the control group and in the treatment group reverts again to the same level.[13] This pattern, that even people who always gave the maximum amount to the two funds, reduce their giving in period $t + 1$, is not compatible with a model which relies on intertemporal substitution or mental accounting. As their behavior is not increased by a matching mechanism, they have nothing to compensate.

However, people might not balance their out-of-pocket donation, but attribute the matched amount to their donation and compensate accordingly.[14] They might smooth over the amount received by the charity. In this case, subjects should reduce more in the treatment "Matching 50%" than in the treatment "Matching 25%." In Table 4, the behavior of people who always contributed the maximum amount in the past is analyzed, looking at the effect of the two treatments. The result in Table 4 shows that reduction in treatment "Matching 25%" is even higher

13. This result is supported in estimations include individual fixed-effects and time dummies.
14. For a related model on "impact philanthropy", see Duncan (2004).

TABLE 4. Reaction to high and low matching rate 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 $> \chi^2$	0.000

Notes: Standard errors in parentheses. OLS regression with individual fixed-effects.
Level of significance: *Significant at $0.1 < p < 0.05$. **Significant at $0.01 < p < 0.05$. ***Significant at $p < 0.01$.

than in "Matching 50%," which is not compatible with the proposed explanation. It 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 a high matching donation. Similar effects are found by Gneezy (2003) and Gneezy and Rustichini (2000a).

5. Concluding Remarks

This experiment tested the effect of a matching mechanism on donations in a randomized field experiment. The donations of students, who have to decide each semester whether they wish to contribute to two social funds, were matched. The results are twofold: First, matching donation increases contributions to both funds in the period in which donations are matched. This constitutes one of the first tests in the field, which shows the positive effect of a matching mechanism on charitable giving. Second, if the matching mechanism is removed, the proportion of people who contribute to the funds decreases. Especially in the initial period

after the field experiment, fewer people are willing to contribute to the two funds. This result therefore adds to the growing evidence on the potential negative effects of incentives.

The results inform charitable organizations about their fundraising practices. The results suggest that a matching mechanism does not necessarily increase donations in the long run. However, two caveats have to be made about this conclusion: First, the decision to contribute in the field experiment is censored. It is possible that people would have increased their donations dramatically due to the matching mechanism, but they couldn't. The overall effect might have been positive in such a situation. Second, the matching mechanism is able to increase contributions for the funding of a single project or if the donations are always matched. In such cases, matching is a good strategy.

One question remains open: How can the negative effect of a matching mechanism be explained? The article discusses various explanations for a negative effect. However, the article cannot discriminate between the different explanations. Future research should therefore concentrate on testing in the field, where features of a matching mechanism lead to a negative net effect in the long run. Only then will it be possible to get an idea of what ultimately motivates people to behave pro-socially, and how incentive systems have to be designed in order to avoid negative effects in the long run.

Appendix A

TABLE A.1. Effect of matching donations after the 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: *Significant at $0.1 < p < 0.05$. **Significant at $0.01 < p < 0.05$. ***Significant at $p < 0.01$.

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