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Matching Donations in a Field Experiment

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Abstract:

Subsidizing charitable giving, e.g. for victims of natural disasters, is very popular, not only with governments but also with private organizations. Many companies, for example, 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 paper tests the effect of matching charitable giving in a randomized field experiment. The students at the University of Zurich have to decide, each semester, whether they wish to contribute to two social funds. In an experiment, the donations of the treatment 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. People not only compensate for their donations during the matching period, but over-compensate. This leads to a negative net effect of the matching mechanism. The field experiment therefore provides evidence suggesting that the willingness to contribute may be undermined by a matching mechanism in the long run.

Keywords: Public Goods, Field Experiment, Matching Mechanism, Charitable Giving

JEL classification: C93, D64, H00

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After a tsunami hit Southeast Asia in December 2004, private donations reached a record high. Many of those contributions were matched with money from corporations or governments. Harvard university, for example, matched the donations of their employees dollar for dollar up to 100 US$.[1] The UK government promised to match all private contributions by an equivalent amount in state aid. It is difficult to analyze in field studies whether such a matching mechanism increases the willingness of individuals to donate, as in the case of aid for the tsunami victims. Too many confusing factors make it difficult to isolate the effect of matching donations. 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.

This paper tests, in a randomized field experiment, whether matching charitable contributions increase donations in the short and in the long run. Contributions to two social funds at the University of Zurich 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 either by 25 percent or by 50 percent if they contribute to *both* funds, depending on the treatment group. The resulting behavior is compared with the control group, whose donations are not matched. Two effects concerning the matching mechanism are of special interest:

First, what is the effect of the matching mechanism on actual contributions in the period in which donations are matched? Second, how do people react if the matching is removed again?

The results of the randomized field experiment support the hypothesis that matching donations increase the contributions to a public good. People who used to contribute to only one of the two funds started giving to both, because of the matching mechanism. The effect depends on the amount matched. The more contributions are matched, the higher is the probability that people donate money. The panel data set allows for the investigation of not only the short run treatment effect and the three decisions before the field experiment, but also the three decisions *after* the period in which contributions had been matched. Since 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.

[1] http://www.news.harvard.edu/gazette/daily/2005/01/06-tsunami.html

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. Possible explanations for this behavioral pattern are discussed.

The results of the field experiment are relevant, because the question as to how giving behavior can be fostered is crucially important for many charitable organizations, as well as for the government. Many organizations ultimately depend on charitable donations, and the charitable sector constitutes a large part of 'economic' activities. People are prepared to contribute to public goods. This can be observed in laboratory experiments (e.g. Ledyard, 1995) and in the case of charitable giving. In the year 2002, individuals in the United States donated over 183 billion dollars (Andreoni, 2004b). In addition, more than 50 percent of all adult Americans did some kind of voluntary work, amounting to 5 million full time equivalents[2] (Anheier and Salamon, 1999: 58). Although the extent of charitable contributions and the engagement in volunteer work is smaller in Europe, it is still substantial. Without anonymous contributions from individuals, many public goods could not be provided privately. From the point of view of economic theory, the fact that people behave pro-socially in an anonymous situation is hard to explain. However, it should be clear that if people care for the utility of other people, decreasing the price of a donated monetary unit should stimulate donations. Such subsidizing can be done either by a rebate or by a matching mechanism towards charitable giving.

A substantial literature exists on the rebate mechanism, analyzing how tax deductions for charitable contributions influence the size of the contributions. The estimated price elasticities vary to a considerable extent. While Auten et al. (2002) estimate price elasticities in the range of –0.79 and –1.26, Randolph (1995) finds very low elasticities. While Randolph can show that people temporally react strongly to price changes, his permanent price elasticity is very low (between –0.08 and –0.51).

A second approach to subsidize charitable contributions is to match donations. This mechanism is popular in a number of corporations in the U.S. and Europe, where employers

[2] The amount of volunteering is converted into the equivalent of full time workers.

match charitable contributions on the part of their employees.[3] But governments could also foster charitable giving by using a matching mechanism instead of a rebate mechanism. Especially if policy makers are thinking about lowering the tax rate, or switching to a flat tax and therefore lowering the incentive to donate, a matching mechanism could be used to increase giving. There is, however, little rigorous research analyzing the effect of matching donations on charitable contributions. One reason for this may be the practical problems involved. The observation that the employees of a firm, where a matching mechanism is implemented, donate more than the employees of a firm without such a mechanism, cannot support the hypothesis that matching leads to a behavioral effect. The higher contribution rate in the first company may be due to various reasons not linked to the matching mechanism, e.g. firms might adopt a matching mechanism because there is a donation culture in the firm, or it could be that, due to the fact that a firm has a matching mechanism, more pro-social employees select to work for that firm. To test the effect of matching donations, people have to be randomly assigned to a matching mechanism. This can best be analyzed in an experimental field setting.

In a laboratory experiment, Eckel and Grossman (2003) present the first study I am aware of which systematically analyzes matching donations (for a replication and comments, see Davis et al., 2003).[4] They analyze whether the rebate and the matching mechanism lead to the same behavioral effects in the short run. From a theoretical point of view, the two mechanisms should yield the same results. It should not matter whether you pay 50 cents for a donation of 1$, due to the fact that you get 50 cents back, or whether someone increases your donation by 50 cents. However, the results of the experiments show that it is important whether the rebate mechanism or the matching mechanism is used. To match donations leads to a higher amount of charitable giving than a rebate, and is therefore more effective. According to this result, a matching mechanism is psychologically different from a pure rebate mechanism. Such special features may in the end be crucial for explaining long term effects of a matching mechanism.

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[3] For example, Hewlett-Packard matches employee donations dollar for dollar up to $1000. See, http://grants.hp.com/us/community_giving.html.

[4] A number of experiments, relying on public goods games or dictator games, analyze different factors which increase ‘charitable giving’ in a laboratory setting. See, e.g. List and Rondeau (2003), Andreoni and Petrie (2004), Rege and Telle (2004), and Bohnet and Frey (1999).

This paper presents one of the first pieces of evidence of the matching donations mechanism outside of a laboratory setting. Eckel and Grossman (Eckel and Grossman, 2005) test in a similar field experiment whether matching and rebate mechanisms differ in a systematic way. They also find differences between rebate and matching mechanisms in the field. In a related field experiment on mechanisms to increase donations, List and Lucking-Reiley (2002) analyze the impact of 'seed money'. An exogenous increase in seed money from 10 to 67 percent increases donations by a factor of six, with an effect on both participation rates and contributions. In another field experiment about donations, Falk (2004) provides potential donors of a charity with either no gift, a small gift or a large gift in the solicitation letter. The relative frequency of donations increases by 75 percent if a large gift is offered compared to the 'no gift' treatment. Falk also tested for a reaction in the following solicitation campaign and did not observe any substitution of donations. The treatment group does not seem to contribute less than the control group in the following fundraising campaign. However, although he is looking at donations to the same charity, the purposes of the campaigns differ. In the field experiment presented here, the decision situation remains exactly the same. This therefore excludes the possibility of third factors influencing the decision to donate in the following period. But the two field experiments differ, especially in the incentive mechanism to increase donations. While Falk sends a gift to the potential donors, in the field experiment analyzed here a monetary matching is offered conditional on students' contributions to *both* funds. In the later section, I discuss that exactly these differences between the two approaches may be important for the behavioral effect in the long run.

One aspect completely missing in previous research on matching mechanisms is the possibility of preference changes due to external interventions. The panel structure of the data set and the experimental design not only allow for an analysis of the immediate reaction to the matching mechanism, but also for a check on the long run behavioral consequences of such an intervention. The possibility that pro-social behavior may be undermined by certain incentives is of course highly relevant for charities or governments interested in a permanent increase in contribution to public goods, and gives insights as to what motivates people to behave pro-socially.

The paper is organized in the following manner: Section II presents the field experiment and the data. Section III formulates the behavioral hypothesis. Section IV shows, on the one hand,

the results for matching in the period in which the contributions are matched and, on the other hand, how giving emerges if matching is removed. Section V discusses various possible explanations for the results. The last section VI offers an evaluation of the results and draws conclusions.

II. Field experiment and data

The field experiment was implemented in a naturally occurring decision situation at the University of Zurich. Every semester for more than 20 years, each student has to decide 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 of all students for the seven semesters from the summer semester 2001 up to and including the summer semester 2004. From now on, I 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 experimental intervention, 600 students are 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 a sheet of paper 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 potential donations are therefore matched by 25% and 50% respectively.[5] The sheet of paper received by the two treatment groups differed only with respect to the amount matched. The subjects were informed that the matched money would be

[5] See appendix for a sample of the information sheet.

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 treatment groups. 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. In total, the decisions of 11,379 students are observed. Students decide anonymously at home about the 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[6], and average contributions in the past[7]) of subjects in the treatment group and in the control group.

[Table 1 about here.]

The unique data set has some special characteristics, which may be 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. Students can decide whether to contribute to no fund, one fund or both funds. Most students either decide not to contribute at all or to contribute to both funds.[8] No marginal adjustment is possible in the sense that people increase their contribution by one or more monetary units. For an experimental effect to become visible, many students in the treatment group have to change their donation behavior. Second, people in the treatment group decided at least once in the past on whether to contribute or not. On average, subjects decided 10.8 times before being faced with the matching donation mechanism. If contributing has become a habit, the matching donations can be expected to have a limited effect on behavior. Third,

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[6] Frey and Meier (2003) show that economists contribute less to the two social funds. The difference can be explained by a selection effect. Economics students donate less before attending any lectures in economics, but the difference does not increase with more knowledge of economic theory.

[7] 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.

[8] For details on contribution to the two funds and an analysis of behavior over time, see also Frey and Meier (2004a).

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 – since 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 a person's behavior half a year or even a year later, than the experimental effect must be strong.

The field experiment and the decision setting used here have three advantages over previous studies:

(1) The field experiment presented here narrows the gap between field studies and laboratory experiments. While experimental research may provide important insights about human behavior, it is unclear how these results can be applied outside of the lab. The controlled field experiment allows us to keep many factors constant, like in a laboratory, while still observing decisions in a natural setting, where people are not aware of being part of a scientific study.

(2) Due to the panel structure of the data set, pro-social preferences, as revealed by past behavior, can be included in the analysis. It is therefore possible to analyze how people with heterogeneous pro-social preferences react to a matching donation mechanism.

(3) The panel structure and the experimental design allow us to answer the important question: What happens *after* a controlled change in the price of giving?

The next section presents the hypotheses for the field experiment.

III. 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 in this activity more. 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: $U_s = u_s((1\pi\pi)\pi_s,\pi\pi_o)$. 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).[9] Furthermore, it is important for people that they personally donate money, because only then do they experience the 'warm glow' from giving (Andreoni, 1990). The giving of others is not a substitute for one's own giving.[10]

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 two hypotheses for period *t*:

> **H1**: More people donate to both funds in the treatment group than in the control group, because giving is cheaper in the treatment group. The higher the matching benefit of each Swiss franc donated, the more people donate. In the field experiment, more people are expected to donate in the treatment 'Matching 50%' than in the treatment 'Matching 25%'.

In the field experiment, the matching is restricted to donations to both funds. Subjects cannot contribute just a positive continuous amount, but have to decide whether they want to donate to neither of the funds, a defined amount to one of the two funds or a defined amount to both of the funds. This discontinuous decision allows predictions to be made about which people are likely to be most responsive. People may be heterogeneous with respect to their pro-social preferences (with respect to their α's). This is important for the effect of matching donations, because people with a very low α are not expected to contribute to the funds and will also not react to the matching mechanism. As stated in a survey on previous experimental studies, "the most important heterogeneity is the one between purely selfish subjects and fair-minded subjects" (Fehr and Schmidt, 2003: 247). Andreoni and Miller (2002: 744) show in their experiments that around 23 percent of the individuals behave totally selfishly and do not react to changes in relative prices for giving. People who used to give nothing to either of the funds are expected to have a low α and are therefore not sensitive to the matching mechanism. Due to the censored decision, people who normally give to both funds are not expected to react, because they are not able to increase their donations. However, people who normally give to

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[9] A variety of theories on pro-social behavior exist apart from simple altruism models. For surveys of different theories and empirical evidence, see e.g. Fehr and Schmidt (2003) and Meier (2004).

[10] 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, 2004b).

only one fund are expected to be most sensitive to the matching mechanism, because their α is greater than 0 and they still have possibilities to donate more if they switch from giving to only one fund to giving to both. In this manner, they can 'profit' from the matching mechanism.

H2: Subjects in the treatment groups switch from donating to one fund to contributing to both funds. Therefore, in the treatment group, contribution rates to one fund are expected to be lower than in the control group.

The matching mechanism was implemented in period *t*. 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) than giving to the two funds. In period *t+1*, they allocate as in period *t-1*, because relative prices return to the normal level. However, even if people compensate in period *t+1* for their higher donation in period *t* (due to reasons to be discussed later), 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.

H3: 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 special features, which have behavioral consequences not predicted by the hypotheses above. The matching donations may, in particular, have two features which may affect motivation to contribute:

(1) The change in relative prices may have an effect on the motivation of people to donate in an anonymous situation to a public good. Due to the underlying incentive structure,

contributions are not utility maximizing in strict monetary terms. People who give to the two social funds therefore have some sort of intrinsic motivation to behave pro-socially.[11] Depending on the perception of the monetary incentive to increase pro-social behavior, the intervention may crowd-out or crowd-in such intrinsic motivation (see Frey, 1997).[12] In psychology, the large number of experimental studies on the crowding effect has led to several meta-analyses that, in general, support the finding that (external) incentives may have detrimental effects on intrinsic motivation (e.g. Deci, Koestner and Ryan, 1999).[13] However, it is not clear how such a detrimental effect can be explained. A motivational crowding-out may be expected if the external intervention is perceived as controlling. Psychologically, extrinsic incentives can have negative effects when they reduce the perceived self-determination of individuals (Rotter, 1966; Deci, 1975), or when they interfere with a relationship based on mutual trust (Rousseau, 1995). As self-determination and trust are important for pro-social behavior, the introduction of external incentives can seriously reduce the intrinsic joy of behaving pro-socially.[14] If, however, the incentive, i.e. the matching mechanism, is perceived as supportive, intrinsic motivation may even be strengthened. An external intervention would then crowd in pro-social behavior.[15] Much less attention is given to this positive effect of monetary incentives in the literature, although external incentives can equally well be perceived as supportive, especially if they are designed like the matching mechanism. It is an empirical question whether people perceive a particular intervention as controlling or supporting, and whether the underlying motivation to behave pro-socially is affected at all.

To measure the effect of a monetary incentive on the motivation to behave pro-socially is often problematic. The overall effect of a change in relative prices is composed of both the

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[11] Empirical studies suggest that people get satisfaction from behaving pro-socially, e.g. from volunteering (Meier and Stutzer, 2004), from donating (Earley and Konow, 2003), or from punishing defectors, i.e. contributing to a second-order public good (de Quervain et al., 2004).

[12] The motivational crowding effect was known in psychology long before economists started to seriously think about the 'hidden costs of reward' (Lepper and Greene, 1978) or the 'corruption effect' (Deci et al., 1999). An exception is Titmuss's book on The Gift Relationship (Titmuss, 1970), where he argues that monetary incentives for blood donors will undermine their motivation and reduce the amount of blood donated overall. Whereas Titmuss did not present any serious empirical evidence, a considerable amount of evidence has since been collected on the motivational crowding-out effect (for an extensive survey, see Frey and Jegen, 2001).

[13] For a meta-study declaring the crowding effect to be 'a myth', see Eisenberger and Cameron (1996). For an evaluation of the two contradictory meta-studies, see Lepper et al. (1999).

[14] For experimental studies, which emphasise the detrimental effect of monetary incentives in trust-based relationships, see Fehr and Gächter (2000) and Fehr and List (2004).

[15] For an empirical application on recycling behavior, see Thogersen (2003).

ordinary price effect and the effect on intrinsic motivation. A negative net effect is therefore only visible if the price effect is not strong enough (Gneezy and Rustichini, 2000; Gneezy, 2003). However, a much more effective way to measure an effect on the underlying motivation is to analyze pro-social behavior after the incentive is removed again (for a theoretical model on the possible long run effect of incentives, see Bénabou and Tirole, 2002). 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 paper.

(2) Not only does the matching mechanism decrease the price of giving, but it also contains certain information which may, on the one hand, lead to an even greater increase than an adequate rebate mechanism (see the discussion in Eckel and Grossman, 2003) and may, on the other hand, lead to a decrease in contributions if the matching mechanism is removed. First, the fact that an anonymous donor matches contributions to the two funds may contain information about the quality of the funds. Similar to the arguments on sequential fundraising and leadership giving, a donor who matches students' giving may be a signal that the fund is trustworthy and efficient (Vesterlund, 2003; Andreoni, 2004a; Potters et al., 2004). The positive reaction to a matching mechanism may therefore partly be due to such information. It is, however, unclear whether subjects react if the matching is not offered any more in period *t+1*. In principal, this could lead to an increase in the willingness to give in the long run. Secondly, the matching mechanism may contain information as to how many people actually contribute to the two funds. If the funds administration has to undertake a campaign to increase contributions via the matching scheme, contributions are maybe not that widespread. As people's willingness to contribute is positively correlated with the percentage of donors in the student population (Frey and Meier, 2004b), this information may decrease people's willingness to contribute – especially if the matching mechanism is removed.

In the following section, the hypotheses are tested.

IV. Analysis and Results

The results are presented in four steps. First, the effect of the matching mechanism is analyzed, looking at the differences in means between the treatment and the control group in period *t*. Second, it is taken into account that people are heterogeneous with respect to their

pro-social preferences. An analysis is therefore undertaken which controls for individual fixed-effects. Third, by looking at a descriptive analysis, an analysis can be made as to how people decide in the periods after the matching treatment. Fourth, the long run effect of giving is analyzed, controlling for heterogeneity.

Behavioral Effect when Donations Are Matched: Descriptive Analysis

Table 2 presents the descriptive statistics for the field experiments. The table shows the contribution rates to both funds, only one fund or no fund for the control group and the two treatment groups in the semester when the field experiment was undertaken (period *t*). The last three columns present Mann-Whitney tests for the differences in contribution rates between the control and the treatment group and between the two treatment groups.

Table 2 shows two results, which are only partly in line with the hypotheses:

(1) People react to the matching donations mechanism. If the two treatment groups are taken together, contribution rates to both funds are higher in the treatment groups than in the control group. These figures are consistent with hypothesis 1, suggesting that people react to the relative price effect. However, no statistically significant difference between control and treatment group emerges. The increasing effect of matching donations is only present for the treatment 'Matching 50%'. As revealed in table 2, the contribution rate to both funds is 3.67 percentage points higher than in the control group ($p<0.210$). In line with hypothesis 1, the effect is bigger for a higher matching donation. But for treatment 'Matching 25%', the contribution rate to both funds is even lower than for the control group. These differences are not statistically significant.

(2) The patterns of giving to only one fund or no fund are consistent with hypothesis 2. Individuals stop contributing to only one fund, because with just a slightly higher contribution, subjects can 'gain' the whole matching amount. This applies especially for the higher incentive to contribute, when the contribution rate to only one fund is 3.10 percentage points lower for treatment 'Matching 50%' compared to the control group. This effect is statistically significant at the 95%-level. The contribution rate to only one fund is also lower for treatment 'Matching 25%', but the difference is not statistically significant. Interestingly enough, a larger number of subjects do not contribute at all in treatment 'Matching 25%',

compared to the control group. For the treatment 'Matching 50%', the contribution rates are as expected. The percentage of people who do not contribute at all decreases. The descriptive analysis shows that the effect of matching donations comes from the high matching mechanism, and mostly from subjects who change from giving to one fund to giving to both funds. The effect of the matching mechanism to start giving at all seems quite modest.

[Table 2 about here]

The matching mechanism has distinct effects on various types of people, because people are heterogeneous with respect to their pro-social preferences (they differ with respect to their χ's). In order to analyze whether people differ in their reaction to a change in the price of giving, we divided people according to their previous behavior towards the two funds. The average donation varies from 0 CHF for students who never contributed to the funds in the past to 12 CHF for people who always contributed the maximum amount (see appendix for the distribution of the types). People who never contribute to the two funds (which are assumed to have a low χ towards the two funds) are not expected to react to a matching mechanism for the two funds, whereas people who always contributed to both funds in the past are not able to increase their donation, as the decision to give to the two funds is censored. Figure 1 shows the behavioral effect of the matching mechanism for different 'types' of people. People who never contributed in the past are not sensitive to a change in relative prices. People who always contributed to both funds are not able to increase their donations any further. However, for people who either changed their mind in the past or used to contribute to only one of the two funds, the matching mechanism increases the probability of contributions to both funds substantially. Looking at those people who contributed more than 0 CHF, but less then 12 CHF in the past, 47.8 percent of the control group contributes to both funds in period *t,* compared to 56.6 percent of the treatment group. The difference of almost 9 percentage points is statistically significant at the 95%-level in a Mann-Whitney test. The result supports the notion that people differ in their attitudes towards charitable giving and accordingly react to a change in relative prices. A matching mechanism has a limited effect on persons with low χ's.

[Figure 1 about here]

Behavioral Effect when Donations Are Matched: Fixed-Effect Models

The above analysis presents an incomplete estimation of the treatment effect for two reasons. First, individuals differ in their pro-social attitudes. There are people who never contribute and there are people who always contribute. As we illustrate above, we do not expect them to react to a matching mechanism, either because they don't care or because they are unable to increase their contributions. These unobservable characteristics have to be taken into account. Second, although the assignment to the treatment and the control group was random, it is possible that small differences in the compositions of the group may occur. There may be slightly more selfish persons ($\alpha = 0$) in the treatment group. To estimate the treatment effect, these random differences have to be taken into account. Due to the panel structure of the data set, it is possible to control for unobservable time-invariant heterogeneity. We therefore estimate logit models, taking personal fixed-effects and period dummies into account.

[Table 3 about here]

Columns (a) and (b) in table 3 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 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. As the magnitude of the coefficients is difficult to interpret, columns (c) and (d) compute the marginal effects in a probit analysis. The coefficients indicate how the probability of contributing changes compared to the reference group. To control for different level effects between the control und treatment group, an additional dummy variable *treatment group* is introduced, which is 0 for the control group and 1 for the treatment group in all periods. As the assignment was random, this variable is not statistically significant.

The general picture in table 2 is confirmed. As can be seen in column (a), the probability of contributing to both funds increases if people's donations are matched. The effect of treatment 'Matching' is statistically significant at the 95-percent level. Column (c) shows that the probability that a student starts contributing to both funds when his or her donation is matched, is 3.5 percentage points higher than for the control group. This marginal effect is

substantial if we take into account that many people already contribute to both funds and that giving is bounded in this situation. In columns (b) and (d), 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 (at the 95 percent-level of statistical significance). The effect of 'Matching 25%' on the contribution rate of subjects in this treatment group is much smaller, as is expected from hypothesis 2, 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, i.e. when the price of giving is decreased. In line with economic theory, the lower the price of giving (the higher the matching), the stronger is the behavioral reaction. The effect of the matching mechanism depends on the amount offered. The amount matched has to be sufficiently large to have a noticeable effect.

Behavioral Effect *After* Donations Were Matched: Descriptive Analysis

The question remains: How do people react if the price of giving goes back to normal? Students might return to their normal giving behavior. Or another possibility is that the matching mechanism changes the relationship between the donors and the charitable organization, which would lead to either a higher or a lower contribution level compared to the periods before the matching mechanism. These questions will be analyzed in this section. The reaction in the long run is not only important for the fundraising organization itself, due to the fact that it might be interested in net contributions in the long run, but it is also most relevant in order to understand the motivation to behave pro-socially. The results above already show that charitable contributions are subject to the relative price effect. It is, however, unclear whether the matching intervention also changes the underlying motivation to behave pro-socially. First, we look at the descriptive statistics and second, we investigate these questions, looking at estimations with individual fixed-effects.

[Figure 2 about here]

Figure 2 plots the differences between treatment and control groups over time. Figures 2a-c show the differences in contribution rates between treatment and control groups. Figure 2d plots the average donations in Swiss Francs for the treatment and the control groups and therefore combines the three other figures into one figure.

Looking at figures 2a-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*. 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 2a-c:

(1) The effect of the matching mechanism on contributions to both funds in period *t* is most visible. Figure 2a shows that the treatment group gives less than the control group in the periods before the matching mechanism was implemented (this difference is not statistically significant). In the treatment period (colored grey), however, the difference is reversed. While the differences of the means in period *t* are in themselves not statistically significant, the difference of the difference is, as shown in the fixed-effect regression above. However, in period *t+1,* the number of people contributing to both funds decreases substantially in the treatment group. The difference is larger than in the periods before the matching mechanism was implemented, and statistically significant at the 90-percent level. 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 2b, 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 (always relative to the control group).

(3) The proportion of people who do not contribute at all increases for the treatment group after the experimental intervention. While in period *t,* the difference between the control group and the treatment group remains the same, people in the control group after the

experiment are less likely to contribute to the funds. Figure 2c shows that in period *t+1*, the proportion of people not contributing to any fund increases for the treatment group. The difference is in itself statistically significant ($p<0.10$). The difference between the control group and the treatment group remains at a higher level than before the matching of donations was offered. 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 2d 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 CHF, compared with 8.19 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 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 8.20 CHF in the three periods after the experimental intervention, while the treatment group donated 7.85 CHF. This difference of 0.35 CHF is statistically significant ($p<0.05$). Even if period *t* is taken into account, subjects in the treatment group donate 0.23 CHF less than the control group. This difference is statistically significant at the 90-percent level. The matching mechanism therefore has a negative net effect on donations. Importantly, the difference of the differences between the two groups before and after the field experiment has to be analyzed. The negative effect of the field experiment can be analyzed, controlling for individual heterogeneity.

Behavioral Effect *After* Donations Were Matched: Fixed-Effect Models

To verify the results from the simple descriptive statistics, table 4 presents logit models, which include dummies for time effects and individual fixed-effects. For three outcomes (contributions to both funds, no contributions at all, and average contributions in Swiss

francs), table 4 shows the results of the matching field experiment. In the first column for each outcome (columns (a), (c), and (e)), a specification is presented which excludes the period when the contributions were 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. A negative coefficient in these specifications signifies that the matching mechanism has a negative net effect on the willingness to contribute.

[Table 4 about here]

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)).[16] The results indicate that, in the long run, the matching mechanism has no effect on contributions to both funds. People seem to compensate the higher contributions in period *t* with a lower donation in period *t+1*.

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 people stop contributing to the funds after the experiment, compared to the periods before the matching mechanism was at work. The difference is statistically significant at the 95-percent level. The willingness to

[16] 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.

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. The probability increases that subjects do not contribute to either of the two funds. The difference is statistically significant at the 90-percent level. It is difficult to explain this result with standard economic theory, because the reduction in the price of giving by the use of the matching mechanism lowers the willingness to contribute to the social funds. Standard economic theory would predict that the effect is zero or positive. The matching mechanism, although successful in increasing the willingness to behave pro-socially when it was in effect, reduced the willingness to behave pro-socially when it was removed again. The overall effect is negative.

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 effects are, however, not statistically significant at any conventional level.

To summarize, the results in table 4 show that the matching mechanism has a negative effect on the contribution rate in the long run. The effect on average donations is also negative, but is not statistically significant. In order to understand how people adjust their giving after the experimental intervention, in the next step the contribution probability is analyzed separately for the three decisions made after the experiment. Table 5 presents the behavioral reaction after the experimental intervention for every single decision period after the field experiment. Column (a) shows the effect on contributions to both funds, including time dummies and individual fixed-effects. Clearly, subjects confronted with a matching mechanism increase their contribution to both funds in period *t* ($p<0.05$). In period *t+1*, the probability that subjects in the treatment group contribute to both funds decreases. In the following periods, the willingness to contribute increases again. The difference after the experimental intervention is, however, not statistically significant. With regard to no contributions at all (column (b)), the willingness to contribute does not change in period *t*. But people stop contributing significantly in period *t+1* ($p<0.05$). In the following periods, the probability that

people in the treatment group do not contribute to any fund is higher than in the periods before the intervention, but not statistically significant. Consequentially, average donations (column (c)) increase in period *t*, but decrease in the following period, and stay lower than before the experiment. But the standard errors are quite large.

The detailed analysis of the behavior after the experimental intervention allows a refined conclusion about the behavioral effect in the long run: While the proportion of individuals not donating money to at least one of the funds is greater in the treatment group after the field experiment, the difference is only statistically significant in period *t+1*. 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 likely to be statistically significant.

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 overall effect. People stop giving to at least one of the funds after the matching of contributions is not offered anymore. In the following section, we discuss possible explanations for this counterproductive effect of the matching mechanism.

[Table 5 about here]

V. Discussion

The empirical analysis shows that the willingness to contribute to two social funds may be negatively affected by a matching mechanism. In this section, three theoretical explanations are discussed and evaluated. First, can the behavior of the subjects in the field experiment be explained by a theory of intertemporal substitution? Second, can the presence of mental

accounts explain the behavior in the field experiment? Third, the implications of models of detrimental effects of incentives on behavior are discussed.

Intertemporal substitution. People decrease their contributions in the period after the matching mechanism is removed. Is it possible to explain such a behavioral pattern by relying on intertemporal substitution? People might maximize over a given number of decisions to either donate for others or to consume other goods. Giving is, however, 'cheaper' in period *t,* due to the matching mechanism. According to an ordinary economic model, one would predict that people spend more in period *t.* If relative prices return to what they were before, subjects should revert to allocating their money between giving and consuming on other goods as they did before the matching was offered – if utility is separable and non-storable. Even if one assumes that giving is a storable good, and people get utility from giving in period *t+1* of giving in period *t*, people should not overcompensate their contributions and stop giving altogether. The empirical results presented above, however, suggest that subjects decrease their giving, i.e. stop giving to the funds at all. The observed behavior in the field experiment is therefore difficult to explain with a theory on intertemporal substitution.

Mental accounting. People might allocate their available budget to various mental accounts, which are separable from each other. The decisions are then taken within such mental accounts (Thaler, 1999). Concerning the decisions to contribute to the two social funds, subjects may have allocated a given budget for this charitable cause. 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). Various empirical studies suggest that people have some sort of mental accounts and their presence explains decisions not compatible with standard economic reasoning (e.g. Thaler, 1999). However, the behavioral reaction to the matching donation mechanism cannot solely be explained by mental accounts. People should not decrease their net contributions in the long run, but just compensate the increase in period *t*.

Both explanations so far, intertemporal substitution and 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 3 analyzes the

average donation of students, who gave the maximum amount in previous periods, for both the control group and the treatment group.

[Figure 3 about here]

Figure 3 shows that 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, i.e. the same proportion of people stop giving in the treatment group and the control group.[17] 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 11.1 CHF compared to only 10.6 CHF 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.[18] 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.[19] 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 6, 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 6 shows that reduction in treatment 'Matching 25%' is even higher 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 (2000).

[Table 6 about here]

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[17] Frey and Meier (2004a) show that, with repetition of the decision, people's willingness to contribute decreases - as in laboratory experiments.

[18] See appendix App.1 for a separate regression for the three types who never contributed, sometimes contributed and always contributed. These estimations include individual fixed-effects and time dummies. They support the result of the descriptive statistics.

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

In addition, a reduction in order to balance the mental account 'charitable giving' over a given period should be independent of the reason why giving increased in the first place. It therefore contradicts the findings of the field experiment by Falk (2004). Subjects in his field experiment, who receive a gift in period *t,* increased their donation in that period, but in period *t+1* no significant difference could be detected between the treatment group and the control group. This means that people did not compensate in period *t+1* for their higher giving in period *t*. However, providing potential donors with a gift in the solicitation letter differs from a matching mechanism. But if the decrease of pro-social behavior is dependent on the type of incentive, mental accounting has difficulties explaining the behavioral reaction to a matching scheme. In order to get an idea whether such differences may exist, we look at the behavioral change after another experimental intervention. Parallel to the field experiment on matching donations, two other treatments were undertaken, which informed people about the behavior of others (for details about this field experiment, see Frey and Meier, 2004b). The information that many other students contribute to the two funds increases the willingness to contribute significantly. Figure 4 presents descriptive statistics about how the *treatment 'Social Comparison'* changes behavior before and after period *t*. If people really compensate their donation to balance their mental account, we would also expect to see such substitution in this treatment. In figure 4a, it seems that people reduce their contribution to both funds slightly in period *t+1*. However, this is far from compensating the increase in contributions to both funds in period *t*. Such a behavioral reaction is much more in line with the results of Falk (2004). In addition, subjects do not stop contributing at all due to the experiment (figure 4b). On the contrary, the treatment 'Social Comparison' seems to increase contributions to the funds permanently.

[Figure 4 and Table 7 about here]

Table 7 presents estimations with time dummies and individual fixed-effects, which show the effect of the two treatment conditions on the contribution probabilities. The dummy variables for the two treatments are 1 for the treatment group and 0 otherwise for periods *t, t+1,* etc. It is especially striking how the net effect on no contribution at all differs between the two treatment groups ($p<0.05$). While the matching treatment increases the probability that people don't contribute at all, the treatment 'Social Comparison' decreases the same probability. Of course, the two experimental interventions differ in various respects and are therefore difficult

to compare. But especially such a comparison shows that certain means used to increase charitable giving (here the matching mechanism) are more prone to induce people to reduce their pro-social behavior in general. A theoretical explanation of the results presented therefore needs to address the particularity of the matching mechanism.

Crowding-out the motivation to behave pro-socially. Another explanation, concentrating on the character of the incentive, is the so-called 'motivation crowing effect' (Frey, 1997; Frey and Oberholzer-Gee, 1997; Kreps, 1997). In the literature on incentives, the possibility that monetary incentives can have a negative effect on (pro-social) behavior has recently gained prominence. The channels through which a monetary incentive may have detrimental effects in the long run can be manifold. Four basically different approaches can be distinguished. First, incentives to behave pro-socially can influence the intrinsic motivation to undertake such an activity. People enjoy giving to a charitable cause, but this joy-of-giving will be partly destroyed if they feel forced to behave pro-socially. Various authors emphasize that monetary incentives may be perceived as controlling, therefore decreasing self-determination to behave pro-socially and finally decreasing the intrinsic motivation to do so (e.g. Deci and Ryan, 1985; Frey, 1997). Second, incentives to behave pro-socially can disrupt the relationship based on trust between a donor and a charity. To offer monetary incentives to behave pro-socially may be perceived by the donor as a sign of mistrust. In a relationship in which trust is crucial for cooperation, incentives may have detrimental effects (e.g. Fehr and List, 2004). Third, monetary incentives can seduce people into looking for more effective alternatives. 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).[20] In the case of the matching mechanism, if a charity offers a monetary incentive to donate, subjects might think that an incentive is offered due to the fact that nobody donates. If people are only willing to contribute if others do so as well, they will consequentially stop contributing.

[20] Monetary incentives make it more difficult to signal one's good intentions to behave pro-socially. This may decrease pro-social behavior (Bénabou and Tirole, 2004). But this effect should exclusively affect the period where the incentive is given.

This section emphasizes that a matching mechanism may contain various pieces of information, apart from the fact that the price of giving changed. These additional features of a matching mechanism seem to decrease the underlying motivation to contribute to the two funds. However, the field experiment cannot discriminate between the various explanations. Further research in the field has to disentangle the various potential explanations for the behavioral pattern observed in the field experiment.

VI. Concluding Remarks

This paper tests the effect of a matching mechanism on donations in a randomized field experiment. The donations of students at the University of Zurich, who have to decide each semester whether they wish to contribute to two Social Funds, are matched. The results are twofold: First, the matching donation increases the contributions to both funds in the period in which the donations are matched. Subjects in the treatment group don't contribute to only one fund anymore, but start giving to both funds. This is important because it 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, less people are willing to contribute to the two funds. The results of this paper therefore add to the growing evidence on the potential negative effects of incentives.

The results are important in order to 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 paper discusses various explanations for a negative effect. However, the paper 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.

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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 (0.044)	8.04 (0.29)	8.34 (0.28)

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

Table 2: Patterns of Giving to the Two Funds in Period *t*

Percentage who contribute ...	Control group	Treatment 'Matching 25%'	Treatment 'Matching 50%'	Difference 'Matching 25%'-Control	Difference 'Matching 50%'-Control	Difference 'Matching 50'-'Matching 25'
... to both funds	66.37% (0.45)	65.66% (2.9)	70.04% (2.8)	-0.71% (z=0.241; p<0.810)	3.67% (z=1.254;p<0.210)	4.38% (z=1.080:p<0.280)
... to only one fund	6.47% (0.24)	4.91% (1.3)	3.37% (1.1)	-1.57% (z=1.027;p<0.305)	-3.10% (z=2.046;p<0.041)	-1.53% (z=0.888;p<0.374)
... to neither of the funds	27.16% (0.43)	29.43% (2.80)	26.59% (2.70)	2.27% (z=0.822;p<0.411)	-0.57% (z=0.206;p<0.837)	-2.84% (z=0.729;p<0.466)
# of individuals	10,847	265	267			

Notes: Standard errors in parentheses. Mann-Whitney test for significance of differences.
Source: See Table 1.

Table 3: Effect of Matching Donations on Contributions in Period *t*

Dichotomous dependent variable: Contribution to Both Funds (=1)

Variable	(a)	(b)	(c)	(d)
Treatment 'Matching'	0.409**		0.036**	
	(0.173)		(0.016)	
Treatment 'Matching 25%'		0.275		0.014
		(0.236)		(0.026)
Treatment 'Matching 50%'		0.553**		0.057**
		(0.247)		(0.024)
Treatment group			-0.022	-0.022
			(0.019)	(0.019)
Individual fixed effects	incl.	incl.		
Semester dummies	incl.	incl.	incl.	incl.
# of observations	13,532	13,532	41,995	41,995
# of individuals	3,657	3,657		
# of periods	4	4	4	4
Prob>χ^2	0.000	0.000	0.000	0.000

Notes: Robust standard errors in parentheses. Periods (t-3), (t-2), (t-1), and (t) included.
Columns (a) and (b) are conditional logit models with individual fixed-effects. Columns (c) and (d) shows marginal effects of probit estimations with robust standard errors adjusted for clustering on the individual level.
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: * $0.1<p<0.05$, ** $0.01<p<0.05$, *** $p<0.01$

Table 4: 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	0.089	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: * 0.1<p<0.05, ** 0.01<p<0.05, *** p<0.01

Table 5: 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 regressions with individual fixed-effects.
Level of significance: * 0.1<p<0.05, ** 0.01<p<0.05, *** p<0.01

Table 6: 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>χ^2	0.000

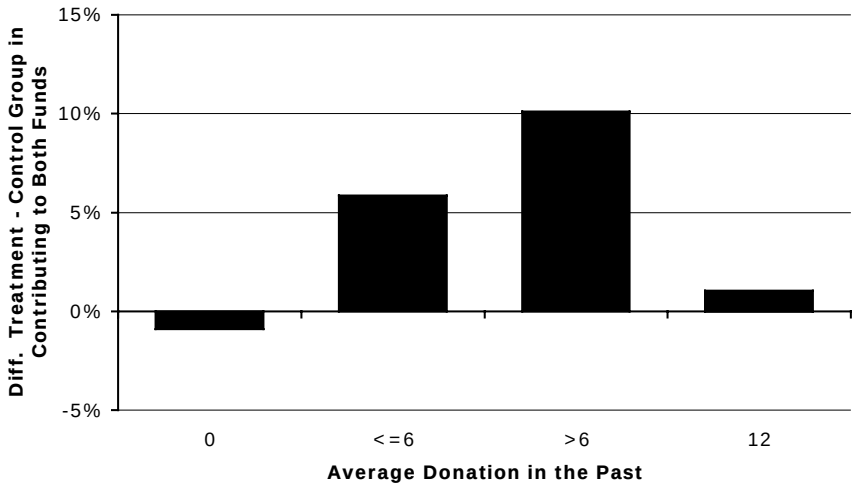
Notes: Standard errors in parentheses. OLS regressions with individual fixed-effects.
Level of significance: * 0.1<p<0.05, ** 0.01<p<0.05, *** p<0.01

Table 7: Comparison 'Matching Donations' and 'Social Comparison' After Experimental Intervention

Dependent variable	Contribution to both funds (=1)	No Contribution at all (=1)	Average donation (CHF)
Variable	(a)	(b)	(c)
Treatment 'Matching'	0.089	0.217*	-0.045
	(0.120)	(0.131)	(0.125)
Treatment 'Social Comparison'	0.126	-0.150	0.166*
	(0.096)	(0.103)	(0.098)
Personal fixed effects	incl.	incl.	incl.
Semester dummies	incl.	incl.	incl.
# of observations	31,994	28,837	74,942
# of individuals	5,200	4,681	12,257
# of periods	7	7	7
Prob>χ^2	0.000	0.000	0.000
Difference 'Matching' - 'Social Comparison'; p-value	0.8021	0.0238**	0.1724

Notes: Standard errors in parentheses. Columns (a) and (b) present conditional logit models; column (c) presents an OLS regressions with individual fixed-effects. P-value indicates the probability that the coefficient for treatments 'Matching' and 'Cond. Coop. High' are the same, using a χ^2-test for (a) and (b) and an F-test for (c).
Level of significance: * 0.1<p<0.05, ** 0.01<p<0.05, *** p<0.01

Figure 1: Different Reaction to Matching Mechanism in Period *t*



Data Source: University of Zurich, 2000-2004.

Figure 2: Effect of Matching Donations Before and After Period *t*

Fig. 2a: Treatment Effect on Contributions to Both Funds Over Time

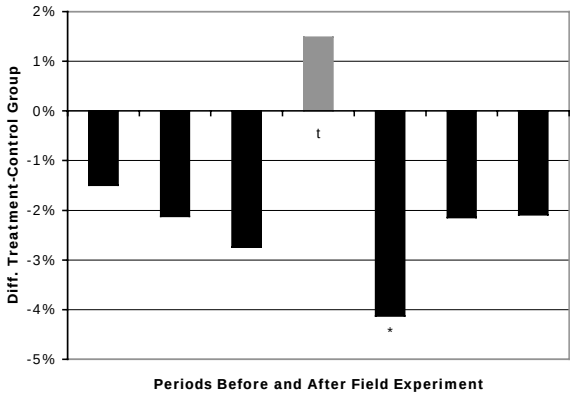


Fig. 2b: Treatment Effect on Contributions to Only One Fund Over Time

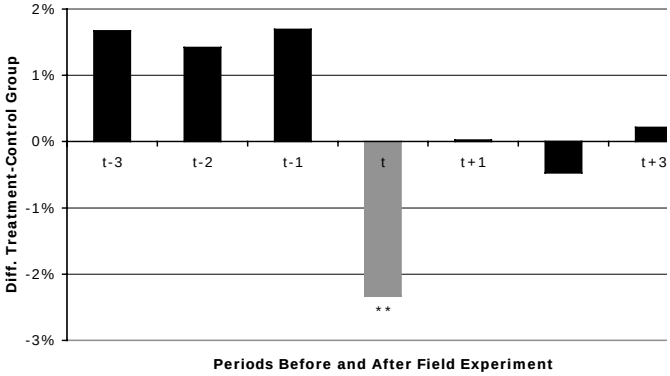


Fig. 2c: Treatment Effect on No Contribution at all Over Time

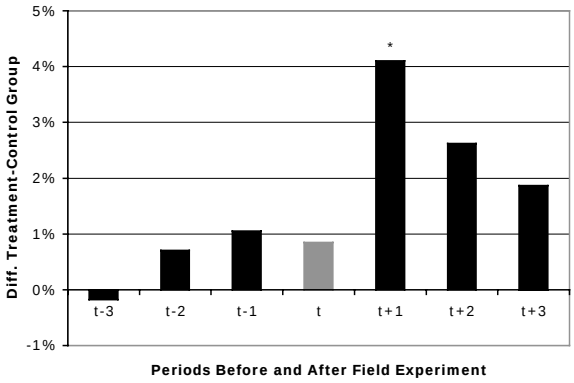
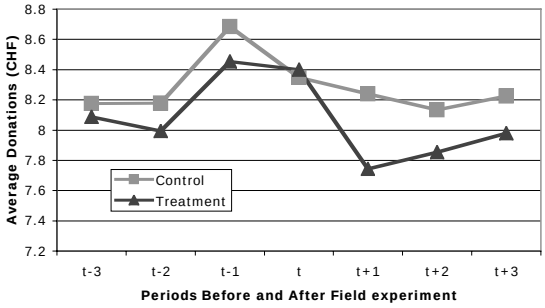
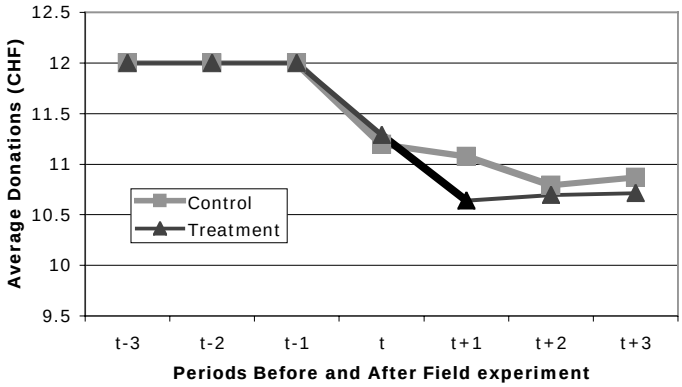


Fig. 2d:Treatment Effect on Average Donations Over Time



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

Figure 3: Average Donations for Subjects who Contributed the Maximum Amount in the Past



Data Source: University of Zurich, 2000-2004.

Figure 4: Effect of Treatment 'Social Comparison' Before and After Period *t*

Fig. 4a: Treatment Effect on Contributions to Both Funds Over Time

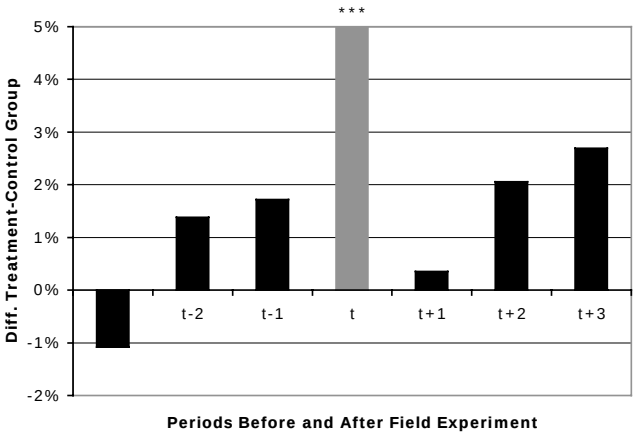
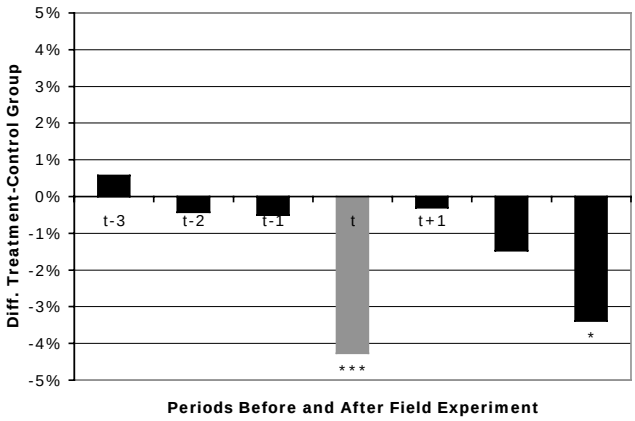


Fig. 4b: Treatment Effect on No Contribution at all Over Time



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

Figure App.1: Sample Information Sheet of Field Experiment (Treatment 'Matching 50%')

Universität Zürich

Unterstützungskampagne

Kampagne zur Erhöhung der freiwilligen Beiträgen für die beiden Fonds ‚Stiftung Darlehenskasse der Studentenschaft' (CHF 7.-) und ‚Solidaritätsfonds für ausländische Studierende' (CHF 5.-) zukommen lassen:

Ein anonymer Spender hat sich bereit erklärt, den von Ihnen geleisteten Beitrag mit zusätzlichen Fr. 6.- zu erhöhen, wenn Sie in *beide* Fonds einzahlen.

(Der zusätzliche Beitrag wird je zur Hälfte an die beiden Fonds ausbezahlt)

Figure App.2: Distribution of Types

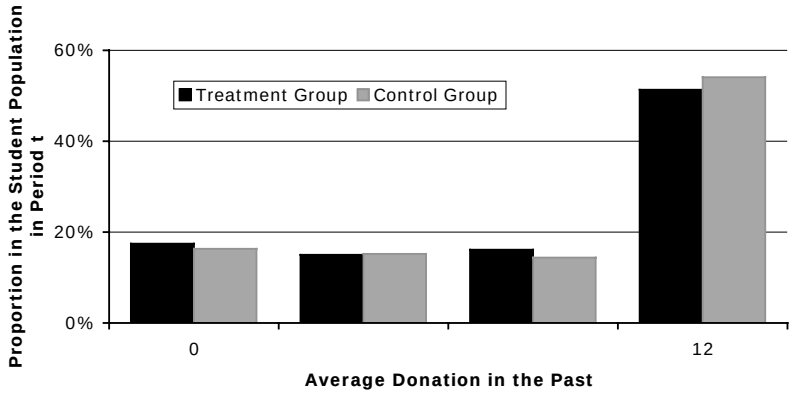


Table App. 1: Time Effects for Different Types

Dependent variable: Average Donation (CHF)

	Contributions in the Past (x)		
Variable	x=0	0<x<1	x=12
Treatment(t)*	-0.389	0.587	0.079
	(0.362)	(0.458)	(0.158)
Treatment(t+1)*	0.063	-0.415	-0.424**
	(0.385)	(0.477)	(0.168)
Treatment(t+2)*	-0.351	-0.091	-0.137
	(0.414)	(0.498)	(0.176)
Treatment(t+3)*	0.324	-0.205	-0.212
	(0.436)	(0.532)	(0.184)
Individual fixed effects	incl.	incl.	incl.
Semester dummies	incl.	incl.	incl.
# of observations	11,129	20,767	37,611
# of individuals	1,859	3,379	6,132
# of periods	7	7	7
Prob>F	0.000	0.000	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