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Some Theoretical Considerations, a Field, and a Lab Experiment

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Matching donations without crowding out?
Some theoretical considerations, a field, and a lab experiment*

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Abstract

Is there a way of matching donations that avoids crowding out? We introduce a novel matching method where *the matched amount is allocated to a different project*, present some simple theoretical considerations that predict reduced crowding out or crowding in (depending on the degree of substitutability between the two projects) and present evidence from a large-scale natural field experiment and a laboratory experiment. Similar to findings in the literature, conventional matching for the same project results in partial crowding out in the field experiment and, as predicted, crowding out is reduced under the novel matching scheme. The lab experiment provides more fine-tuned evidence for the change in crowding and yields further support for the theory: the novel matching method works best when the two projects are complements rather than substitutes.

JEL classifications: C93, D64, D12

Keywords: Charitable giving, Matched fundraising, Natural field experiment

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1 Introduction

Matched fundraising, in which a large donor tops up individual donations according to some scheme, is popular among charitable organizations. Recent studies based on lab or field experiments (see, for example, Eckel and Grossman 2003, Karlan and List 2007, or Huck and Rasul 2011) demonstrate, however, that matched fundraising has a downside: it generates substantial crowding out and appears inferior to solicitation schemes that simply announce a lead gift (Huck, Rasul, and Shephard 2015). One reason why fundraisers might be forced to use matched fundraising nevertheless is competition. Holding everything else constant, donors will always prefer to give money to fundraising drives that offer more matching rather than less (simply notice that with matching a donor's budget set rotates outward.) Hence, the question arises, whether it is possible to design an alternative matching scheme that is attractive to donors and avoids crowding out or perhaps even generates some crowding in. In this paper, we present some simple theoretical considerations that suggest that a matching scheme in which the matched money is allocated to a different project should outperform standard matching for the same project. The model also suggests that the effect of matching improves when the two projects become less substitutable. We test these predictions in the field and in the lab.

In the field experiment, we confirm crowding out for standard linear matching: the average donation given is lower under standard matching than in a pure lead donor treatment that serves as a control. We refer to a "lead donor" environment whenever money offered by a lead donor before a fundraising drive starts is given unconditionally and simply announced, that is, when it is not used for matching. Regarding our main hypothesis, we find evidence for reduced crowding out when the matched amount is allocated to an alternative project. The overall performance of both matching schemes is, however, not significantly different. The reason for these weak differences is probably that the two projects are quite similar such that the advantage of reduced substitutability does not fully kick in.

In order to provide a more fine-tuned test for our theoretical predictions we conduct a laboratory experiment. In the lab we compare standard matching with two versions of the proposed alternative matching: in one version the partner project receiving the matching money is a complement, while in the other version it is a substitute to the base project. We find that, relative to standard matching, donations increase significantly when the partner

project is a complement to the base project. When the partner project is a substitute, the increase is smaller and the difference to standard matching is non-significant.

These results suggest that charitable organizations might substantially improve their fundraising success through such alternative forms of matching provided they can find a suitable partner project that is not perceived as a close substitute or, ideally, is perceived as a complement.

2 Literature

There has been a multitude of studies employing laboratory and field experiments analyzing matched fundraising. For example, Karlan and List (2007) conclude from a direct mail solicitation to prior donors that the introduction of a simple (1:1) matching scheme significantly increases the probability of giving but reduces the average donation given. The overall return is significantly higher with matching than without. Further increases in the matching rate (2:1 or 3:1) have little, if any, effect. Controlling for the informational role of the presence of a lead donor, Huck and Rasul (2011) show that crowding out is already quite severe with low matching rates (0.5:1). In Eckel and Grossman (2008), the matching schemes (0.25:1 and 0.33:1) generate average donations similar to those without matching but surprisingly reduce response rates for repeat donors. Meier (2007) finds that matching increases participation in the short term but shows that in the long term, when matching ceases to be in place, contribution rates decline such that the overall long-run effect of one round of matching is negative.

It has also been shown that larger lead gifts increase the success of fundraising campaigns (List and Lucking-Reiley 2002). However, only few studies hold lead gifts constant and compare several fundraising schemes in order to understand how the initial contribution can be best used to stipulate subsequent "small money" donations. Huck and Rasul (2011) compare standard matching to a pure lead gift environment which allows them to come up with precise estimates of the crowding out effect. Huck, Rasul, and Shephard (2015) estimate a structural model based on experimental data and show that, in the environment they study, linear matching will never outperform a simple lead donor treatment in which the lead donor offers his money unconditionally and recipients of the fundraising drive are informed about

this lead donation. In Gneezy *et al.* (2014) a lead donor treatment outperforms standard linear matching in every dimension (response rate and average positive donation). Also, they find that a lead donor treatment in which the lead gift is said to cover overhead costs results in even higher total contributions. Rondeau and List (2008) compare, among others, a lead donor (challenge gift) campaign and a (1:1) matching campaign, but they use a different context—a threshold public good setup with a refund in case the threshold is not met. They conclude that announcing a lead donor increases average donations and the probability of giving. In their experiment, matching does not increase the success of the fundraising drive and they conclude that it is inferior to a challenge gift.

3 Some theoretical considerations

Consider a model with three goods: a composite good that captures private consumption y and two charitable goods, a and b, where we assume that donors care about their individual contributions.[1] We restrict our attention to situations where the donor makes only one decision about an out-of-pocket amount, x, that he wants to contribute from his income, I, to a fundraising drive. How x is mapped into a and b depends on the fundraising strategy of the charitable organization.

We assume that donors have a quasi-linear utility function

$$U(y,a,b) = y + u(a,b)$$

where $y = I - x$ is private consumption, and a and b denote the amounts of money generated for the two projects. We assume $u'_a, u'_b > 0$ and $u''_{aa}, u''_{bb} < 0$. Notice that the cross derivative u''_{ab} is negative for substitutes and positive for complements. For perfect substitutes we would have $u''_{aa} = u''_{bb} = u''_{ab}$.

[1] See Huck, Rasul and Shephard 2015 for a similar approach.

Now consider a fundraising drive where donors make a single decision about x and where matching schemes, $a(x)$ and $b(x)$, are in place that map the donation x into effective contributions to the two charitable goods. Then we can write the donor's utility function as

$$U(x) = I - x + u(a(x), b(x)).$$

For linear matching schemes, which we employ in the experiments, we have $a(x) = \lambda x$ and $b(x) = \theta x$. The donor's optimal choice is given by the first-order condition

$$-1 + \lambda u'_a + \theta u'_b = 0.$$

We are interested in crowding effects, that is, in how the match rates, λ and θ, affect the donation x. We can easily derive these crowding effects through the implicit function theorem which yields

$$\frac{dx}{d\lambda} = -\frac{u'_a + au''_{aa} + bu''_{ab}}{\lambda^2 u''_{aa} + 2\theta\lambda u''_{ab} + \theta^2 u''_{bb}}$$

and

$$\frac{dx}{d\theta} = -\frac{u'_b + bu''_{bb} + au''_{ab}}{\lambda^2 u''_{aa} + 2\theta\lambda u''_{ab} + \theta^2 u''_{bb}}.$$

Inspecting the numerators of these derivatives highlights the role of the curvature of the donor's utility function for crowding, while inspecting the denominator underlines the role of substitutability between the two charitable goods.

Let's say that the donor is asked to contribute to good *a*. Then for matching in the same good (and no matching in the other, that is, for $\theta = 0$) we get

$$\frac{dx}{d\lambda} = -\frac{u'_a + au''_{aa}}{\lambda^2 u''_{aa}}$$

and we have crowding out, $\frac{dx}{d\lambda} < 0$ (as has been documented by the previous literature), if and only if $-\frac{au''_{aa}}{u'_a} > 1$.

For matching in the other good, b, we have to consider $\frac{dx}{d\theta}$. Assuming that the two goods are either (weak) substitutes or, in case of complementarity, that u''_{ab} is not too large we get a simple condition for the absence of crowding out or some crowding in:

$$\frac{dx}{d\theta} \geq 0 \Leftrightarrow -\frac{bu''_{bb}}{u'_b} - \frac{au''_{ab}}{u'_b} \leq 1. \tag{1}$$

Inspecting (1) reveals the key insight that we take away from this model sketch: the condition is easier to fulfill *the weaker the substitutability* between the two charitable goods is, hence, the alternative matching scheme will be more effective than standard matching provided the match is allocated to a second project that is not a perfect substitute for the first. Moreover, the effectiveness of the alternative scheme should increase when the degree of substitutability falls.

The considerations presented in this section lead to following testable implications:

1: *An alternative matching scheme where the match is allocated to a different project results in less crowding out (or more crowding in) if the two projects are not near substitutes.*

2: *The alternative matching performs better when the two projects are complements rather than substitutes.*

4 A natural field experiment

In order to test the predictions of the model we conducted a field experiment in charitable giving implementing two lead donor treatments, a standard (1:1) matching treatment, and an alternative matching treatment with the same matching rate. In terms of our model this means we examine

T1: $\lambda = 1$, $\theta = 0$ (donations are allocated to the first project)

T2: $\lambda = 0$, $\theta = 1$ (donations are allocated to the second project)

T3: $\lambda = 2$, $\theta = 0$ (donations are allocated to the first project and are doubled)

T4: $\lambda = 1$, $\theta = 1$ (donations are allocated to the first project and the matched money is allocated to the second project)

In order to avoid the possibility of spillovers from previous fundraising campaigns, we decided to conduct our experiment with an institution that had previously not engaged in any ("small money") fundraising activities. This led to the choice of the municipal opera house of Frankfurt/Main. In April 2014, the opera house sent out 25,000 solicitation letters to opera visitors, asking them to support one or two social youth projects organized by the opera house. Both projects are part of the "JETZT! OPER FÜR DICH" ["NOW! OPERA FOR YOU"] program, which enhances cultural education and social integration. The first project ("Aramsamsam") benefits small children aged 2–4 and gives children their first contact with classical music regardless of their social background. The second project ("Opera Bus") runs an opera bus that visits schools, pediatric wards in hospitals, and social enterprises for the disabled. Those two projects are likely to be perceived as substitutes given that they both benefit children (although of different age and characteristics) in a similar way. But there are also marked differences between the projects thus we do not expect them to be perceived as perfect substitutes. Consequently, condition (1) has a chance to hold.

The recipients were randomly selected from the opera's database of individuals who had visited at least one opera performance since 2010. Recipients were randomly assigned to one of four treatment groups such that there were over 6,000 subjects per treatment. In the first base treatment (T1), the letter asks for donations for the first project (Aramsamsam) and informs the reader that an anonymous sponsor has already been attracted who will support the "JETZT!" campaign (of which Aramsamsam is part) by donating €30,000. In the second base treatment (T2), the letter asks for donations for the second project (Opera Bus) and, similarly

to T1, announces a lead donor who will support the "JETZT!" campaign by donating €30,000. Those two base treatments allow us to compare the basic desirability of the two projects. In the traditional matching treatment (T3) the letter asks for donations for the main project (Aramsamsam) and announces an anonymous donor who will match the donations 1:1 up to an amount of €30,000. In the new matching scheme (T4) the letter asks for donations for the main project (Aramsamsam) and announces an anonymous donor who will give the same amount to support another project (Opera Bus) up to an amount of €30,000.

The mail-out letters were identical in all treatments with the exception of two paragraphs. The exact format and wording of the mail-out is provided in the Appendix A.

We would like to point a few facts. First, the projects we are considering are of an essentially linearly expandable nature such that all donations will matter on the margin. With more money, the opera house will be able to organize more sessions with small children and more visits of the Opera Bus. There are no explicit or implicit targets in the mailing. Second, recipients are told the truth. The lead gift was actually provided and each matching scheme was implemented. The value of matches across all treatments was capped at €30,000, which ensured that subjects were told the truth even if the campaign was more successful than anticipated. Crucially, this holds the commitment of the lead donor and, hence, the signal of quality, constant across treatments. Note, that holding the large donation constant among treatments also reflects the situation in which a charitable organization has already identified a big donor and now has to decide how to utilize the lead gift for subsequent "small money" fundraising.

In the Appendix B, Table B1, we analyze the random assignment of recipients into treatments. A number of recipient characteristics are available in the opera house's database, which records information on individuals that visited an opera house performance in the recent past. Due to randomization, recipients are, in most cases, not significantly different to each other across the treatments, which is confirmed by t-tests of equality of means for the available demographic variables (female dummy, couple dummy, academic title dummy for a PhD or professorship, subscriber dummy and Frankfurt resident dummy), and activity variables (days since last order in the database, number of orders in the database). For the large number of variables and treatments and, hence, number of t-tests, the number of tests with p-values at and below 0.05 is in the expected range and does not contradict random assignment (2, 3, and

3 at 1%, 5%, and 10% respectively out of 54 tests). However, given that we do detect some significant differences between the treatment groups, we will control for this lack of balance when analyzing the data on donations.

Results

The fundraising campaign generated a total of €46,159 in donations from 447 individuals,[2] thus yielding an overall response rate of 1.8%. Most donations arrived within the first and second month after the mail-out (344 and 79 respectively), but some donations trickled in during the subsequent months. Table 1 provides descriptive statistics on donations by treatment. The average response rate varies between 1.5% and 2.1% and the average positive donation ranges between €88 and €121 depending on the treatment. The return per mailing varies between €1.68 and €2.30. The distribution of donations is skewed with a median at €50 and donations as high as €1000 present in every treatment. In T3 there were two very high donations: In one case, a donor gave €2014[3] and in another case, one donor donated €1000 twice, which we count as one €2000 donation.[4]

Table 1: Descriptives (field experiment)

Mean, standard error in parentheses

Treatment	Treatment description	Number of recipients	Number of donations	Response rate	Average positive donation	Median	Minimum	Maximum	Return
Column				I	II				III
T1	Lead donor (Aramsamsam)	6,143	93	0.0151	121.29	50	5	1000	1.836
				(.0016)	(18.09)				(.3316)
T2	Lead donor (Opera Bus)	6,143	106	0.0173	97.36	50	10	1000	1.680
				(.0017)	(11.50)				(.2554)
T3	Standard matching (Aramsamsam + Aramsamsam)	6,143	129	0.0210	109.37	50	5	2014	2.297
				(.0018)	(22.56)				(.5126)
T4	Alternative matching (Aramsamsam + Opera Bus)	6,144	119	0.0194	87.81	50	10	1000	1.701
				(.0018)	(10.79)				(.2591)

Notes: Response rate is not significantly different between treatments with the exception for the difference between T1 and T3 (Fisher's exact test: p=0.02) and between T1 and T4 (Fisher's exact test: p=0.08). Average positive donation is not significantly different between treatments with the exception for the difference between T2 and T3 (MWU-Test: p=0.07). Return is not significantly different between treatments with the exception for the difference between T1 and T3 (MWU-Test: p=0.02) and between T1 and T4 (MWU-Test: p=0.07).

[2] Three donors donated twice.
[3] The donor explained this particular amount with the year of donation—2014.
[4] There were two other donors who donated twice; one donated €250 and €500 in T3 (counted as €750) and one donated €150 twice in T4 (counted as €300).

Table 2: Regression results (field experiment)

Specification	Response	Value of donations (nonzero)		Return	
Dependent variable	Donation dummy	log(donation)| donation >0	log(donation)| donation >0	log(max (donation,1))	log(max (donation,10))
Method	probit (m.e.)	OLS	QRE (m.e. at median)	tobit (m.e. y*)	tobit (m.e. y*)
Column	I	II	III	IV	V
T2: Lead donor (Opera Bus)	0.003	-0.002	-0.021	0.012	0.018
	(0.002)	(0.126)	(0.131)	(0.010)	(0.014)
T3: Standard matching (Aramsamsam + Aramsamsam)	0.006**	-0.237**	-0.282**	0.024**	0.029**
	(0.002)	(0.120)	(0.125)	(0.010)	(0.014)
T4: Alternative matching (Aramsamsam + Opera Bus)	0.004*	-0.104	-0.086	0.018*	0.023*
	(0.002)	(0.122)	(0.127)	(0.010)	(0.014)
Controls	yes	yes	yes	yes	yes
Observations	24573	447	447	24573	24573
R^2		0.145			
Pseudo R^2	0.062		0.051	0.043	0.050
Wald-test p-value					
T3=T4	0.550	0.238	0.095	0.571	0.649
T3>=T4	0.725	0.119	0.048	0.715	0.676

Notes: Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Controls include: number of orders, average value of order, time since last activity, and dummies for subscription holder, female, couple, PhD or professor, Frankfurt resident. In tobit regression the lower limit is set to zero. The full estimation results are presented in the Appendix B, Table B2.

Given that we have detected some imbalances between our treatment groups, it is important to condition on individual characteristics when analyzing the results. In Table 2, we present a number of regression results that control for donor characteristics. We also take care of the skewness of the distribution by taking logs when applicable[5] and of outliers by presenting the results from quantile regressions. The base treatment is T1. In the first column, we analyze the responses by running a probit specification and present marginal effects. In the second and third, we look only at positive donations. The second column presents results from a simple OLS regression and the third column shows marginal effects from a quantile regression at the median being more robust to outliers than OLS. The dependent variable is the logarithm of

[5] The results from quantile regression with levels of positive donations instead of logs lead to the same conclusions.

(positive) donations in both specifications. The last two columns look at the return from the mail-out and show marginal effects after a tobit regression (Column IV and V) which is better suited for the underlying distribution with many zeros than OLS. The dependent variable is given by the logged amount of the maximum of the value of donation or one in Column IV and respectively ten in Column V.[6]

The first important result is that we do observe *crowding out with the standard matching scheme*. The coefficient on the standard matching treatment (T3) is negative and significant in, both, an OLS regression (Table 2, Column II) and a quantile regression (Table 2, Column III) for the subsample of positive donations. This confirms a significant negative effect of matching on the value of donations given relative to the lead donor treatment (T1). Notice that our theoretical predictions about crowding hold for an interior solution, hence, the focus on positive donations.

The second important result is that we observe *reduced crowding out with the alternative matching scheme*. This can be seen by inspecting the coefficient on the alternative matching (T4) in Table 2, Column II and III and comparing it to standard matching (T3). We find that *T4 does not* significantly reduce the average donation suggesting there is no crowding out. Figure 2 shows that for the quantile regression the coefficient on T4 is virtually zero at every percentile (i.e. not only at the median). Moreover, the coefficient on T4 is small compared to that of T3 (in absolute terms). While the simple matching scheme (T3) significantly reduces the average donation given by as much as 23–28%, a Wald test following the quantile regression rejects the null of T3 being larger than T4 at $p < 5\%$, confirming that there is *less crowding out in T4 than in T3*. Given that the second project on its own is not considered better than the first (recall that T1 is the base treatment and that all coefficients on T2 are small and not significant), this suggests that matching with another good can indeed improve the effectiveness of matching.

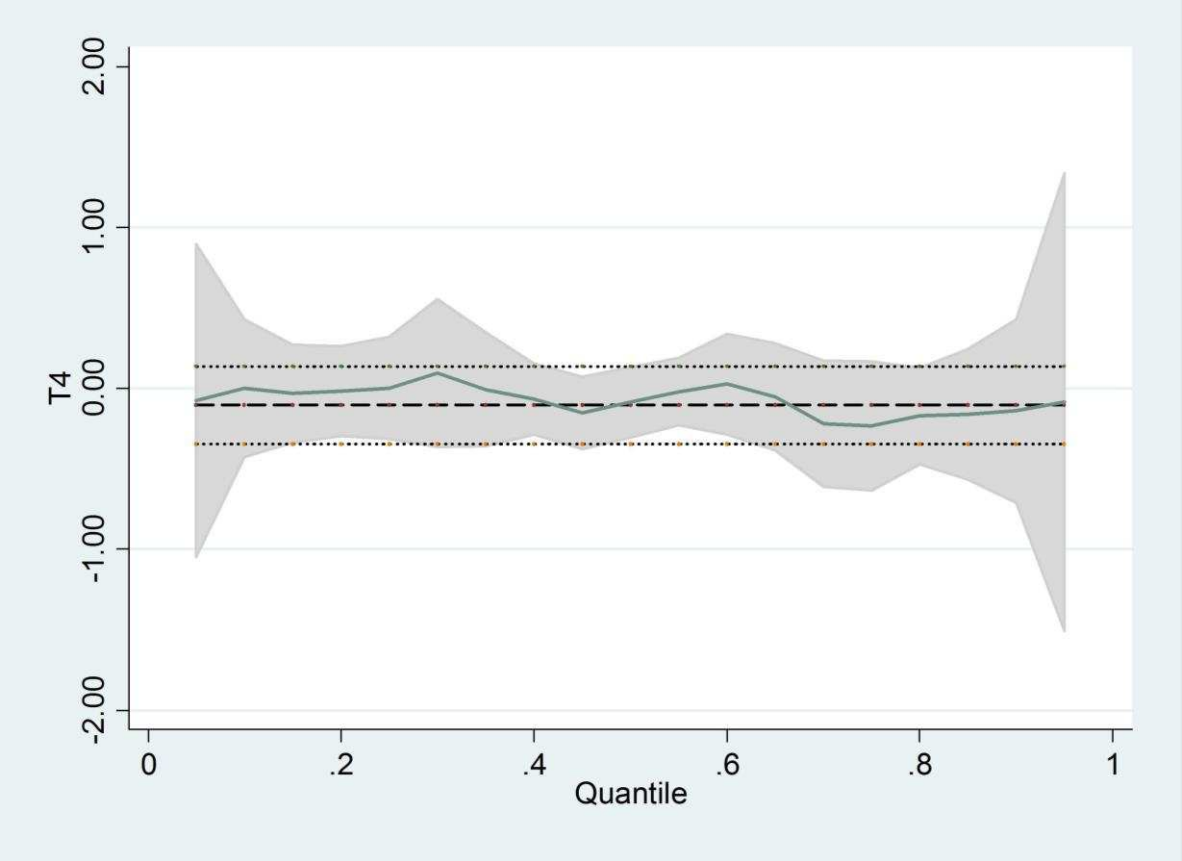
Beyond that, we find that both matching treatments significantly increase the response rate (probit regression: Table 2, Column I) when compared to the lead donor treatment.[7] In the case of standard matching (T3), the combined effect of more responses with lower amounts

[6] The usual approach in the literature is to use as dependent variable log of donation plus one (or a higher number). The relevant coefficients for a tobit specification using this transformation are analogous to those presented in column IV and therefore not included here. The results for such an OLS specification are presented in Appendix B, Table B2.

[7] Rare events logit (King and Zeng 2001) suggests slightly lower coefficients of T2, T3, and T4 being 0.002, 0.005, and 0.003 respectively (with the same significance level).

yields an increase in the overall return of around 2.4–2.9% (Table 2, Column IV and V). From that, we conclude that, in our environment, matching works better than the pure lead donor treatment.[8] This result differs from the findings of the earlier literature. For the alternative matching scheme, the overall performance is also better than in the lead donor treatment. However, there is no significant difference in overall performance between the two matching treatments (Wald test p=0.571 and p=0.649 for the two tobit specifications in Column IV and V respectively).

Figure 2: T4 coefficient: Quantile regression estimates



Note: solid line – coefficient on T4 from quartile regression for all percentiles of logged positive donations, grey area – 95% confidence interval, dashed line – OLS coefficient on T4, dotted line – 95% confidence interval.

[8] This result is due to the large number of additional small donations in the matching treatments, and not, as one could think, the two large outliers in T3. Repeating the regressions in Column IV and V with donations capped at 95th percentile, i.e. €300, lead to very similar results (not presented here).

5 Laboratory experiment

As our field experiment only covered some aspects of the theoretical model and yielded only weak support for the theoretical superiority of the alternative matching scheme (after all, the overall performance remained unchanged) we followed up our investigation in the laboratory. In the laboratory, we are also able to address the prediction that crowding varies with the degree of substitutability between base and partner project. Specifically, we examine matching with a substitutionary and a complementary project. The projects in the field experiment were likely to be perceived as substitutes and they may have been too close to each other to make a difference (both in terms of the statistical analysis and in terms of the predictions of the model).

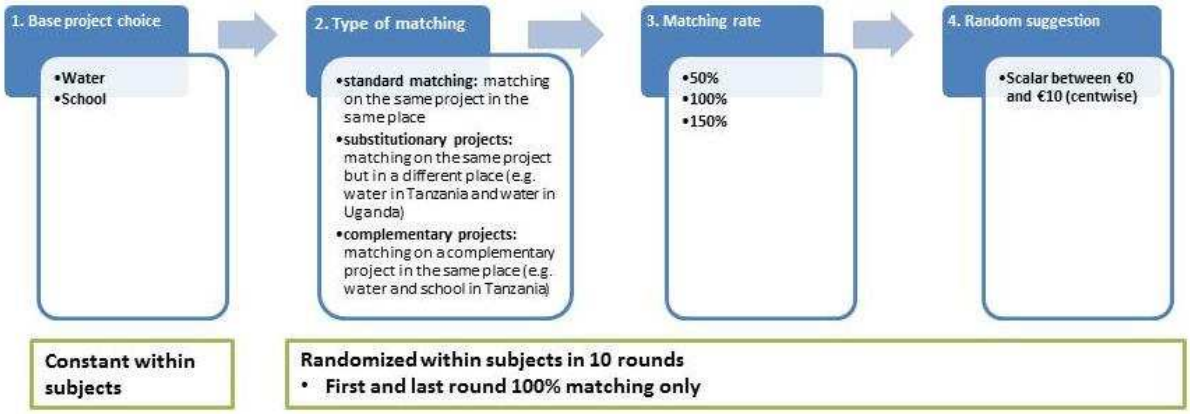
In the lab experiment, we concentrate on the comparison between standard matching and alternative matching leaving out lead donor treatments. Moreover, the design of the experiment allows for a better focus on the intensive margin that is more suited to test our model predictions which hold for an interior solution rendering the statistical analysis more intuitive. This helps us to investigate the question of crowding out and overall performance in much finer detail. The convenience of the laboratory also allows us to add two additional dimensions: the role of matching rates and suggestions. Finally, the lab experiment provides evidence for a different, non-opera context.

The recipient organization in our experiment was the local branch of Ingenieure ohne Grenzen (Engineers without Borders). Ingenieure ohne Grenzen implement a broad range of projects in developing countries. Working with local partner organizations they bring the expertise for, among others, water provision projects and participate in school construction projects. We chose two water provision projects and two school construction projects for our experiment. One water and one school project were being carried out in the village of Chonyonyo in Tanzania and the remaining two projects in the village of Gayaza in Uganda.[9] We argue that water and school projects *in the same village* are likely to be perceived as complements while water provision *in different villages* in Tanzania and in Uganda should be considered substitutes as should school construction *in different villages* and countries. We chose Tanzania and Uganda to be similar countries in terms of economic indicators and the importance of development aid.

[9] Note that in the following we skip the name of the village for brevity reasons but we always mean only the two localities.

We implement a within-subject design with a small between-subject element that is documented in Appendix B. Apart from the different types of matching we also implement different matching *rates* (50%, 100%, and 150%) as well as random suggestions (a slider placed at a random position between €0 and €10).[10] Some participants could make their basic donations towards a water project and others towards a school project and this was not changed throughout the experiment. Figure 3 summarizes the design.

Figure 3: Schematic representation of different treatments implemented and the randomization procedure.



Procedures

The experiment was conducted at the WZB-TU laboratory in late summer and early fall 2015. In 11 sessions we had 261 participants, a substantial number of them being students of engineering. The choice of the receiving organization was, thus, likely to be aligned with the interests of many participants. Indeed, 43% stated having known the organization before the experiment and it was held in high esteem receiving an average rating of 8.16 out of 10. Recruitment was conducted using ORSEE (Greiner 2015) and the experiment itself was programmed in z-Tree (Fischbacher 2007). The instructions were in German and were presented on the computer screen.

[10] A random suggestion is implemented partly due to technical reasons. Since we present a graphical design with a slider and three bars representing own budget, donation and additional matching, there is no natural point to start with (zero could be such a point but it is clearly inferior in our case).

After presenting a short explanation about the basic structure of the experiments, subjects received detailed information about the charitable organization, the type of projects, etc. Then they separately received the information about the projects relevant for the experiment (water and school both in Tanzania and Uganda). In all of the 10 rounds the participants had a budget of €10, which they could allocate between themselves and the organization. The division could be made at the cent level. The donations were matched at the rate of 50, 100, or 150% and the matching money went either to the same project or to a partner project (which was a substitute or a complement).

For the decision we used a graphical interface that also visualized the effect of the match. Participants could move a slider and bars showing the subject's account, the donation, and the matched amount changed according to the movement. At the beginning of each round the slider appeared at a random position—which can be interpreted as a non-binding suggestion.[11] There was no time limit. Only after all subject confirmed their choices the next round would start.

The first round implemented only one matching rate—100%. The following 8 rounds implemented the remaining 8 treatments (3x3-1) in random order. The last round repeated the first. Subjects could make donations only toward one project: either water or school in Tanzania, and this was not changed during the experiment. In the water in Tanzania base case the match went either to the water in Tanzania project (standard matching), or to the water in Uganda project (substitutes), or to the school in Tanzania project (complements). In the school in Tanzania base case the match went either to the school in Tanzania project (standard matching), or to the school in Uganda project (substitutes), or to the water in Tanzania project (complements).

We explained to the participants that one randomly chosen round was going to be payoff relevant in the end. We also explained to them that all donations including the matching money from the randomly chosen round was going to be forwarded to Ingenieure ohne Grenzen. Donations were announced to be put in an original sealed donation box before their eyes after the experiment.[12]

[11] For a literature about non-binding contribution suggestions, see e.g. Adena et al. (2014), Adena and Huck (2016a), Adena and Huck (2016b), or Altmann et al. (2016).

[12] This was to assure that the participants trusted that the donations were indeed forwarded to the IoG. IoG picked the sealed boxes after the sessions and received instructions specifying the amounts to be forwarded to different projects, and finally, confirmed the amounts received after counting the content of the donation boxes.

Before the end of the experiment, participants were asked to fill out a questionnaire covering sociodemographic characteristics and their perception of the charitable organization and the projects. Finally, the randomly chosen round determined the subject's payoff and the donation. In addition, participants received a show up fee of 5 Euros. The experiment took, on average, around 30–40 minutes.

Results

On average, participants chose a donation of €5.33 (sd €3.10). There was substantial variation in donation values with €10, €5, and €0 being the amounts chosen most often (see Figure B1 in the Appendix B). A substantial share of donations amounted to the maximum of €10 (17.2%) and 9.2% of individuals *always* donated the maximum. 7.2% of donations were €0 but only 1.9% of individuals always donated €0.

Table 3 presents descriptive results from the experiment—averages in different treatments obtained from an OLS regression without a constant after controlling for the amount suggested, a dummy base school, round, and excluding the constant. Therefore, average donations by matching rate and matching type are presented in each cell.[13] In order to ease the comparisons, we have ordered the relevant coefficients in a 3X3 Table. Looking from left to the right, we present the effect of increasing the matching rate and looking from top to bottom the effect of changing the matching type from standard matching over substitutes to complements. The average donation increases both from left to right as well as from top to bottom for every single comparison suggesting potentially both a positive effect of increasing a matching rate as well as for going from same project over substitutes to matching on complements.

[13] We do not distinguish between base treatment school or water. However, the coefficient on the dummy school base treatment is not significant in both specifications.

Table 3: Descriptive results from the experiment—averages in different treatments

Dependent variable: amount donated
Clustered robust errors in parenthesis

		Pooled OLS		
		Matching rate		
		50%	100%	150%
matching type	standard	5.280 (0.264)	5.594 (0.250)	6.055 (0.279)
	substitutes	5.486 (0.257)	5.745 (0.250)	6.075 (0.275)
	complements	5.514 (0.259)	5.992 (0.252)	6.163 (0.260)
	Base school	-0.422 (0.361)		
	Suggestion (+€1)	0.035 (0.020)		
	Round dummies	Yes		
	Individuals	261		
	R^2	0.752		

Notes: a constant is excluded.

Next, in regressions, we identify the effects of different matching schemes, matching rates and suggestions on the chosen donation value, and control for individual characteristics or fixed effects, as well as time effects. Our main focus is on the interaction between matching rate and the type of matching scheme.

The first two columns of Table 4 present the results from pooled OLS with robust clustered standard errors; the next two columns present the results from regressions with individual fixed effects; the final column shows the results from a tobit regression with the lower limit being zero, the upper limit being 10, including subject dummies.

Notice that we force all treatments to have the same intercept simply because the zero matching counterfactual is identical for all three types of matching schemes (standard, substitute, complement). Our key result is the positive coefficient for the interaction term of the matching rate and complements dummy. It shows that *matching improves significantly under the alternative scheme with a complementary project*. This additional effect amounts to around 20 cents. Notice that this is despite the fact that the standard matching scheme exhibits local crowding in in our experiment which works somewhat against our prediction as there is less room for improvement. The coefficient on the matching rate suggests that increasing it by one (e.g. from 0% to 100%) increases the average donation by 60 cents. Nevertheless, crowding in does get even stronger with a complementary project.

In contrast, we do not find any significant effects of replacing standard matching with an alternative scheme where the match goes to a partner project that is arguably a substitute for the base project. The coefficient on the interaction of matching rate and substitute dummy is small and not significant (however, positive).

We also find a significant effect of suggestions which is largely in line with the previous literature (see, Adena et al. 2014). Increasing the suggestion by one Euro increases the donation by 3–4 cents.

Table 4: Results from the regression analysis

Dependent variable: amount chosen as a gift to the charity in each round (donation)
Standard errors in parenthesis

	Pooled OLS		Fixed effects		Tobit
	(1)	(2)	(3)	(4)	(5)
Matching rate	0.572***	0.587***	0.589***	0.588***	0.800***
	(0.132)	(0.134)	(0.085)	(0.085)	(0.105)
Complements x	0.211***	0.176**	0.175***	0.175***	0.208**
Matching rate	(0.078)	(0.078)	(0.068)	(0.067)	(0.083)
Substitutes x	0.086	0.079	0.072	0.073	0.077
Matching rate	(0.067)	(0.066)	(0.068)	(0.067)	(0.083)
+ €1 suggestion	0.037*	0.036*	0.038***	0.037***	0.045***
	(0.020)	(0.020)	(0.011)	(0.011)	(0.013)
Base school	-0.422	-0.245			
	(0.360)	(0.338)			
Round dummies		yes		yes	yes
Individual characteristics*		yes			
Fixed effects				yes	
Subject dummies					yes
Constant	4.624***	5.327***	4.462***	4.943***	4.849***
	(0.264)	(0.506)	(0.098)	(0.131)	(0.557)
Individuals	261	255	261	261	261
R^2	0.013	0.129	0.040	0.058	
Pseudo R^2					0.337

Note: The matching rate takes the following values: 0.5, 1, and 1.5. Complements stands for the treatment in which either the base donation is for water and the matching money goes for school, or the other way round. Substitutes stand for the treatment in which the matching money goes to the same type of project (water or school) but in the other country. Individual characteristics have been surveyed at the end of the experiment and include following dummies: gender, enrolled in a master program, making ends meet without difficulties, making ends meet with great difficulties; and following demeaned continuous variables: self-assessment of math proficiency and age, IOG rating. In pooled OLS clustered robust errors are computed. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B3 in the Appendix B presents the results for the intensive and extensive margins separately. The table confirms the impression from the field that the alternative matching scheme works on the intensive margin only, reducing crowding out without additional increases in the response rate.[14]

6 Conclusions

We hypothesized that matching donations for one project with contributions to another project might be a promising alternative to traditional matching schemes. Earlier studies of matched fundraising have indicated that standard matching might be problematic as it causes partial crowding out and hinted at the superiority of fundraising campaigns where large lead gifts are simply announced as unconditional. However, competition might force charitable organizations to employ matching nevertheless. Ceteris paribus, donors will prefer to give to fundraising calls that offer more rather than less matching.

In a simple theoretical sketch we showed that, for rather general assumptions on donors' preferences, matching schemes that introduce a second charitable good towards which the matched amount is allocated can outperform standard matching. Taking our inspiration from these considerations, we conducted a field experiment to shed some light on this idea.

In a field experiment, we investigated four different fundraising schemes: two environments with lead donors for the two different charitable goods, standard (1:1) linear matching in the same good, and an alternative matching scheme in which the (1:1) matching amount is allocated to a second project. For standard linear matching we observed substantial crowding out which, however, was attenuated when the matched amount was allocated to a second project likely to be perceived as a (non-perfect) substitute to the first. Indeed our point estimates suggest that there was no crowding out under the novel matching scheme. As the two projects are not too dissimilar we conjectured that alternative designs with a second project that is a weaker substitute or a complement should improve outcomes even further.

In a lab experiment, we set out to analyze the last point in more detail. We compared standard matching with two alternative schemes: one where the matching amount was allocated to a partner project likely to be perceived as a complement and one where the match went to a

[14] The same holds for the suggestion while, in contrast, the matching rate affects donations on both margins.

partner project likely to be perceived as a substitute. The lab experiment provides clear evidence of the superior performance of the alternative matching scheme with a partner project that is a complement. The alternative matching scheme with a partner project that is a substitute shows only weak and non-significant improvements in performance.

Our findings suggest a new promising avenue for improving matching in the field but also show that caution is needed when choosing the partner project—ideally the projects should be complements (although all our results show that matching with a substitute is never worse than using the match for the same project). This suggests some similarity to and possibly an alternative explanation for the success of the fundraising strategy proposed by Gneezy et al. (2015). In their experiment individuals could donate to the main project such that every dollar directly increased the output while the overheads were covered by a lead donor. The complementarity of these two "projects" is at hand.

We view our study as a proof of concept. It demonstrates that charitable organizations might be able to improve the success of their fundraising schemes substantially by trying out more imaginative forms of matching. This would retain the advantages of matching in competitive environments while avoiding crowding out.

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Appendix A
Mail-out letter (original)
Spendenaufruf für das JETZT! OPER FÜR DICH

es ist ein großes Anliegen der Oper Frankfurt, Kinder und Jugendliche aus dem Rhein-Main-Gebiet mit altersgerechten Angeboten an die faszinierende Welt von Oper und Musik heranzuführen. JETZT! OPER FÜR DICH fördert kulturelle Bildung und soziale Integration.

Auch in der Spielzeit 14/15 steht die Oper Frankfurt vor der Herausforderung,

(T1, T3) *Aramsamsam,* einen wichtigen Pfeiler des JETZT! Programms für Kinder im Alter von 2-4 Jahren, durchzuführen. Die Realisierung des künstlerisch und pädagogisch anspruchsvollen Projekts

(T2) *Oper für Kinder unterwegs*, einen wichtigen Pfeiler des JETZT! Programms für Grundschüler, durchzuführen. Die Realisierung des künstlerisch und pädagogisch anspruchsvollen Projekts

(T4) *Aramsamsam* und *Oper für Kinder unterwegs,* wichtige Pfeiler des JETZT! Programms für Kinder von 2-4 Jahren bzw. für Grundschüler, durchzuführen. Die Realisierung der künstlerisch und pädagogisch anspruchsvollen Projekte

bedeutet für das Haus einen großen finanziellen Aufwand, für den leider kaum Mittel im Haushaltsetat vorgesehen sind.

Ein Förderer, der anonym bleiben möchte, konnte bereits gewonnen werden.

(T1, T2) Er unterstützt JETZT! OPER FÜR DICH mit insgesamt 30.000 €.

(T3) Er wird *Aramsamsam* unterstützen: Für jede Spende, die für *Aramsamsam* eingeht, spendet er den gleichen Betrag noch einmal für *Aramsamsam* - bis zu einem Maximum von 30.000 € insgesamt, das uns der Spender im Rahmen unserer Kampagne für JETZT! OPER FÜR DICH zur Verfügung stellt.

(T4) Er wird *Oper für Kinder unterwegs* unterstützen: Für jede Spende, die für *Aramsamsam* eingeht, spendet er den gleichen Betrag noch einmal für *Oper für Kinder unterwegs* - bis zu einem Maximum von 30.000 € insgesamt, das uns der Förderer im Rahmen unserer Kampagne für JETZT! OPER FÜR DICH zur Verfügung stellt.

(T1, T3) Helfen auch Sie! Mit Ihrem Engagement tragen Sie dazu bei, dass *Aramsamsam* weiterhin angeboten und ausgebaut werden kann.

(T2) Helfen auch Sie! Mit Ihrem Engagement tragen Sie dazu bei, dass *Oper für Kinder unterwegs* weiterhin angeboten und ausgebaut werden kann.

(T4) Helfen auch Sie! Mit Ihrem Engagement tragen Sie dazu bei, dass *Aramsamsam* und Oper für *Kinder unterwegs* weiterhin angeboten und ausgebaut werden können.

Weitere Informationen finden Sie in der beiliegenden Projektbeschreibung. Bei Fragen ist das Development-Team (Tel. XXXXXX) gerne für Sie da.

Als Dankeschön verlosen wir unter den Spendern einen Opernbesuch für 2 Personen sowie 20 Bücher „Ein Haus für das Theater“.

Herzlichen Dank für Ihre Unterstützung!

Mit freundlichen Grüßen

Mail-out letter (translation)
Call for donations for the JETZT! OPER FÜR DICH

It is a major concern of the Opera Frankfurt to introduce children and adolescents of the Rhine-Main Region to the fascinating world of opera and music by offering age-appropriate attractions. JETZT! OPER FÜR DICH [NOW! OPERA FOR YOU] enhances cultural education and social integration.

Also in the 14/15 season, the Opera Frankfurt faces the challenge of offering

(T1, T3) *Aramsamsam*, an important pillar of the JETZT! [NOW!] program for children aged 2–4. The realization of this artistically and pedagogically ambitious project

(T2) *Oper für Kinder unterwegs* [Opera on the go for children], an important pillar of the JETZT! [NOW!] program for elementary school students. The realization of this artistically and pedagogically ambitious project

(T4) *Aramsamsam* and *Oper für Kinder unterwegs* [Opera on the go for children], important pillars of the JETZT! [NOW!] program for children aged 2–4 and elementary school students. The realization of these artistically and pedagogically ambitious projects

implies a large financial outlay for the opera, which exceeds unfortunately the opera's budget.

We have already succeeded in attracting a sponsor for our program, who wishes to remain anonymous.

(T1, T2) He is supporting JETZT! OPER FÜR DICH with an amount of €30,000.

(T3) He is supporting *Aramsamsam:* For each donation for *Aramsamsam*, the sponsor will donate the same amount to *Aramsamsam*, up to a maximum of €30,000—the total amount he will provide for our campaign JETZT! OPER FÜR DICH.

(T4) He is supporting *Oper für Kinder unterwegs:* For each donation for *Aramsamsam*, the sponsor will donate the same amount to *Oper für Kinder unterwegs*, up to a maximum of €30,000—the total amount he will provide for our campaign JETZT! OPER FÜR DICH.

(T1, T3) Please help us too! Your commitment will contribute to ensuring that *Aramsamsam* continues to be offered and improved.

(T2) Please help us too! Your commitment will contribute to ensuring that *Oper für Kinder unterwegs* continues to be offered and improved.

(T4) Please help us too! Your commitment will contribute to ensuring that *Aramamsam* and *Oper für Kinder unterwegs* continues to be offered and improved.

Further information can be found in the enclosed material. If you have any questions, our development team would be delighted to help you [No. XXXXX].

As a thank you, we will raffle a pair of opera tickets and twenty books "Ein Haus für das Theater" ["A house for the theatre"] among all our donors.

With many thanks for your support and best wishes,

Enclosed material (Original and Translation)

(T1, T3, T4) **ARAMSAMSAM – die Mitmachkonzerte der Oper Frankfurt für die Kleinsten!**
Mit Aramsamsam hat die Oper Frankfurt ein neues Projekt initiiert, das schon den Jüngsten unabhängig ihrer sozialen Herkunft den Zugang zu Kultur ermöglicht. Die Zielgruppe der Kleinkinder zwischen zwei und vier Jahren kommt zusammen mit vertrauten Personen, z.B. ihren Eltern oder ihrer Kita-Gruppe, am Vormittag in das Holzfoyer der Oper. In den Aramsamsam-Konzerten wird für und mit Kindern gesungen und musiziert. Hier findet ein erster Kontakt zu Liedern und Melodien statt; die Kinder werden spielerisch in die Welt der Musik eingeführt. Die Konzerte haben jeweils einen Themenschwerpunkt, der eine Verbindung zum täglichen Leben der Jüngsten darstellt. In dieser Spielzeit können die Kinder die Themen SONNE, MOND UND STERNE sowie LUFTSPRÜNGE musikalisch erleben und kennenlernen.

(T1, T3, T4) **ARAMSAMSAM – the join-in concerts of the Opera Frankfurt for the little ones!**
Aramsamsam is a new project initiated by the Opera Frankfurt, which enables even the youngest children, regardless of social background, to access culture. The target audience of toddlers aged 2–4 arrives in the morning at the opera's Holzfoyer accompanied by familiar faces, e.g. their parents or their kindergarten group. During the *Aramsamsam* concerts, the actors sing and play instruments for and with the children. This is where the children get in touch with songs and melodies for the first time; thus they become playfully introduced to the world of music. Each concert contains a key subject, which expresses a connection to the children's daily lives. During the current season the children may musically experience the subjects SONNE, MOND UND STERNE [Sun, moon and stars] and LUFTSPRÜNGE [leaping in the air].

(T2, T4) **OPER FÜR KINDER UNTERWEGS – die mobile Produktion der Oper Frankfurt!**

Die Oper Frankfurt versorgt mit einem mobilen Angebot zahlreiche Institutionen des gesamten Rhein-Main-Gebietes: Unser Opernbus tourt jährlich mit einer Oper für Kinder durch Schulen und andere soziale Einrichtungen, wie z.B. die Praunheimer Werkstätten und die Uniklinik Frankfurt. Das Projekt ermöglicht Schülern aller sozialer Schichten, Menschen mit Behinderung und Patienten einen spielerischen (Erst -) Kontakt zu Welt der Oper. Die Bearbeitungen großer Opernwerke sind für alle leicht verständlich. Mit im Gepäck ist natürlich auch das Opernensemble: direkt vor Ort erleben die Zuhörer die Künstler, die sich ihrerseits schon auf ein Wiedersehen mit den kleinen und großen Experten im Opernhaus freuen.

(T2, T4) **OPERA ON THE GO FOR CHILDREN – the mobile production unit of the Opera Frankfurt!**

The Opera Frankfurt serves a numerous institutions throughout the Rhine-Main region with a mobile service: our opera bus and its opera for children annually tours schools and other social facilities like, for example, the Praunheimer Workshop and the University Hospital Frankfurt. This project allows students of all social classes, people with disabilities, and patients their (first) contact with the world of opera. The adaptations of large-scale operatic works are easily understandable for everyone. The opera ensemble comes as part of the package: the audiences directly experience the artists, who are already looking forward to seeing the younger and older experts in the opera again.

Appendix B

Table B1: Random assignment of recipients into treatments in the field experiment

Mean, standard error in parentheses

P-value on test of equality of means in box brackets

Treatment	Treatment description	Comparison group	Number of recipients	Female [Yes=1]	Couple [Yes=1]	PhD or Professor [Yes=1]	Subscriber [Yes=1]	Frankfurt resident [Yes=1]	Days since last order[15]	Number of orders	Average value of order	order value (sum)
T1	Lead donor (Aramsamsam)		6,143	.503	.019	.116	.289	.369	301	6.81	114.92	800.07
				(.006)	(.002)	(.004)	(.006)	(.006)	(2.205)	(.125)	(1.43)	(20.43)
T2	Lead donor (Opera Bus)		6,143	.500	.019	.120	.287	.378	308	6.43	118.42	782.77
				(.006)	(.002)	(.004)	(.006)	(.006)	(2.204)	(.119)	(1.48)	(17.54)
T3	Standard matching (Aramsamsam + Aramsamsam)		6,143	.504	.022	.119	.293	.376	304	6.88	115.92	814.21
				(.006)	(.002)	(.004)	(.006)	(.006)	(2.228)	(.126)	(1.50)	(19.28)
T4	Alternative matching (Aramsamsam + Opera Bus)		6,144	.509	.019	.109	.295	.371	302	6.97	115.33	811.67
				(.006)	(.002)	(.004)	(.006)	(.006)	(2.226)	(.128)	(1.51)	(17.74)
		(1)=(2)		[0.732]	[0.947]	[0.433]	[0.735]	[0.314]	[0.024]	[0.027]	[0.088]	[0.521]
		(1)=(3)		[0.857]	[0.144]	[0.575]	[0.648]	[0.467]	[0.240]	[0.691]	[0.627]	[0.615]
		(1)=(4)		[0.477]	[0.843]	[0.240]	[0.491]	[0.843]	[0.567]	[0.367]	[0.843]	[0.668]
		(2)=(3)		[0.601]	[0.163]	[0.823]	[0.426]	[0.780]	[0.282]	[0.009]	[0.235]	[0.228]
		(2)=(4)		[0.291]	[0.896]	[0.050]	[0.304]	[0.419]	[0.093]	[0.002]	[0.144]	[0.247]
		(3)=(4)		[0.595]	[0.206]	[0.083]	[0.817]	[0.596]	[0.548]	[0.610]	[0.780]	[0.923]

Notes: The tests of equality in box brackets are based on a mean comparison t-test against a two sided alternative hypothesis.

[15] In the database of customers.

Table B2: Detailed regression results for the field experiment

Specification	Response	Value of donations (nonzero)		Return		
Dependent variable	Donation dummy	log(donation)| donation >0	log(donation)| donation >0	log(max(don ation,1))	log(max(don ation,10))	log(donation +1)
Method	probit (m.e.)	OLS	QRE (m.e. at median)	tobit (m.e. y*)	tobit (m.e. y*)	OLS
Column	I	II	III	IV	V	VI
T2: Lead donor (Opera Bus)	0.003	-0.002	-0.021	0.012	0.018	0.011
	(0.002)	(0.126)	(0.131)	(0.010)	(0.014)	(0.010)
T3: Standard matching (Aramsamsam + Aramsamsam)	0.006**	-0.237**	-0.282**	0.024**	0.029**	0.020**
	(0.002)	(0.120)	(0.125)	(0.010)	(0.014)	(0.010)
T4: Alternative matching (Aramsamsam + Opera Bus)	0.004*	-0.104	-0.086	0.018*	0.023*	0.014
	(0.002)	(0.122)	(0.127)	(0.010)	(0.014)	(0.010)
number of orders	0.001***	0.009***	0.007**	0.002***	0.003***	0.006***
	(0.000)	(0.003)	(0.003)	(0.000)	(0.000)	(0.000)
average value of order (in 100 Euros)	0.002***	0.217***	0.197***	0.009***	0.013***	0.016***
	(0.001)	(0.035)	(0.036)	(0.003)	(0.003)	(0.003)
subscription holder	0.005***	-0.062	-0.044	0.023***	0.029**	0.010
	(0.002)	(0.098)	(0.101)	(0.008)	(0.011)	(0.010)
time since last activity (in months)	-0.001***	-0.003	0.001	-0.005***	-0.007***	-0.002***
	(0.000)	(0.010)	(0.011)	(0.001)	(0.001)	(0.001)
female	-0.000	-0.200**	-0.108	-0.001	-0.004	-0.003
	(0.002)	(0.086)	(0.089)	(0.007)	(0.010)	(0.007)
couple	-0.001	0.288	0.443*	-0.003	-0.001	0.004
	(0.005)	(0.254)	(0.263)	(0.023)	(0.030)	(0.026)
PhD or professor	-0.004	0.090	0.084	-0.015	-0.021	-0.015
	(0.003)	(0.136)	(0.141)	(0.011)	(0.015)	(0.011)
Frankfurt resident	-0.001	0.026	0.085	-0.004	-0.006	-0.002
	(0.002)	(0.087)	(0.090)	(0.007)	(0.010)	(0.008)
Observations	24573	447	447	24573	24573	24573

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure B1: The distribution of donations (all rounds) in the laboratory experiment

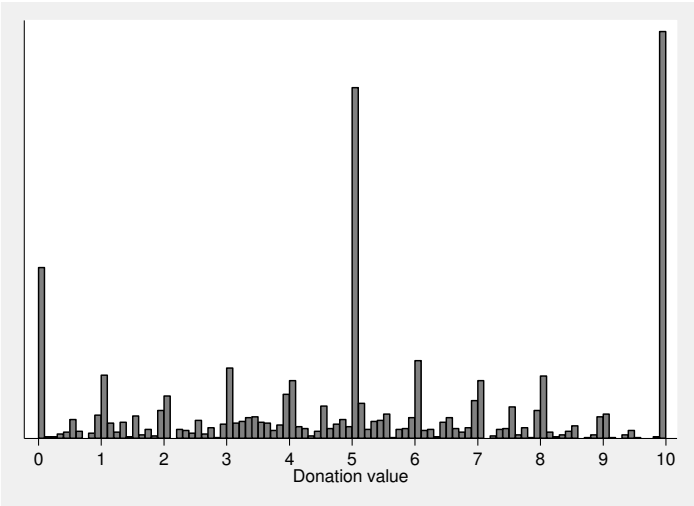


Table B3: Regression results for the intensive and extensive margin separately—laboratory experiment

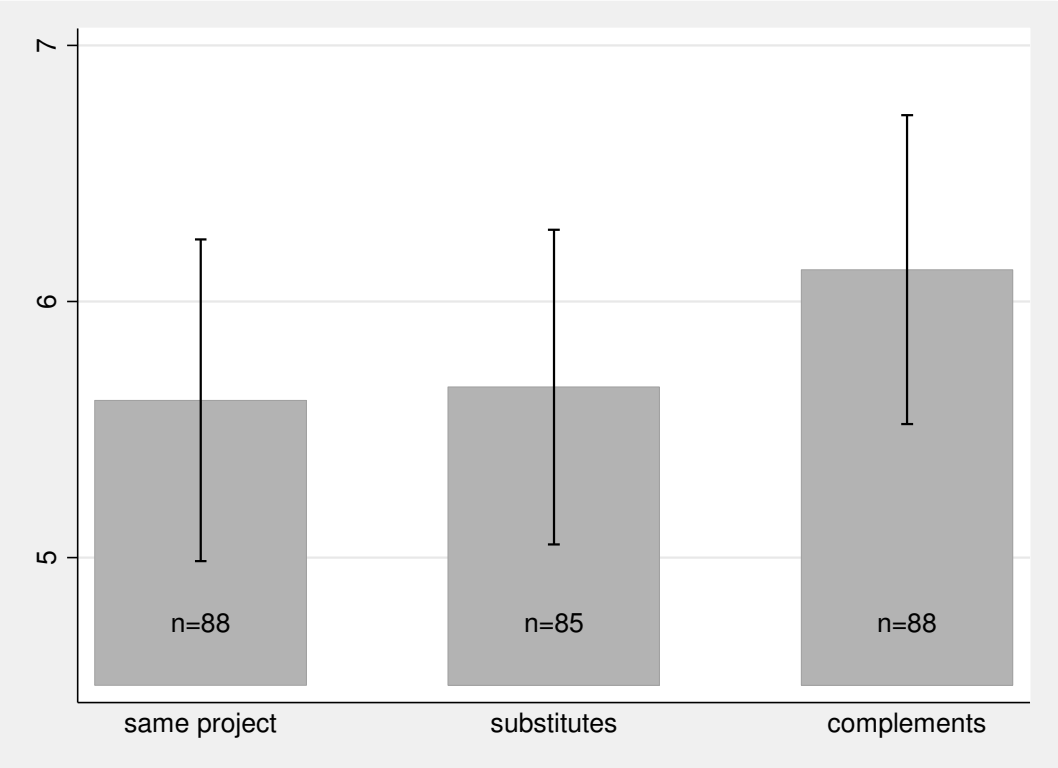
Dependent variable	Donation dummy		Donation>0			
	Probit		Pooled OLS		Fixed effects	
matching rate	0.421***	0.593***	0.265**	0.271**	0.293***	0.294***
	(0.113)	(0.136)	(0.110)	(0.108)	(0.077)	(0.077)
complement	0.071	0.041	0.182**	0.173**	0.182***	0.182***
	(0.060)	(0.082)	(0.070)	(0.071)	(0.060)	(0.060)
substitute	0.034	-0.007	0.068	0.089	0.084	0.085
	(0.060)	(0.080)	(0.069)	(0.067)	(0.060)	(0.060)
Base school	-0.500***	-0.550***	-0.017	0.065		
	(0.189)	(0.198)	(0.341)	(0.334)		
+ €1	0.008	-0.002	0.033*	0.036*	0.039***	0.039***
suggestion	(0.012)	(0.015)	(0.019)	(0.019)	(0.010)	(0.010)
Individual characteristics		yes		yes		
round dummies		yes		yes		yes
Constant	1.210***	1.285***	5.232***	6.265***	5.157***	5.499***
	(0.148)	(0.339)	(0.241)	(0.503)	(0.089)	(0.118)
Observations	2610	2550	2421	2374	2421	2421
R^2			0.004	0.093	0.025	0.039
Pseudo R^2	0.049	0. 293				

Laboratory experiment, between subjects results, first round

In the first round we implemented a reduced number of treatments, concentrating on a comparison between different matching types (standard matching complements or substitutes) keeping the matching rate constant at 100%. Figure B2 presents the results.

When looking at the first round only (our between-subject results), the treatments with matching on complementary projects resulted in higher average donations than standard matching but the difference of 51 cents (or 9%) is not significant. The matching on a substitutionary project results in only slightly higher donations and the difference is also not significant. The between-subject component of the experiment is simply underpowered because of the extremely flat distribution in individual donations (see Figure B1).

Figure B2: Donations in the first round by matching type



Note: 95% CIs. Both base projects and all different suggestions are lumped together.