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Working Paper

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CESifo Working Paper, No. 750

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Frey, Bruno S.; Meier, Stephan (2002) : Pro-Social Behavior, Reciprocity or Both?, CESifo Working Paper, No. 750, Center for Economic Studies and ifo Institute (CESifo), Munich

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PRO-SOCIAL BEHAVIOR, RECIPROCITY OR BOTH?

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CESIFO WORKING PAPER NO. 750
CATEGORY 10: EMPIRICAL AND THEORETICAL METHODS
JULY 2002

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PRO-SOCIAL BEHAVIOR, RECIPROCITY OR BOTH?

Abstract

Empirical evidence is provided for the importance of non-reciprocal pro-social behavior of individuals in an anonymous, n-person pure public good setting. A unique panel data set of 136,000 observations is matched with an extensive survey. Even under anonymous conditions, a large number of individuals are prepared to donate quite a significant sum of money. Cooperation conditional on giving by specific other persons (reciprocity) is present, but the causal relationship is ambiguous. The manner in which one is asked to donate is crucial. Identification with the organization is also important.

JEL Classification: H41, D64, Z13.

Keywords: public goods, pro-social behavior, reciprocity, donation.

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We are grateful for helpful comments from Matthias Benz, Iris Bohnet, Geoffrey Brennan, Armin Falk, Ernst Fehr, Robert Frank, Simon Gächter, Roger Gfrörer, Herbert Gintis, Reto Jegen, Armin Schmutzler, Vernon Smith, Gordon Tullock, and Frans van Winden.

I. Beyond Self-Interest

The assumption that the behavior of human beings is driven by self-interest has been a powerful approach when studying the economy. The self-interest hypothesis is quite good at predicting individuals' choices in most competitive markets. This also holds for most types of behavior outside of the traditional economic markets. "Economic imperialism" or, more generally, rational choice analysis building on the self-interest assumption, has had great success in many areas outside of economics, examples being politics, history, law, the arts and the family [e.g. Becker, 1976, 1996; Stigler, 1984; Frey, 1999 and Lazear, 2000].

But not all applications of the self-interest hypothesis meet the necessary conditions under which it works well; many markets are characterized by rigidities, incomplete contracts, or by a small number of traders. Warnings have been issued that the application of the calculus of self-interest may face decreasing marginal returns [e.g. Hirshleifer, 1985; Frey, 2001]. A recent book on giving and altruism, appearing under the auspices of the *International Economic Association*, even describes itself as an "obituary of Homo oeconomicus" [Kolm, 2000a, p. 32]. Studies of important activities, such as charitable giving [e.g. Andreoni, 1990, 1998 and Weisbrod, 1998], voting [e.g. Mueller, 1989, 1997], and tax paying [e.g. Slemrod, 1992 and Andreoni, Erard and Feinstein, 1998], have convincingly argued that such actions cannot be explained by relying on the strict self-interest axiom. Thus, for example, it has been stated that "[A] purely economic analysis of the evasion gamble implies that most individuals would evade if they are "rational", because it is unlikely that cheaters will be caught and penalised" [Alm, McClelland and Schulze, 1992, p. 22; similarly Graetz and Wilde, 1985, p. 358 and Skinner and Slemrod, 1985]. But most people actually pay their tax dues. Tax payment can therefore be considered a "quasi-voluntary act" [Levi, 1988]. The self-interest model has been clearly rejected in a great number of

laboratory experiments [see Ledyard, 1995 and Davis and Holt, 1993 for surveys]. Most importantly, experiments of the Ultimatum Game in 15 societies, exhibiting a wide variety of economic and cultural conditions, reveal that “the canonical model of the self-interested material pay-off maximizing actor is systematically violated” [Henrich et al., 2001, p. 77].

As a result of these findings, a large number of theories evolved trying to explain non-selfish behavior or other-regarding preferences [for a survey, see Fehr and Schmidt, 2000]. Basically two main approaches exist, which try to explain certain phenomena in human behavior¹: The first approach assumes that people have pro-social preferences. They not only care about their own utility but take the utility of others into account. Extended versions of such simple altruistic models are fairness theories, which incorporate inequality aversion by individuals [Bolton and Ockenfels, 2000 and Fehr and Schmidt, 1999]. The other approach focuses on reciprocal relationships. Reciprocity occurs when persons act in a more cooperative manner in response to the friendly behavior of others and act in a hostile way when treated in an unfriendly way by others. The reciprocity model has recently gained much attention. It has been claimed that “Practically all life in society includes and implies reciprocities, and reciprocity has been seen as the basic glue that makes people constitute groups or societies” [Kolm, 2000b, p. 115]. Recently, a large number of laboratory experiments have been devoted to the study of reciprocity in economics [see the surveys in e.g. Fehr and Gächter, 2000; Fehr and Schmidt, 2000; Falk, Fehr and Fischbacher, 2000; Gächter and Falk, 2001 and Falk and Fischbacher 2001]. It supplements evidence that has been provided for decades by anthropology [e.g. Mauss, 1924; Sahlins, 1970 and Godelier, 2000], by sociology and social psychology [e.g. Gouldner, 1960 and Adam, 1963,

¹ For economists, who assume people to be self-interested, this behavior is astonishing.

1965] as well as by economics itself [early contributions are Boulding, 1973; Kolm, 1973, 1984 and Collard, 1978]. To focus on reciprocity may, however, contribute to missing other important motives for pro-social behavior which are maybe an even more significant driving force for other-regarding behavior. This paper argues that there is very important *pro-social behavior that goes beyond reciprocity*. People are prepared to act in a non-selfish, altruistic and non-strategic way, but such behavior is contingent on environmental and institutional conditions.

For at least two decades, theories of pro-social behavior have been tested in laboratory experiments, where it could be demonstrated that human beings are not only driven by self-interest, but deviate substantially from the standard economic predictions. The experimental evidence may teach us a lot about human behavior. Yet, it remains an open question how best these results can be applied outside the lab. This paper wants to fill this gap by testing behavioral theories in a naturally occurring situation, thus bringing back external validity to the test of pro-social behavior. This paper provides empirical evidence for the importance of non-reciprocal pro-social behavior of individuals in an anonymous, n-person public good setting. We use a unique panel data set of 136,000 observations (roughly 33,000 persons) concerning the decisions of students at the University of Zurich on whether or not to contribute to two Social Funds administered by the University. These field observations are matched with an extensive survey of the same group of people to find out more about the conditions and motives for giving.

We are able to show that even under these anonymous conditions, a large number of individuals are prepared to donate a significant sum of money. This finding is not trivial; it contradicts, for instance, the statement that “Positive *and stable* contributions to the public good are very unlikely ... free riding will be pervasive under conditions of anonymous interactions” [Fischbacher, Gächter and Fehr, 2001, p. 403]. We will discuss how much our results depend on the nature of

the ‘game’ we look at in reality. This helps in understanding in which contexts ‘pro-social’ and ‘reciprocal’ behavior are significant and in which contexts other motivational factors are important. Evidence of reciprocity with respect to expectations is identified: when students expect others to contribute, they themselves tend to donate more. But the direction of causality is not at all clear, i.e. one's own willingness to donate may lead one to expect that others behave in the same way.² Moreover, due to anonymity, the individuals in our sample do not know what the others are doing and do not seem interested in knowing. While cooperation conditional on giving by specific other persons is present but ambiguous, the donations are contingent on the environmental and institutional conditions under which the donations take place. In particular, it is crucially important whether, and in what way, one is asked to donate. The behavior of the students seems to indicate that not only is the way the question is framed is vital but also that identification with the organization is an important institutional condition which influences their pro-social behavior.

Finally, our data suggests that individuals differ among themselves with respect to the extent of their pro-social preferences.³ Some of them self-select according to their own preferences for the different disciplines (faculties) taught at the university.

Section II discusses the concept of reciprocity in the context of giving behavior and compares it with pro-social behavior. On that basis, theoretical hypotheses are derived. The following section III presents the actual case studied and the data collected. The econometric analysis to test the hypotheses is undertaken in section IV. The last section V offers conclusions.

² For a discussion of the so-called ‘false consensus’ effect, see Ross et al. [1977] and Dawes et al. [1977].

³ The seminal paper by Kelley and Stahelski [1970] discusses two types of people who differ not only in their expectations about the behavior of others but also in their actual behavior.

II. Reciprocity and More General Pro-Social Behavior

The effect of reciprocity on giving for the voluntary funding of a (linear) pure public good (which is both non-rival and non-excludable) can be analyzed in the following way [e.g. Croson, 1996]:

Each potential contributor i in the group of n identical persons involved has an income Y_i , which she can either use to donate to a fund F or to consume private goods. If d_i is the contribution to the fund, the individual is privately able to consume $Y_i - d_i$. The individual's earning from the fund is a multiple⁴ m of the sum of donations from all the participants, $m \sum d_i$. A public good problem exists whenever $1/n < m < 1$. When $m < 1$, it is never optimal for a self-interested person to contribute to the public good because the contribution costs her one unit, but earns her only m .

When $1/n < m$, contributing to the public good is always optimal for the group as a whole, because donating one unit to the public good costs the individual one unit but earns $n \cdot m$ for the group.

For selfish individuals, there is a unique dominant strategy equilibrium in which all persons in the group *free ride* (i.e. contribute nothing), independent of what the others do. If, however, an individual's utility function depends on another individual's (or group of individuals') utility [Becker 1974], a higher contribution by the other members to the fund induces a *reduction* in the individual's own contribution [Sugden, 1982]. If an individual's utility moreover positively depends on the amount she contributes [Andreoni's 1989, 1990 "warm glow of giving"], her donation and the contributions by the others are imperfect substitutes. The reduction in the individual's contribution is smaller than in the case of Becker's pure altruism. In the context of the public goods model, Sugden [1984] formalizes reciprocity by assuming that an individual

⁴ The multiple m is the marginal return for each individual when he or she contributes one unit to the fund.

contributes the minimum of (i) the smallest donation of all other group members and (ii) the donation level she would most prefer other group members to make. It follows that there may be a positive correlation between the donation of a particular person and the contributions of other members. This result is consistent with reciprocity in a one-shot game context. A more general theory of reciprocity has been advanced by Rabin [1993]. Reciprocity is defined as the desire to be kind to those who are perceived to behave kindly towards you, and to punish those who are perceived to act in a hostile way towards you. This theory, which bases reciprocity on intentions⁵, again predicts that a person donates more if the others contribute too [see also Dufwenberg and Kirchsteiger, 1999 and Falk and Fischbacher, 2001].

Depending on the issue to be analyzed, there are many reciprocity concepts⁶. In the context of our study, the idea of *conditionality* in the reciprocity concept is crucial. Individuals are defined to be conditional cooperators when the positive correlation discussed above applies, i.e. when people contribute the more to a public good, the more others contribute⁷. In a recent standard public good experiment, for example, it was identified that, according to this definition, roughly 50 percent of the subjects are conditional cooperators, while a third of the subjects act as free riders [Fischbacher, Gächter and Fehr, 2001]. According to this study, the observation that cooperation declines after repetition in public goods games,⁸ is due to conditional cooperation: people adjust their contribution according to what others do, but give slightly less. This process leads to a

⁵ Because intentions are crucial, this reciprocity model differs from fairness models, where the behavioral responses are solely caused by inequity aversion [Bolton and Ockenfels, 2000 and Fehr and Schmidt, 1999].

⁶ For example, direct and indirect, strong and weak, chain and general reciprocity [see e.g. Bowles and Gintis, 2001; Kolm, 2000b].

⁷ See e.g. the experiments by Keser and van Winden [2000], Sonnemans, Schram and Offerman [1999], Croson [1998], and Falk and Fischbacher [2002].

⁸ See, for example, Andreoni [1988], Andreoni and Miller [1993], and for surveys, Davis and Holt [1993] and Ledyard [1995].

decline towards the Nash equilibrium. Only the introduction of a punishment mechanism to allow for reciprocity can sustain a high cooperation level [Fehr and Gächter, 2000].

This study argues that there are important cases in which this kind of conditional reciprocity cannot solely explain the substantial number of individuals willing to contribute to the public good. This non-reciprocal giving will be called “*pro-social behavior*”. While it is not conditional on the contribution of others (type I conditionality), it strongly depends on another kind of conditionality (type II conditionality), namely the environmental and institutional conditions under which the contributions take place. Several studies support type II conditionality in a specific sense: Being asked is an important factor in explaining why people contribute to a public good and offer to do voluntary work [Varese and Yaish, 2000; Opp, 2001, p. 3-5; Freeman, 1997 and Foster et al., 2001]. In addition to being asked, pro-social behavior also depends on the way one is asked. Although the decision remains the same, the institutional change has significant behavioral consequences. This context dependence has been labeled ‘institutional framing’ by Isaac et al. [1991]. This is consistent with findings in Ultimatum Game experiments that have been conducted in 15 cultures: “... the preferences over economic choices ... are shaped by the economic and social interactions of everyday life” [Henrichs et al., 2001, p. 77]. This indicates that outside the lab, conditionality of type II is crucially important.

Pro-social behavior varies considerably between individuals. While some persons act according to the economic assumption, and therefore free-ride in social dilemma situations, others reveal substantial pro-social preferences. While economic theory distances itself from the notion that people differ in their preferences, because one can explain all behavior assuming the ‘right’ preferences, experimental evidence show that there are dramatic differences in pro-social preferences. Andreoni and Versterlund [2001] show that about 44 % of their subjects are

completely selfish, while the others are driven by pro-social preferences. This result relates to other experimental findings [Charness and Rabin, 2000].⁹ Such differences have important economic consequences and have to be taken into account – but of course one should handle different ‘types’ of people with appropriate caution. According to such differences in pro-social preferences, individuals select specific groups. For students, the chosen subject of interest may reflect a dimension which correlates with the extent of pro-social preferences. As has been shown in previous studies, economists seem to constitute one such group [e.g. Carter and Irons, 1991 and Frank et al., 1993]. On the basis of this discussion, we advance the following hypotheses for the case of contributing to a Social Fund:

- H1: A substantial number of people are prepared to act in a pro-social way in an anonymous situation – even after several rounds.
- H2: Expectations about the contributions of other people matter. The more people expect others to cooperate, the more they cooperate themselves (Conditionality of type I).
- H3: The environment under which the donations take place matters (Conditionality of type II). In particular, it is essential that people are asked to contribute in a way they perceive as acceptable.

⁹ Social psychology divides types of person according to their ‘social value orientation’ into individualistic, competitive and cooperative types [Messick and McClintock, 1968 and McClintock, 1978]. Some studies detect a player’s type by playing a separate fairness game first. According to the behavior in this game, e.g. a dictator game, individuals are characterized and their behavior in the following prisoner’s dilemma or trust game is observed. Different ‘types’ of people behave in a substantially different way in the social dilemma situation [e.g. Cain, 1998].

H4: People differ in their pro-social attitudes. The type of person (as reflected partly by their choice of study) influences donating even when standard personal characteristics (gender, and age) are controlled for.

In the following sections, we test these hypotheses empirically.

III. The Empirical Case and the Data

Each semester, all the students at the University of Zurich have to decide whether or not they want to contribute to two official 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 give 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 at the University of Zurich. Without their explicit consent (by marking a box), students do not contribute to any Fund at all. Our data refers to the decisions made in the seven semesters from the winter semester 1998/99 up to and including the winter semester 2001/2002. The fact that every student at the University of Zurich has to decide anew each semester whether he or she is willing to contribute to one or both of the Social Funds generates a large number of observations. Table I presents summary statistics of the data set. The table also shows the amount of students who contribute to at least one of the Funds for each variable. We observe the decisions of 32,961 students who decide on average 5.4 times, depending on how many semesters they are there. The decisions from the seven semesters are pooled, generating 136,862 observations. The panel structure allows us to analyze the effect of repetition on the decision to contribute. We will also use personal fixed-effects to control for unobservable heterogeneity. In this kind of analysis only people who changed their minds at least once are of interest. In our data set this amounts to 9,378 students, which is 28.5 percentage of the

total student population. We have also aggregated data since 1993, which allows us to test the effects of environmental and institutional conditions on giving behavior.

Table I
Summary Statistics

Variables	Data set			Survey data
	Number of Observations	Percentage of student body	Percentage who contribute to at least one Fund	Means (s.d.)
Economics	13932	10.18	62.82	0.129
Theology	1367	1.00	77.18	
Law	21777	15.91	64.01	
Medicine	15211	11.11	65.81	
Veterinary Medicine	3760	2.75	58.46	
Arts Faculty	62086	45.36	73.13	
Natural Science	14524	10.61	66.99	
Computer Science	4205	3.07	66.87	
Age, Mean (s.d.)	27.78 (7.97)			26.657 (5.59)
Aged below 26	65563	47.90	71.09	
Age 26-30	37399	27.33	63.62	
Age 31-35	17673	12.91	65.70	
Age 36-40	8366	6.11	69.77	
Aged over 40	7861	5.74	76.92	
Gender				
Female	68468	50.03	69.16	0.475
Male	68394	49.97	68.05	0.525
Nationality				
Foreigner	15782	11.53	62.91	
Swiss	121080	88.47	69.35	
Number of semesters, Mean (s.d.)	10.47 (8.21)			6.94 (5.07)
Period 1 (winter semester 1998/99)	19507	14.25	64.15	
Period 2 (summer semester 1999)	18231	13.32	67.07	
Period 3 (winter semester 1999/00)	20060	14.66	69.06	
Period 4 (summer semester 2000)	18650	13.63	69.10	
Period 5 (winter semester 2000/01)	20335	14.86	70.24	
Period 6 (summer semester 2001)	19075	13.94	69.78	
Period 7 (winter semester 2001/02)	21004	15.35	70.56	

Data source: Compiled from data provided by the accounting department of the University of Zurich.

In addition, an anonymous on-line survey was carried out among the same student group of the University of Zurich.¹⁰ The response rate was 18 percent. From this sample, we were able to use 3'256 answers, containing responses to all the questions relevant for our context. This sample is not totally representative (not surprisingly, a larger number of economics students responded to the questionnaire sent out by two economists), but with respect to gender and age, the sample corresponds to the distribution of students at the University of Zurich. See row the 'survey data' in table I for a descriptive analysis of the survey data set. The survey again asked whether the person contributed money to one or both of the Funds. 73 percent responded that they did, compared to the 68 percent who actually contributed. This difference between survey answers and actual behavior is found in a lot of survey-based studies. While the differences can be the result of people lying [see Eichenberger and Oberholzer-Gee [1998] and Bertrand and Mullainathan [2001] for differences between hypothetical and real decisions], a more convincing explanation is that people who contributed to the Funds are more likely to respond. However, the differences should be kept in mind while interpreting the survey data.

The donations by the students to the Social Funds have three characteristics, which are crucial for our undertaking:

- (1) A large number of people are involved (more than 33,000 people). The condition $1/n < m$ is certainly fulfilled and rational selfish individuals would not contribute to the Fund.
- (2) It is not generally known who receives actual support from the Funds. But it is known that a public good will be provided.

¹⁰ The on-line questionnaire is reproduced at <http://www.iew.unizh.ch/grp/frey/fragebogen.htm>.

(3) Whether a student donates to the Social Funds or not remains completely anonymous.

Social pressure can therefore be excluded as a motive.

As will be explained in detail in the next section, these characteristics *exclude direct reciprocity* as defined above. Donations to the Social Funds at the University of Zurich are therefore more a case of *pro-social behavior*.

IV. Analysis and Results

1. Pro-social behavior

The raw data suggest that the students in our sample do not act like the traditional economic model of selfish individuals predicts. A large proportion of the students are prepared to contribute to the Funds. Between the years 1998 – 2001, on average more than 68% of the individuals contributed to at least one of the Funds (see table II). More than 61% contributed to both Funds.¹¹ Most of the students either always contribute or never contribute to one of the Funds. This fact is not surprising, as we know from laboratory experiments that subjects always divide into groups who free-ride all the time and others who do not. At the University of Zurich, almost 19% of the students who decided at least two times never contributed to the two Funds. On the other hand, about 49% of the students always contribute.

¹¹ In dictator games, the contribution of the subjects is much smaller. These differences can be explained by the fact that recipients differ. Eckel and Grossman [1996] show in an anonymous dictator game that contributions are much bigger if the subjects can give money to an established charity rather than another student.

Table II
Contribution to two Social Funds, University of Zurich 1998-2001

	Absolute	Percent
Contribution to both Funds (\$7.2)	84,765	61.9%
Contribution to Foreigner Fund only (\$3)	5949	4.35%
Contribution to Loan Fund only (\$4.2)	3184	2.33%
No contribution to either Funds	42,964	31.39%
Total	136,862	100.00

Data source: Compiled from data provided by the accounting department of the University of Zurich.

As the decision is not a laboratory dictator or public good game, we can exclude that pro-social behavior is due to an experimenter effect or some other sort of direct reciprocal reaction mentioned by Hoffman et al. [1996]. They believe that the fact that anonymity is not completely guaranteed can indeed explain the remaining level of donation in their dictator game.

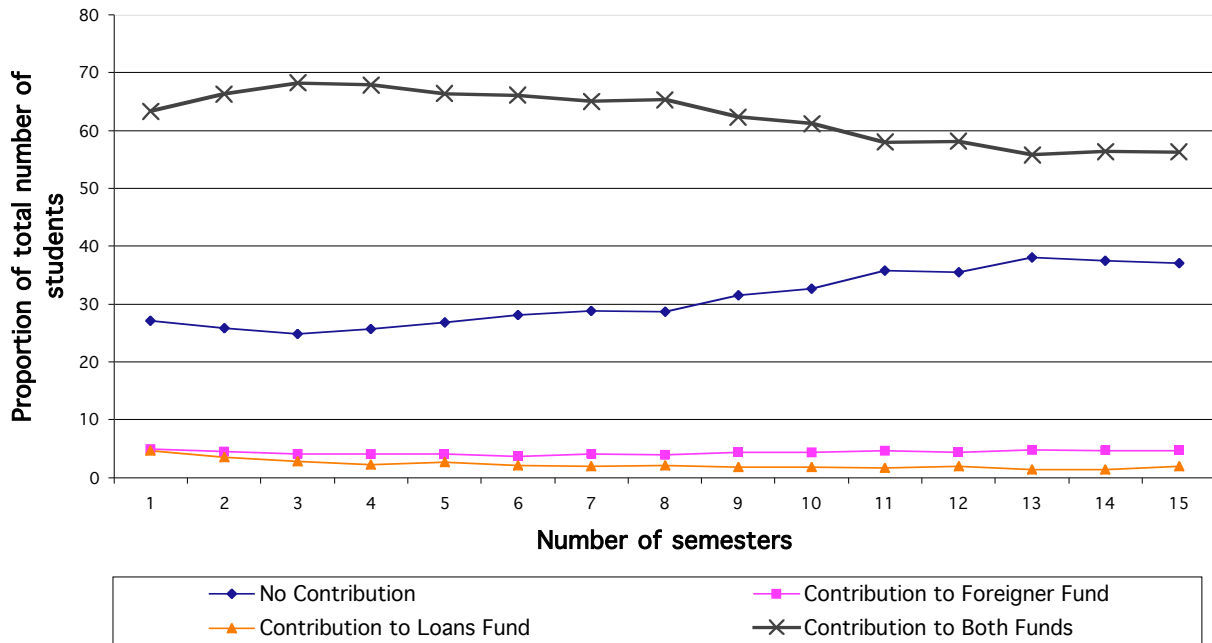
Johannesson and Persson [2000], on the other hand, by increasing social distance between dictator and recipients even more, find evidence of non-reciprocal altruism. In our case, the students decide in their own home and under totally anonymous conditions. So, *direct* reciprocity either (i) by the students and/or (ii) by the University can be ruled out as an explanation of the contribution:

(i) Students who do not contribute to the Funds cannot be punished or accused of being selfish by their colleagues. The mechanism of punishment for sustaining cooperation, discussed e.g. by Fehr and Gächter [2000], cannot explain the high number of people acting pro-socially. In the absence of any form of punishment, one would expect that repetition strongly decreases cooperation, as shown by public goods experiments [Dawes and Thaler, 1988; Ledyard, 1995 and Fehr and Gächter, 2000]. Figure I shows the willingness to give money to the Social Funds to be dependent on the number of semesters the students study at the University. The repetition of the decision only weakly decreases the level of contribution. This observation supports the idea that in the

situation analyzed, direct reciprocity activated through a punishment mechanism is not necessary in order to sustain the pro-social behavior of the students. However, three comments are needed concerning the not dramatically decreasing cooperation rate: (a) there is no feedback in this decision situation. Students do not know how the others behaved in the previous period. According to Fischbacher, Gächter and Fehr [2001], cooperation declines with repetition because with each succeeding round, students observe what others contributed and react by giving a little bit less. After several rounds, they find themselves contributing next to nothing. However, it is not exogenously given that no feedback is provided. The comparison with others does not seem to be important for students. If it really were, a student organization and/or the Funds administration would provide the respective information. There are also many real-life public goods where no accurate information about the behavior of others is available and contribution does not decline over time (an example is tax paying). In other cases, there is perfect feedback and no decay of cooperation occurs (an example is voting). (b) The decision situation may not be identical with a public good setting studied in laboratory experiments, because the interdependence of action is not as strong (one's payoff is not obviously linked to another's contribution) or not salient enough. This may lead to the situation where reciprocity is not as important as in other situations. But of course it is difficult to classify social dilemmas according to traditional game structures (e.g. a pure public good game or dictator game). In order to close this gap, more real-life 'public good' situations have to be studied (c) The sustainability of contributions under anonymity does not exclude reciprocity in expectations ('conditional cooperation'). People may expect others to contribute and react reciprocally to this expectation. But, as will be discussed in the next section, students do not have exogenously given information about other people's behavior. This reflects the fact that it is not important for the students' decision to contribute.

(ii) Direct reciprocity on behalf of the University is also excluded. The contribution of the students does not influence any possible future support from the Funds in case of need, nor does it in any way affect the relationship between the students and the University.

Figure I: Contributions depending on number of semesters



Notes: Students are shown up until their 15th semester. Eight semesters, including the exams, is the norm. But 22% of the students study longer.

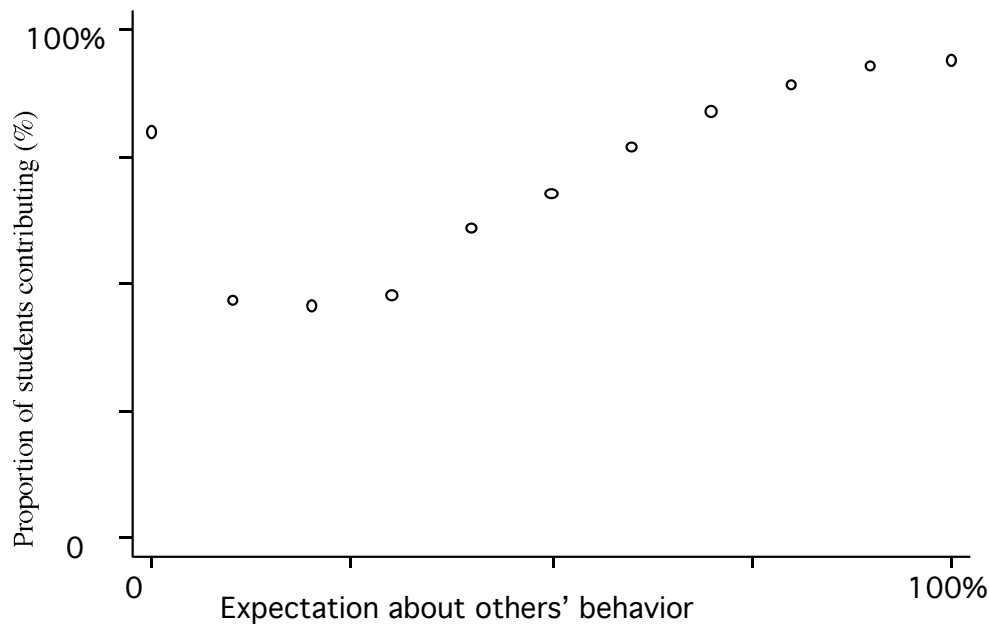
Data source: Compiled from data provided by the accounting department of the University of Zurich.

The results of the descriptive statistics are consistent with *hypothesis 1*: even after several rounds, a large number of students act pro-socially in an anonymous decision setting. Because no mechanism of punishment and therefore direct reciprocity is at hand, this result supports the existence of non-reciprocal pro-social preferences. Conditional cooperation cannot be excluded from the evidence presented. In the following sections, we analyze whether this *indirect* type of reciprocity can explain the contribution of the students to the Funds.

2. Indications of reciprocity in expectation

Theories of reciprocity suggest that people contribute to a public good dependent on the behavior of others. An individual dislikes being a 'sucker', i.e. being the only one who contributes to a public good while the others free-ride. The more a person believes that others cooperate, the greater is the probability that this person contributes too. To test this notion, the students were asked via a large-scale online survey, how many other students they expected would be contributing. The results of our survey show that expectations about others correlate with the individual decision to contribute to the Social Funds. The coefficient of the correlation between the expressed expectation and the contribution to at least one Fund is 0.34. This correlation is quite large and statistically significant at a 99%-level ($F_{1,3168}=415.47$, $p>0.01$). As can be seen from Figure II, the marginal effect is substantial.¹² An increase of the perceived cooperation of others by 10 percentage points increases the individual probability of contributing by 6 percentage points.

¹² The marginal effect vector in a probit analysis equals 0.0062 (s.e. 0.00035).



But the *causality* is not at all clear. While for the notion of conditional cooperation it is important that individuals cooperate conditional on the behavior of others, the causality can be the other way around: people behaving in a cooperative way also expect others to cooperate. They deduce from their own behavior how they think other people will behave. The perceived expectation about the cooperation of others is therefore a good indicator of people's own pro-social behavior and does not provide evidence for conditionality of type I. Similarly, Glaeser et al. [2000] found evidence of such an effect in their study about trust and conclude: '... the best way to determine whether or not a person is trustworthy is to ask him whether or not he trusts others'. Fischbacher, Gächter and Fehr [2001] use the strategy method to get rid of the causality problem. The subjects had to decide how much they would contribute, given the amount of money others' potentially contributed. Their results of conditional cooperation cannot be due to a false consensus effect, because people do not form their own expectations but react to the given behavior of others. However, the subjects may be focused too much on the behavior of other people. Even the very fact of asking people to think about what others do, changes their behavior [Croson, 2000]. The

problem of causality in the field case studied here is even more obvious when one looks at how little students really know about the actual contribution rate.

Students do not know for certain what other people do and also do not seem to be interested in the behavior of other people, as they rarely talk with their colleagues about the two Social Funds.

Table III shows the answers to two questions designed to find out whether the students are aware of the behavior of others and whether they actually talk with each other about the Funds. The results indicate that more than three quarters of the students do not tell their friends whether they contributed or not. Three quarters of the students never talk with their colleagues about the Funds. These results throw even more doubt on the notion that the causality of the correlation goes from any expectations about the number of overall contributions to one's own contribution.

Table III
Knowledge about the Contribution of Others

- 'Do your friends know about your contribution?'

	Absolute	Percent
No, they do not know	2568	78.87
Yes, they do know	688	21.13
Total	3256	100.00

- 'Do you ever talk about the two Social Funds to your friends?'

	Absolute	Percent
No, we do not talk	2488	76.34
Yes, we do talk	771	23.66
Total	3259	100.00

Data source: Own survey 2000.

The results of the empirical analysis are consistent with *hypothesis 1* and also partly apply to *hypothesis 2*. A large number of students behave pro-socially. The anonymous situation does not allow for direct reciprocity and students behave pro-socially at the whole. There is some empirical evidence that students compare themselves with others and that their actions depend on the behavior of others. The evidence for this reciprocity in the form of conditional cooperation (Conditionality of type I) is, however, ambiguous. While the correlation between the expected cooperation rate and the actual contribution of the students is large, causality is unclear. Only approximately every fifth student knows about the behavior of his or her colleagues or talks with others to find out about the appropriateness of their own behavior. It may be concluded that students behave *not* exclusively conditional on the behavior of others, i.e. in a reciprocal way. There is considerable evidence for pro-social behavior depending on the environmental and institutional conditions, as will be argued in the next section.

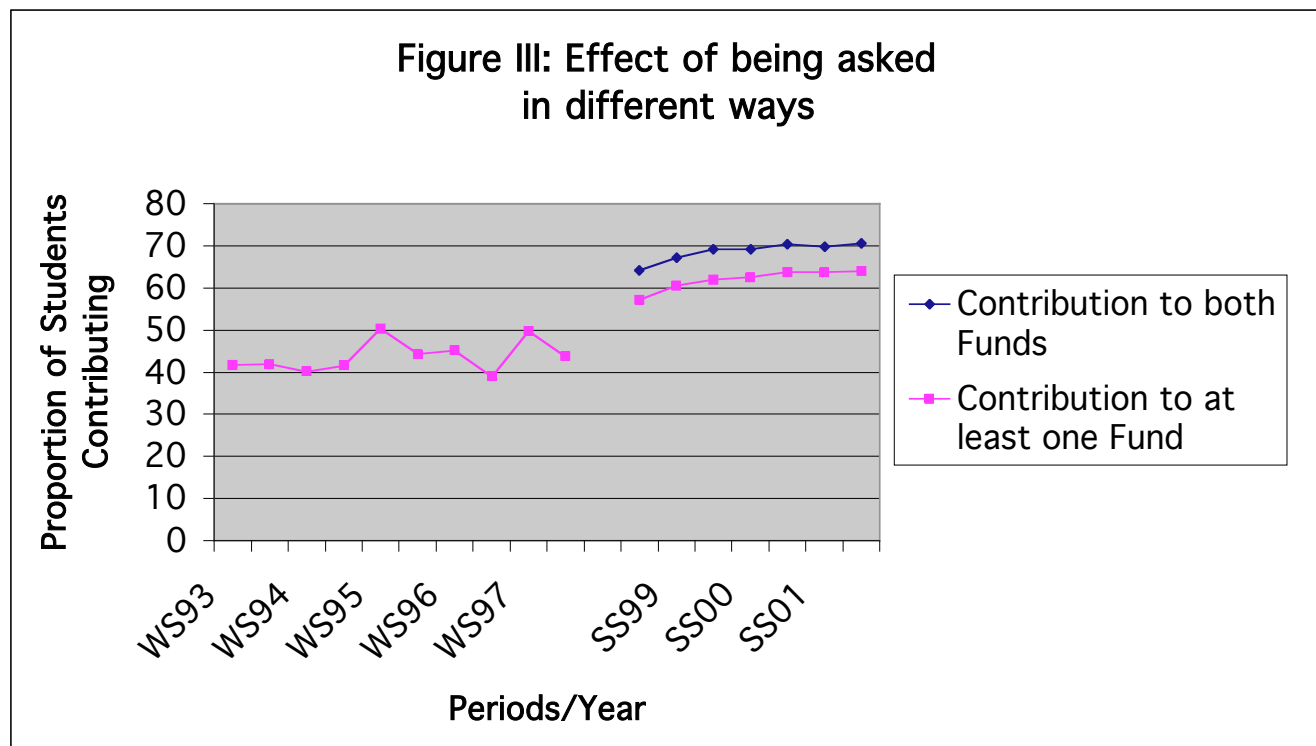
3. Pro-social behavior depends on Environmental and Institutional Conditions

We have adduced empirical evidence that contributing to the two Social Funds is not only due to reciprocal considerations but to other pro-social attitudes. This pro-social behavior depends on institutional conditions. A crucial institutional feature supporting pro-social behavior is being asked to do so. Moreover, a lot depends on how one is asked. Different ways of framing the same question institutionally can change the prevalence of pro-social behavior dramatically (for framing effects see e.g. Quattrone and Tversky [1988]; Lindenberg [1992]; Sonnemans et al. [1998]; Andreoni [1992]; Elliott and Hayward [1998] and Cookson [2000]).

At the University of Zurich, an exogenous variation of the institutional conditions allows us to test the effect on pro-social behavior. Due to a restructuring of the administration, the University of Zurich changed the official letter for renewing students' registration for the winter semester of

1998. After this semester, the administration was able to handle students' decisions electronically. The students are now asked to contribute in the following way: they have to tick boxes to decide if they want to donate money to one or the other Fund, to both or to neither of the Funds. After a month, they receive an invoice with the compulsory tuition fee plus the chosen amount for the Social Funds. Before the winter semester of 1998, students received two invoices and had to choose between the two; one with the amount of the compulsory tuition fee on it, and the other with the amount of the tuition fee *plus* the amount due for contributions to both Funds.

Figure III shows the effect of the exogenous change in the institutional setting on pro-social behavior. After the change effected in the summer semester of 1998, the percentage of people contributing to the two Social Funds increased from an average of 44% to 62%. The difference is statistically significant (t-test of differences of distribution: t-value=-11.1). Moreover, according to the new system, the students can also opt for only one of the Funds, so that the percentage of people who contribute to at least one of the Funds saw an even bigger increase. This result is consistent with hypothesis 3 that pro-social behavior is sensitive to changes in the institutional conditions.



Standard economic reasoning would consider the two decisions identical, because the underlying decision to be taken is the same: does one want to contribute money to the two Funds or not? And the prediction is also straightforward: no homo oeconomicus will donate any money in either of the two anonymous decision settings. But even for non-traditional explanations of cooperative behavior (e.g. reciprocity and pure altruism), the different settings should not affect the behavior of the subjects. If, for example, cooperation is only conditional on the behavior of others, no behavioral difference should be observed in the two settings. Thus, it is obvious that our theory must go *beyond* an assumption of reciprocity or pure altruism because they are unable to explain the results presented here. However, the concept of pro-social behavior, as given above, depends

on the institutional conditions or the context of the decision.¹³ In particular, one reason can be put forward in explaining the result: people have ‘self-control’ problems. O’Donoghue and Rabin [1999] and Laibson [1997] establish a theory of hyperbolic discounting which essentially argues that people discount costs of events in the far distant future with a higher rate than for the same events in the near future. In the decision setting presented above, the costs are the same and have to be paid at almost the same time of the year. But in one setting, the decision to contribute occurs long before the actual payment. Therefore the psychological costs of deciding today and in paying in a month’s time are lower than deciding today and paying today.

Context-dependent pro-social behavior has been labeled ‘institutional framing’ by Isaac et al. [1991]. Frey and Bohnet [1995] and Bohnet and Frey [1999] further develop the idea and present evidence that institutions affect fairness consideration in experiments. They allow for one-way identification in a dictator game and observe that the amount shared increases substantially. Their analysis indicates the importance of identification with the ‘victim’¹⁴. The marked increase seems to support the concept of context dependent pro-social behavior going beyond reciprocity and pure altruism. The same holds for identification with an organization. As has been shown in other studies, especially in studies concerning alumni giving to universities, attachment to an organization is an important factor in explaining pro-social behavior [Clotfelter, 2001 and Mael and Ashforth, 1992]. In the case of the contribution to the two Social Funds of the University of

¹³ Andreoni [1992] presents evidence that positive framing leads to more cooperation in a public good experiment than negative framing of the same decision. He explains this difference in the light of the ‘warm glow’ effect. ‘(...) it must be that people enjoy doing a good deed more than they enjoy not doing a bad deed’[p. 11].

¹⁴ The idea of the so-called ‘identifiable victim effect’ goes back to Schelling [1968] and has recently been analyzed by Jenni and Loewenstein [1997].

Zurich, changes in the institutional conditions which affect the identification with the University should explain some of the variation in giving behavior.

One such change in the environmental and institutional conditions takes place at the beginning and the end of a student's University life. For both periods, students' actual attendance at the University is lower than in the periods in between. Before taking up their studies, i.e. at the very beginning, students obviously have not attended the University at all; at the end of their studies, students no longer attend classes, but prepare for their exams over an extended period of time (more than half a year in the Swiss University system) and therefore attend the University only sporadically. The strongest identification with one's University should exist when students regularly attend courses and feel themselves to be a part of the student body and their *alma mater*. As a consequence, students are expected to contribute significantly less to the Social Funds at the beginning and end of their studies.

The first decision of whether to contribute to the Funds is taken before the students are actually attending the University. They have registered, but the actual decision concerning their contribution takes place before the start of the freshman semester. Again, the traditional economic prediction would not change. But, as can be seen from a probit model, estimated for the period 1998-2001 and reproduced in table IV, this change in environmental condition systematically affects behavior. The probability that a first semester student contributes money is 2.3 percentage points lower compared to those in the following semesters (the reference period is the *basic* study). This effect is statistically significant at the 99%-level and persists in an estimation with personal fixed-effects (see the conditional logit model in table IV).

Table IV
Contribution to the Social Funds

University of Zurich 1998-2001
Dichotomous dependent variable: 'Contribution to at least one Fund' = 1

Variable	Model I Probit estimate			Model II Conditional fixed effect logit	
	Coefficient	Z-value	Marginal effect	Coefficient	Z-value
Freshmen	-0.065**	-3.503	-2.3%	-0.266**	-4.858
Main stage	0.114**	10.438	4.1%	-0.101	-1.823
Ph.D.	0.017	1.105	0.6%	-0.010	-0.082
Last semester	-0.184**	-14.692	-6.6%	-0.189**	-4.327
Number of semesters	-0.043**	-24.322	-1.5%	-0.274**	-3.945
(Number of semesters) ²	0.001**	14.202	0.02%	-0.001	-1.211
Age 26-30	0.157	1.357	0.6%	-0.094	-1.615
Age 31-35	0.189**	11.889	6.8%	0.019	0.186
Age 36-40	0.347**	16.457	12.4%	0.087	0.608
Age over 40	0.541**	23.050	19.4%	0.174	0.642
Gender (female=1)	-0.012	-1.497	-0.4%		
Nationality (foreigner=1)	-0.103**	-8.544	-3.7%		
Married (=1)	0.052**	3.780	1.9%	0.210	1.404
Period 2 (summer semester 1999)	0.082**	6.030	2.9%	0.479**	6.247
Period 3 (winter semester 1999/00)	0.142**	10.810	5.1%	0.816**	5.874
Period 4 (summer semester 2000)	0.141**	10.440	5.1%	0.977**	4.749
Period 5 (winter semester 2000/01)	0.179**	13.567	6.4%	1.229**	4.529
Period 6 (summer semester 2001)	0.168**	12.456	6.0%	1.360**	4.008
Constant	0.606**	41.282			
N	115'858			39,583	
Log Likelihood	-71041.783			-14811.858	
				LR chi ² (16) = 180.09	

Notes: Reference group consists of 'basic study', 'aged below 26', 'male', 'Swiss', 'semester 1998/99'.

Level of significance: * 0.01<p<0.05, ** p<0.01

Data source: Compiled from data provided by the accounting department of the University of Zurich.

The effect on contributing while being in the last semester is also shown in table IV. The variable for the last semester takes the value 1 if a student is in her last semester and 0 otherwise. Both models show a significant effect for being in the last semester. The probability of contributing to at least one Fund decreases by 6.6 percentage points compared to the preceding periods.

The two behavioral regularities observed – that students tend to contribute less before they start their studies, and at the very end of their studies – is consistent with a changing identification with the University as an organization.

The control variables show the expected signs: the different stages in a student's studies (*Main stage* and *Ph.D.*) do not have a significant effect on his or her pro-social behavior in the fixed-effects estimation, which controls for individual heterogeneity. As could already be seen in the descriptive statistics (see figure I), the *Number of semesters* attended decreases the probability of a contribution to the Funds, but not dramatically so. *Gender* does not have an effect on giving behavior. *Married* students are more generous than their single colleagues. However, the effect is not statistically significant in a fixed-effects model. Marriage itself does not make one more generous, but married students are a special selection. Over time, the willingness to contribute increases, as indicated by the period dummies. Interestingly, the probability that *foreign* students contribute to the Social Funds is smaller than for Swiss students. This behavior of foreign students is of interest because one of the two Funds is exclusively designed to support foreigners. It could be that, if foreigners contribute, they tend to prefer to support other foreigners.

Table V shows the descriptive statistics for the contributions of foreigners to the Social Funds. Foreign students, if they contribute at all, mainly have the tendency to support other foreigners. The result is supported in a multinomial regression model, which includes control variables (see

appendix I). This pattern of pro-social behavior can be interpreted as further support for the importance of identification for giving. Foreigners identify more with other foreigners. This evidence is consistent with various studies, which find that group identity explains a lot about pro-social behavior [Simon, 1993; Dawes and Thaler, 1988; Turner and Giles, 1981 and Akerlof and Kranton, 2000]. In contrast to these experiments, where group identity is achieved through discussion, our data suggest that even anonymous group attachment can evolve.

Table V
Contribution of Swiss and Foreigners to the Two Social Funds

University of Zurich 1998-2001

	Swiss	Foreigners	Total
Contribution to both Funds (\$7.2)	63.28%	51.60%	61.93%
	(N=76622)	(8143)	(84765)
Only to Foreigner Fund (\$3)	3.61%	9.97%	4.35%
	(4376)	(1573)	(5949)
Only to Loan Fund (\$4.2)	2.45%	1.35%	2.33%
	(2971)	(213)	(3184)
No contribution to the Funds	30.65%	37.09%	31.39%
	(37111)	(5853)	(42964)
Total	100%	100%	100%
	(121080)	(15782)	(136862)

Notes: Pearson Chi2 (3)= 1861.6411

Data source: Compiled from data provided by the accounting department of the University of Zurich.

The empirical results in this section show that pro-social behavior depends on environmental and institutional conditions (*hypothesis 3*). Most of all, the way one is asked to contribute to a public good is of great importance, even in the absence of personal contact. Moreover, our results support the crucial effect of identification and identity for giving behavior.

4. Effect of Education on Pro-Social Behavior

People seem to differ in their pro-social preferences, which leads to different behavior as, for example, is reflected in experimental settings [e.g. Fehr and Gächter, 2000 and Weimann, 1994]. Some of them free-ride right from the beginning of the game and thus behave according to the standard economic predictions, while others deviate from this prediction substantially and act in a pro-social way. We test this notion about different types of people in our data set (hypothesis 4) by looking at potential selection effects. People with similar preferences select similar subjects at the University. If this is the case, we should observe that the distribution of selfish types is not random, but systematic.¹⁵ To test this hypothesis, we look at the very first decision to contribute to the two Funds at the University. At this time, students have not yet attended any lectures at the University, so we can exclude any effects resulting from the influence of University training.

While 73% of arts students contribute to the Funds, only 64% of law students do so.¹⁶ The chosen discipline of study partially reflects the type of students and their behavior, which is consistent with *hypothesis 4*. Because the students of the faculties could differ systematically with regard to other characteristics, such as sex or age, which correlate with giving behavior, we estimate a multivariate regression model. The results in table VI support our hypothesis that students differ in their social preferences and select according to these preferences for different subjects.¹⁷ The control variables in this estimation for students in their first semester show the same effects as in table IV. An exception is the behavior of women. Counting all the semesters, women do not

¹⁵ Similarly, Ockenfels and Weinmann [1999] compare the preferences of East- and West-Germans in laboratory experiments and find differences in their cooperative behavior. Cadsby and Maynes [1998] compared the behavior of nurses with economics students in an experimental public good game.

¹⁶ The respective results for students of other faculties are: 77% of theology students, 65% of medical students, 58% of veterinary medicine students and 67% of natural science students contribute to at least one fund.

¹⁷ Frey and Meier [2001] could show empirically that for economics students pro-social behavior is due to a selection process and will not be influenced by the teaching of economics using the data set presented here. This result contradicts laboratory evidence from Frank et al. [1993, 1996] who found that training in economic theory changes the willingness to behave pro-socially for the economics students in a negative way.

behave significantly differently from men, but the probability that women contribute to the Funds is almost 4 percentage points lower in the first semester than it is for men. This result contradicts previous results of behavioral differences between women and men [Eckel and Grossman, 1998 and Ortmann and Tichy, 2000]. Further research should investigate which conditions in the data set used influence the behavior of the two sexes [for similar experiments, see Andreoni and Vesterlund, 2001].

Table VI
Contribution of Students of Different Faculties in the First Semester

University of Zurich 1998-2001
Dichotomous dependent variable: 'Contribution to at least one Fund' = 1
Probit estimates

Variable	Coefficient	Z-value	Marginal effect
Economics	-0.246**	-5.634	-8.0%
Computer Science	-0.145*	-2.169	-4.7%
Theology	-0.337*	-2.070	-11.0%
Law	-0.229**	-6.092	-7.4%
Medicine	0.004	0.079	0.1%
Veterinary medicine	-0.100	-1.241	-3.2%
Natural science	-0.197**	-4.281	-6.4%
<i>Control variables</i>			
Age 26-30	-0.033	-0.585	-1.1%
Age 31-35	0.063	0.650	2.1%
Age 36-40	0.276	1.874	9.0%
Aged over 40	0.261	1.702	8.5%
Gender (female=1)	-0.116**	-4.153	-3.8%
Nationality (foreigner=1)	-0.026	-0.510	-0.8%
Married (=1)	0.017	0.166	0.6%
Period 2 (summer semester 1999)	0.171	1.512	5.6%
Period 3 (winter semester 1999/00)	0.389**	10.289	12.6%
Period 4 (summer semester 2000)	0.158	1.383	5.1%
Period 5 (winter semester 2000/01)	0.396**	10.339	12.9%
Period 6 (summer semester 2001)	0.346**	2.692	11.3%
Period 7 (winter semester 2001/02)	0.332**	8.977	10.8%
Constant	-0.503**	-14.178	
N	10,584		
Log Likelihood	-6062.4379		

Notes: Reference group consists of 'Arts faculty', 'aged below 26', 'male', 'unmarried', 'Swiss', 'semester 1998/99'.

Level of significance: * 0.01 < p < 0.05, ** p < 0.01

Data source: Compiled from data provided by the accounting department of the University of Zurich.

V. Conclusions

This paper has provided empirical evidence for the importance of non-reciprocal pro-social behavior of individuals in an anonymous, n-person public good setting. We use a unique panel data set of 136,000 observations (roughly 33,000 persons) concerning the decisions of students at the University of Zurich to contribute to two Social Funds administered by the University. These field observations are matched with an extensive survey of the same sample group of students to find out more about the conditions and motives for giving.

Four hypotheses are tested with these data:

1: A substantial number of people are prepared to act in a pro-social way in an anonymous situation in which direct reciprocity is absent.

The results of the statistics are consistent with *hypothesis 1*: Even after several rounds, a large number of students act pro-socially in an anonymous decision setting. Because no mechanism of punishment and therefore direct reciprocity is on hand, this result supports the existence of non-reciprocal pro-social preferences. But conditional cooperation cannot be excluded by the evidence presented.

2: Expectations about the contributions of other people matter. The more people expect others to cooperate, the more they cooperate themselves (conditionality of type I).

The results of the empirical analysis are consistent with this *hypothesis*. While the anonymous situation does not allow for direct reciprocity, students compare themselves with others and make their actions dependent on the way they expect others to behave. The evidence for this ‘indirect’ reciprocity, in the form of conditional cooperation, is ambiguous. While the correlation between the expected cooperation rate, and the actual contribution of the students is quite large, the

causality is unclear. Only approximately every fifth student knows the behavior of his or her colleagues or talks with others to find out about the appropriateness of their own behavior. Students thus seem to behave pro-socially but *not* exclusively conditional on the behavior of others.

3: The environment in which the donations take place matters (conditionality of type II). In particular, it is essential that people are asked to contribute in a way they conceive to be acceptable.

The empirical results suggest that pro-social behavior depends on environmental and institutional conditions. The way one is asked to contribute to a public good is of great importance, even in the absence of any personal contact. Moreover, our results support the crucial effect of identification and identity for giving behavior.

4: People differ in their pro-social attitudes. The type of person (as partially reflected by the choice of study) influences donating even when standard personal characteristics (gender and age) are controlled for.

Our data suggest that students indeed select different disciplines according to differences in their pro-social preferences.

The results derived are based on the behavior of the students and a survey carried out at the University of Zurich. Future research must establish whether the giving behavior identified applies to other persons and to other settings. However, we are confident that our findings are not peculiar to these students but apply more generally. The students at the University of Zurich are quite unlike a student population in many other countries, especially the United States, because

they are considerably older and a large number of them hold a part-time job while studying.

They are thus more like the population at large than, for instance, American college students.

Our results do not prove that reciprocity is not important for contribution to public goods, but we present evidence that people tend to cooperate without a punishment mechanism in a public good situation. Theories have to evolve which can explain such substantial pro-social behavior.

Therefore more analyses of real-life public goods are needed, which allow the comparison of results from laboratory experimental research with naturally occurring situations and thus close the gap between research in the lab and field studies.

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Appendix I

Contribution to Social Funds

Multinomial logit regression, Basic category: No contribution to Funds

	Coefficient	z-value
Category 1: Contribution only to foreigner Fund		
Freshmen	0.104	1.50
Main stage	0.216**	5.06
Ph.D.	0.143*	2.39
Last semester	-0.228**	-4.62
Number of semesters	-0.063**	-10.73
(Number of semesters) ²	0.001**	9.62
Age	0.040*	2.36
(Age) ²	-0.0005*	-1.98
Gender (female=1)	0.179**	5.86
Nationality (foreigner=1)	0.898**	24.67
Married (=1)	0.212**	4.18
Period 2 (summer semester 1999)	0.053	1.01
Period 3 (winter semester 1999/00)	0.121*	2.42
Period 4 (summer semester 2000)	0.060	1.14
Period 5 (winter semester 2000/01)	0.051	1.00
Period 6 (summer semester 2001)	0.031	0.59
Constant	-2.696**	-10.14
Category 2: Contribution only to loan Fund		
Freshmen	0.264**	3.53
Main stage	-0.418**	-7.89
Ph.D.	-0.518**	-6.10
Last semester	-0.612**	-7.67
Number of semesters	-0.090**	-11.65
(Number of semesters) ²	0.001**	8.22
Age	0.062**	5.81
(Age) ²	-0.0001	-0.96
Gender (female=1)	0.093*	2.31
Nationality (foreigner=1)	-0.645**	-8.13
Married (=1)	0.054	0.72
Period 2 (summer semester 1999)	0.122	1.67
Period 3 (winter semester 1999/00)	0.278**	4.15
Period 4 (summer semester 2000)	0.296**	4.17
Period 5 (winter semester 2000/01)	0.253**	3.72
Period 6 (summer semester 2001)	0.174*	2.37
Constant	-3.395**	-17.88
Category 3: Contribution to both Funds		
Freshmen	-0.111**	-3.50
Main stage	0.183**	9.92
Ph.D.	0.017	0.65
Last semester	-0.305**	-14.67
Number of semesters	-0.085**	-30.37
(Number of semesters) ²	0.001**	18.71
Age	0.044**	25.77
(Age) ²	-0.00004**	-15.98
Gender (female=1)	-0.031*	-2.34
Nationality (foreigner=1)	-0.280**	-13.74
Married (=1)	0.082**	3.54

Period 2 (summer semester 1999)	0.132**	5.85
Period 3 (winter semester 1999/00)	0.239**	10.84
Period 4 (summer semester 2000)	0.235**	10.36
Period 5 (winter semester 2000/01)	0.313**	14.17
Period 6 (summer semester 2001)	0.291**	12.84
Constant	-0.054**	-1.27
N	115'858	
Log likelihood	-100622.22	

Notes: Reference group consists of 'basic study', 'aged below 26', 'male', 'Swiss', 'semester 1998/99'.

Level of significance: * 0.01 < p < 0.05, ** p < 0.01

Data source: Compiled from data provided by the accounting department of the University of Zurich.

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