Pro-social behavior in a natural setting

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Abstract

Empirical evidence is provided for the importance of pro-social behavior of individuals in an anonymous, n-person 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 is present, but the causal relationship is ambiguous. The manner in which one is asked to donate is crucial. Identification with the organization, and with specific groups, is also important.
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1. Beyond self-interest

Assuming the self-interested behavior of human beings has been a powerful approach when studying the economy. The self-interest hypothesis works well for 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; Lazear, 2000).

Not all applications of the self-interest hypothesis, however, meet the necessary conditions under which it works well; many markets are characterized by rigidities, incomplete

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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, 2000, p. 32). Studies of important activities, such as charitable giving (e.g. Andreoni, 2002; Weisbrod, 1998), voting (e.g. Mueller, 2003), and tax paying (e.g. Slemrod, 1992; Andreoni et al., 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 et al., 1992, p. 22; similarly Graetz and Wilde, 1985; 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; 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 to explain non-selfish behavior or other-regarding preferences (for a survey, see Fehr and Schmidt, 2003). Basically two main approaches exist that try to explain certain phenomena in human behavior: 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 that incorporate inequality aversion by individuals (Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999). The other approach focuses on reciprocal relationships that appear 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, 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, 2000a; Falk and Fischbacher, 2001).

Moreover, for at least two decades, theories of pro-social behavior have been tested in laboratory experiments and have 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. However, 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 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 anonymous conditions, a large number of individuals are prepared to donate a significant sum of money over a number of years. 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 et al., 2001, p. 403). Evidence of 'conditional cooperation' is identified: when students expect others to contribute, they themselves tend to donate more. However, the direction of causality is not at all clear; one's own willingness to donate may lead one to expect that others behave in the same way. Moreover, due to anonymity, the individuals in our sample do not know what the others are doing, which makes the problem of causality even more salient. 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 the way the question is framed is vital, but also that identification with the organization is an important institutional condition influencing their pro-social behavior. Finally, our data suggests that individuals differ among themselves with respect to the extent of their pro-social preferences. Some of them self-select according to their own preferences for the different disciplines (faculties) taught at the university.

This paper will proceed as follows: Section 2 discusses aspects of pro-social behavior and compares it with reciprocal motivations. On that basis, theoretical hypotheses are derived. Section 3 presents the actual case studied and the data collected. The econometric analysis to test the hypotheses is undertaken in Section 4. The last Section 5 offers conclusions.

2. Pro-social behavior and reciprocal motivations

Pro-social behavior in 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, 1998): 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 multiple[1] 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 $n \times m$ for the group.

For selfish individuals, there is an 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. Moreover, if an individual's utility positively depends on the amount she contributes (Andreoni, 1989, 1990), her donation and

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

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 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 intentions,[2] again predicts that a person donates more if others contribute too.

In the context of our study, the idea of *conditionality* is crucial. Individuals are defined to be conditional cooperators when the positive correlation discussed above applies, that is, when people contribute more to a public good when the others contribute more.[3] 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 et al., 2001). According to this study, the observation that cooperation declines after repetition in public goods games[4] is due to conditional cooperation: people adjust their contribution according to what others do, but give slightly less. This process leads to a decline towards the Nash equilibrium. The introduction of a punishment mechanism to allow for reciprocity, however, can sustain a high cooperation level (Fehr and Gächter, 2000b). The theory of conditional cooperation is based on a broad notion of social comparison. Conditional cooperation may not be triggered by a norm of reciprocity, but more by the wish to fulfill a social norm to behave appropriately (Messick, 1999). The few studies that try to evaluate in the laboratory whether people undertake social comparison out of conformity or reciprocity mostly conclude that their results can be explained by conformity rather than by reciprocity (Schroeder et al., 1983; Bohnet and Zeckhauser, 2003; Bardsley and Sausgruber, 2002).

This study analyzes patterns of *pro-social behavior* outside the lab. Factors affecting pro-social behavior in a field setting are identified. Pro-social behavior strongly depends on the environmental and institutional conditions under which the contributions take place. Several studies point to one specific form of institutional condition: 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; 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). A robust finding in dictator games is that results are most sensitive to the experimental procedure (for surveys, see Roth, 1995; Davis and Holt, 1993). Carpenter

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[2] 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; Fehr and Schmidt, 1999).

[3] See, for example, the experiments by Keser and van Winden (2000), Sonnemans et al. (1999), and Croson (1998).

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

et al. (2003) show in their dictator and ultimatum games with students and non-students that context is crucially important for pro-social behavior. 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" (Henrich et al., 2001, p. 77). This indicates that outside the lab, context dependence is crucially important, suggesting that theories of pro-social behavior should go beyond reciprocity and altruism.

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.[5] Andreoni and Vesterlund (2001) show that about 44 percent 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, 2002).[6] 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 discipline chosen may reflect a dimension that 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; 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.

H3. The environment under which the donations take place matters. In particular, it is essential that people are asked to contribute in a way they perceive as acceptable.

H4. People differ in their pro-social attitudes. The type of person (as reflected partly by people's 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.

3. 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

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[5] 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.

[6] Social psychology divides types of person according to their 'social value orientation' into individualistic, competitive and cooperative types (Messick and McClintock, 1968; McClintock, 1978).

fee. On the official letter for renewing their registration, the students are asked whether they want to give a specific amount of money (CHF 7.-, about US$ 4.20) to a Fund that 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 1998/1999 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. The strictly official procedures applied when renewing student registration offer a controlled environment and, at the same time, use a natural setting. The results can therefore be well compared to laboratory experiments on giving behavior in fairness games (e.g. dictator games) which, in addition, use the same subject pools and similar amount of money.

Table 1 presents summary statistics of the data set. The table also shows the number 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 4.2 times, depending on how many semesters they actually study at the University. 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 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 9378 students, which is 28.5 percentage of the total student population. We also have data on an aggregated level since 1993 that allows us to test the effects of environmental and institutional conditions on giving behavior.

In addition, an anonymous on-line survey was carried out among the same student group of the University of Zurich.[7] The response rate was 18 percent. From this sample, we were able to use 3256 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. The column 'survey data' in Table 1 provides a descriptive analysis of the survey data set. The survey also asked whether the person contributed money to one or both of the Funds. While 73 percent responded that they did, only 68 percent 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; 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 crucial for our undertaking:

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[7] The on-line questionnaire is reproduced at http://www.iew.unizh.ch/grp/frey/fragebogen.htm.

Table 1
Summary statistics

Variables	Data set			Survey data, means (S.D.)
	Number of observations	Percentage of student body	Percentage who contribute to at least one Fund	
Economics	13,932	10.18	62.82	0.129
Theology	1,367	1.00	77.18	
Law	21,777	15.91	64.01	
Medicine	15,211	11.11	65.81	
Veterinary Medicine	3,760	2.75	58.46	
Arts Faculty	62,086	45.36	73.13	
Natural Science	14,524	10.61	66.99	
Computer Science	4,205	3.07	66.87	
Age				
Aged below 26	65,563	47.90	71.09	
Age 26–30	37,399	27.33	63.62	
Age 31–35	17,673	12.91	65.70	
Age 36–40	8,366	6.11	69.77	
Aged over 40	7,861	5.74	76.92	
Mean (S.D.)	27.78 (7.97)			26.657 (5.59)
Gender				
Female	68,468	50.03	69.16	0.475
Male	68,394	49.97	68.05	0.525
Nationality				
Foreigner	15,782	11.53	62.91	
Swiss	121,080	88.47	69.35	
Number of semesters				
Period 1 (winter semester 1998/1999)	19,507	14.25	64.15	
Period 2 (summer semester 1999)	18,231	13.32	67.07	
Period 3 (winter semester 1999/2000)	20,060	14.66	69.06	
Period 4 (summer semester 2000)	18,650	13.63	69.10	
Period 5 (winter semester 2000/2001)	20,335	14.86	70.24	
Period 6 (summer semester 2001)	19,075	13.94	69.78	
Period 7 (winter semester 2001/2002)	21,004	15.35	70.56	
Mean (S.D.)	10.47 (8.21)			6.94 (5.07)

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

(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.

(3) Whether a student donates to the Social Funds or not remains completely anonymous, so social pressure can therefore be excluded as a motive.

Donations to the Social Funds at the University of Zurich are, therefore, a case of *pro-social behavior*.

Table 2
Contribution to two Social Funds, University of Zurich 1998–2001

	Absolute	Percent
Contribution to both Funds (US$ 7.2)	84,765	61.9
Contribution to foreigner Fund only (US$ 3)	5,949	4.35
Contribution to loan Fund only (US$ 4.2)	3,184	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.

4. Analysis and results

4.1. 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 percent of the individuals contributed to at least one of the Funds (see Table 2). More than 61 percent contributed to both Funds. In dictator game experiments, the contribution of the subjects is normally 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 to some student who does not need the money urgently.

Most of the students either always contribute or never contribute to one of the Funds. As we know from laboratory experiments, subjects basically tend to divide into two groups: one group who free-rides all the time and another group of subjects who does not. At the University of Zurich, almost 19 percent of the students who decided at least two times never contributed to the two Funds. On the other hand, the fact that about 49 percent of the students always contribute may be an indicator that students keep on contributing even after several rounds.

Fig. 1 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 slightly decreases the level of contribution. In the absence of any form of punishment, one would expect that repetition decreases cooperation considerably, as shown by public goods experiments (Dawes and Thaler, 1988; Ledyard, 1995; Fehr and Gächter, 2000b). This result is consistent with Hypothesis 1: even after several rounds, a large number of students act pro-socially in an anonymous decision setting. As the decision is completely anonymous and people decide at home, pro-social behavior seems not to be due to an experimenter effect or to some other sort of direct reciprocal reaction, as 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.[8]

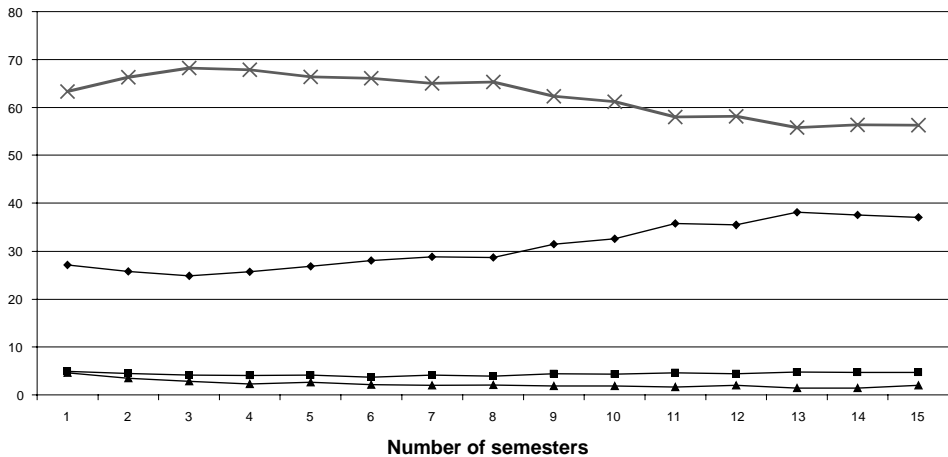[8] See also the results in Bolton et al. (1998).

Fig. 1. 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 percent of the students study longer. *Data source*: Compiled from data provided by the accounting department of the University of Zurich.

The decision situation appears to have no official punishment mechanism by the other students due to complete anonymity or by the University due to the fact that the contribution of the students does not influence any possible future support from the Funds in case of need. However, three important remarks have to be made as to why reciprocity cannot be excluded as a motivational factor: (i) feedback about the behavior of others is missing; (ii) the decision setting may not be totally anonymous; (iii) reciprocity in expectation cannot be excluded. These will each be discussed in turn.

(i) There is no feedback concerning the pro-social behavior of others in this decision situation. Students do not know how the others behaved in the previous periods, so they cannot update their beliefs. Therefore reciprocity cannot be excluded. According to Fischbacher et al. such updating of beliefs may lead to a decline in cooperation because, with each successive 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 of aggregate participation rate and no deterioration in cooperation occurs (one example is voting). Houser and Kurzban (2002) show in their public goods game that the decay in cooperation can be explained by a reduction in confusion and that "it does not seem that cooperation due to social motives decays much with rounds" (p. 1066). It may be that in the concrete situation analyzed here, less confusion is present, reducing the deterioration in cooperation.

(ii) The decision situation may not be anonymous in two respects: first, other students may apply social pressure. However, as will be shown in the next section, most students never talk with others about the funds, and their friends also do not know about their decision. Second, although the University does keep accounts of who contributes to the funds separate from the administration of the Funds, people may still suspect that the University uses the information about the contribution in some kind of way. As in laboratory experiments such uncertainty can never be ruled out. However, as the relationship to the University administration is quite anonymous and there are no ambiguous signals about the way the information is handled, the probability that persons are skeptical in this respect is small.

(iii) 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. Such conditional cooperation may, of course, be due to perceptions of social norms. People indicate how they perceive the norm of contributing when asked how many others they expect are contributing, or as discussed in the next section, causality may be the other way around.

To summarize, in the natural decision setting analyzed, pro-social behavior does not deteriorate dramatically with repetition. This pattern may be due to a lack of feedback on others' behavior. This anonymous situation is unlike many laboratory public good games. The high contribution rate may be explained by conditional cooperation, which will be analyzed in more depth in the next section.

4.2. Indications of conditional cooperation

According to the notion of 'conditional cooperation' people contribute to a public good dependent on the behavior of others. An individual dislikes being a 'sucker', 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. As stated above, such social comparison can be due to various motivational mechanisms, such as a social norm to behave appropriately. To test this notion, the students were asked in a large-scale online survey how many other students they expect will contribute. 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 percent-level ($F_{1,3168} = 415.47$, $P < 0.01$). As can be seen from Fig. 2, the marginal effect is substantial.[9] An increase of the perceived cooperation of others by 10 percentage points increases the individual probability of contributing by 6 percentage points.

The *causality* is, however, 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 who behave 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

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[9] The marginal effect vector in a probit analysis equals 0.0062 (S.E. 0.00035).
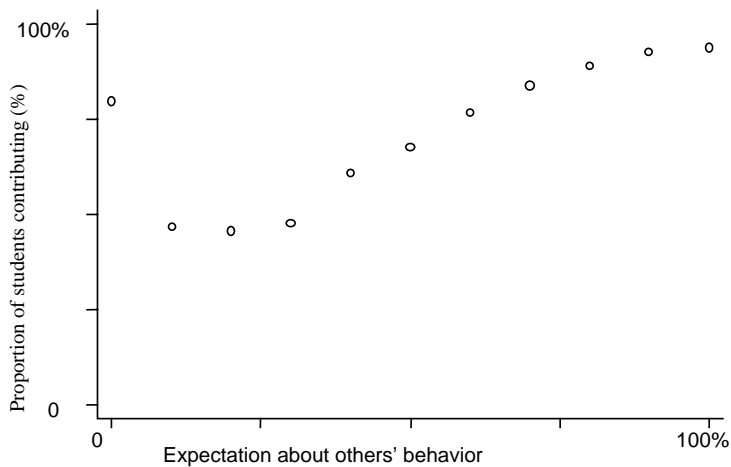
Fig. 2. Expectations and actual behavior.

indicator of people's own pro-social behavior and does not provide evidence for conditional cooperation.[10] Similarly, Glaeser et al. (2000, p. 833) 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'.[11] Fischbacher et al. 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). However, Frey and Meier (2003b) show in a field experiment that people indeed increase their contribution if presented with the fact that many other students contribute to a good cause. But first, the actual behavioral reaction depending on the behavior of others is much smaller than expected by the correlation between expectations and behavior and, second, such conditional cooperation can only explain a small part of the variation in pro-social behavior.

The problem of causality in the field case studied here is even more crucial 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 3 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

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[10] For a discussion of the so-called 'false consensus' effect, see Ross et al. (1977) and Dawes et al. (1977).

[11] However, Fehr et al. (2003) could not replicate these results in a large-scale analysis, which combined survey methods and experiments. In their study "none of the survey measures of trust are good predictors of trustworthiness in the experiment" (p. 12).

Table 3
Knowledge about the contribution of others

	Absolute	Percent
'Do your friends know about your contribution?'		
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?'		
No, we do not talk	2488	76.34
Yes, we do talk	771	23.66
Total	3259	100.00

Data source: Own survey 2000.

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 comes from any expectations about the number of overall contributions to one's own contribution.

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 punishment for not behaving pro-socially. There is some empirical evidence that students compare themselves with others and that their actions depend on the behavior of others. 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 his or her own behavior. It may be concluded that students behave *not* exclusively conditional on the behavior of others. As will be argued in the next section, there is considerable evidence for pro-social behavior depending on the environmental and institutional conditions.

4.3. 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 pro-social attitudes. This pro-social behavior depends on institutional conditions. Two sorts of environmental conditions may be crucial and are tested using the field data set: (1) the framing effects of different ways of asking and (2) group identifications. Such context-dependent pro-social behavior has been labeled 'institutional framing' by Isaac et al. Frey and Bohnet (1995) and Bohnet and Frey (1999) further develop the idea and present evidence that institutions affect fairness consideration in dictator games 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'.[12] Bolton et al. analyze how much context

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[12] The idea of the so-called 'identifiable victim effect' goes back to Schelling (1968) and has recently been analyzed by Small and Loewenstein (2003).

influences behavior in dictator games. While they could not detect any experimenter effect, the context of the decision (as given by differences in the written instructions) has a very large impact. This concept of context dependent pro-social behavior goes beyond theories of reciprocity and pure altruism.

4.3.1. The way of asking

A crucial institutional feature supporting pro-social behavior is being asked to do so. Moreover, much 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. Lindenberg, 1992; Sonnemans et al., 1998; Elliott and Hayward, 1998; 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. One month later, 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.

Standard economic reasoning would consider the two decisions identical because the underlying decision to be taken is the same: one has to choose whether to contribute money to the two Funds or not. The prediction is also identical: no homo oeconomicus will donate any money in either of the two anonymous decision settings. However, 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. Our approach must therefore go *beyond* an assumption of reciprocity or pure altruism because these theories are unable to explain the results presented here. In contrast, the concept of pro-social behavior depends on the institutional conditions or the context of the decision.[13]

Fig. 3 shows the effect of the exogenous change in the institutional setting on pro-social behavior. After a change in the way of asking (in the summer semester of 1998), the percentage of people contributing to the two Social Funds increased from an average of 44 to 62 percent. The difference is statistically significant (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.

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[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).
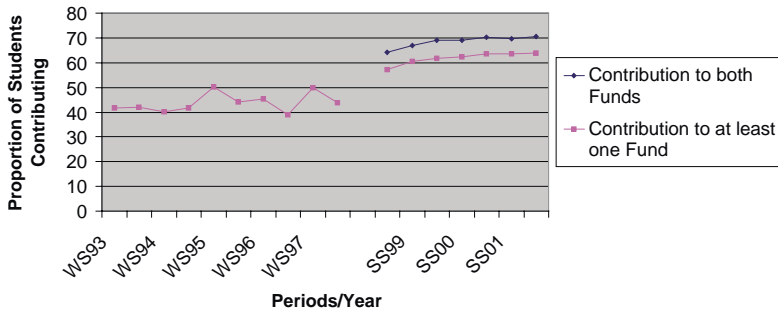
Fig. 3. Effect of being asked in different ways.

One possible explanation for this result may be that people have 'self-control' problems. 'Self-control' problems can be understood according to O'Donoghue and Rabin (1999) and Laibson (1997), who enhanced a theory by Strotz (1956) of hyperbolic discounting that 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. However, hyperbolic discounting may only account for why the way of asking may have a positive effect on pro-social behavior; but this concept has nothing to do with the existence of pro-social motivations, whose effect on the amount donated may be positive or negative, depending on the framing of the decision.

4.3.2. Group identification

A second important aspect influencing pro-social behavior is 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, 2003; Mael and Ashforth, 1992). In the case of the contribution to the two Social Funds at the University of Zurich, changes in the institutional conditions affecting 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 (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, this should not influence the traditional economic prediction, but as can been seen from a probit model estimated for the period 1998–2001 and reproduced in Table 4, this change in the 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 percent-level and persists in an estimation with personal fixed-effects (see the conditional logit model in Table 4).

The effect on contributing while being in the last semester is also shown in Table 4. 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

Table 4
Contribution to the Social Funds (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 (percent)	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 years	0.157	1.357	0.6	−0.094	−1.615
31–35 years	0.189**	11.889	6.8	0.019	0.186
36–40 years	0.347**	16.457	12.4	0.087	0.608
40 years	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 1999/2000)	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 2000/2001)	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			395,83	
Log likelihood	−71041.783			−14811.858	

Notes: LR chi^2 (16) = 180.09. Reference group consists of 'basic study', 'aged below 26', 'male', 'Swiss', 'semester 1998/1999'. *Data source*: Compiled from data provided by the accounting department of the University of Zurich.

  ** Level of significance: $P < 0.01$.

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—are consistent with a changing identification with the University as an organization.

The control variables in Table 4 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 hetero-geneity. As could already be seen in the descriptive statistics (see Fig. 1), the *Number of semesters* attended decreases the probability of a contribution to the Funds, but not dra-matically 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 sig-nificant 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 con-tribute 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 5 shows the descriptive statistics for the contributions of foreigners to the So-cial Funds. Foreign students, if they contribute at all, mainly have the tendency to sup-port other foreigners. The result is supported in a multinominal regression model that includes control variables (see Appendix A). 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 that find that group identity explains much pro-social behavior (Simon, 1993; Dawes and Thaler, 1988; 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. Based on the results of their prisoner's dilemma experiments, Yamagishi and Kiyonari (2000) argue that such in-group favoritism is due to expectations of generalized reciprocity.

The empirical results in this section show that pro-social behavior depends on environ-mental and institutional conditions (Hypothesis 3). Most of all, the way one is asked to

Table 5
Contribution of Swiss and foreigners to the two Social Funds

	Swiss (percent)	Foreigners (percent)	Total (percent)
Contribution to both Funds (US$ 7.2)	63.28 ($N = 76,622$)	51.60 (8,143)	61.93 (84,765)
Only to foreigner Fund (US$ 3)	3.61 (4,376)	9.97 (1,573)	4.35 (5,949)
Only to loan Fund (US$ 4.2)	2.45 (2,971)	1.35 (213)	2.33 (3,184)
No contribution to the Funds	30.65 (37,111)	37.09 (5,853)	31.39 (42,964)
Total	100 (121,080)	100 (15,782)	100 (136,862)

Notes: Pearson chi^2 (3) = 1861.6411. *Data source*: Compiled from data provided by the accounting department of the University of Zurich.

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.

4.4. Heterogeneity in pro-social behavior

People seem to differ in their pro-social preferences, which leads to different behavior as is, for example, reflected in experimental settings (e.g. 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.[14] 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 percent of arts students (in all semesters) contribute to at least one Funds, only 64 percent of law students do so.[15] 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, that correlate with giving behavior, we estimate a multivariate regression model. The results in Table 6 support our hypothesis that students differ in their social preferences and select according to these preferences for different subjects.[16] The control variables in this estimation for students in their first semester show the same effects as in Table 4. An exception is the behavior of women. Counting all the semesters, women do not 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, 1997; Ortmann and Tichy, 1999). 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). Another surprising result is the low contribution rate of theology students in the first semester. But their contribution rate increases dramatically in the second semester, which explains the overall high contribution rate. Whether such an increase is due to ethics training is beyond the scope of our paper. However, the field of study may correlate with

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[14] Similarly, Ockenfels and Weimann (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.

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

[16] Frey and Meier (2003a) 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.

Table 6
Contribution of students of different faculties in the first semester (Dichotomous dependent variable: 'contribution to at least one Fund' = 1, probit estimates)

Variable	Coefficient	z-value	Marginal effect (percent)
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
Control variables			
Age 26–30 years	−0.033	−0.585	−1.1
Age 31–35 years	0.063	0.650	2.1
Age 36–40 years	0.276	1.874	9.0
Aged over 40 years	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 1999/2000)	0.389**	10.289	12.6
Period 4 (summer semester 2000)	0.158	1.383	5.1
Period 5 (winter semester 2000/2001)	0.396**	10.339	12.9
Period 6 (summer semester 2001)	0.346**	2.692	11.3
Period 7 (winter semester 2001/2002)	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 1998/1999'. *Data source*: Compiled from data provided by the accounting department of the University of Zurich.
  * Level of significance: $0.01 < P < 0.05$.
  ** Level of significance: $P < 0.01$.

factors not controlled for (e.g. income), which may influence pro-social behavior. If this is the case, different giving patterns by different majors may not indicate different tastes for pro-social behavior. Based on survey data Frey and Meier (2003a) show that differences in contributing to the two funds between economists and non-economists can not be explained by differences in factors unknown to the University administration, such as income. But differences in pro-social behavior between students of different majors may still be due to other factors we are unable to control for.

5. Conclusions

This paper provides empirical evidence for the importance of 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 no direct enforcement mechanism exists.

   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. However, 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.

   The results of the empirical analysis are also consistent with Hypothesis 2. 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 his or her 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. 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.

Appendix A. Contribution to Social Funds

Multinominal 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 1999/2000)	0.121*	2.42
Period 4 (summer semester 2000)	0.060	1.14
Period 5 (winter semester 2000/2001)	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 1999/2000)	0.278**	4.15
Period 4 (summer semester 2000)	0.296**	4.17
Period 5 (winter semester 2000/2001)	0.253**	3.72
Period 6 (summer semester 2001)	0.174*	2.37
Constant	−3.395**	−17.88

Appendix A (*Continued*)

	Coefficient	z-value
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 1999/2000)	0.239**	10.84
Period 4 (summer semester 2000)	0.235**	10.36
Period 5 (winter semester 2000/2001)	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 years', 'male', 'Swiss', 'semester 1998/1999'. *Data source*: Compiled from data provided by the accounting department of the University of Zurich.

* Level of significance: $0.01 < P < 0.05$.

** Level of significance: $P < 0.01$.

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