

ARE POLITICAL ECONOMISTS SELFISH AND INDOCTRINATED? EVIDENCE FROM A NATURAL EXPERIMENT

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Most professional economists believe that economists in general are more selfish than other people and that this increased selfishness is due to economics education. This article offers empirical evidence against this widely held belief. Using a unique data set about giving behavior in connection with two social funds at the University of Zurich, it is shown that economics education does not make people act more selfishly. Rather, this natural experiment suggests that the particular behavior of economists can be explained by a selection effect. (JEL A13, A20, H41)

I. INTRODUCTION

Economic science is constantly being accused of having a blind spot. It is said that, compared to efficiency, equity is not given its just weight in the education of economists. Moreover, it is argued that the *Homo economicus* is too narrowly defined and that it does not explain the behavior of human beings accurately. According to the critics, the consequences of this oversimplified view of human behavior is that the students of economics act in a more selfish way than students of other social sciences.¹ Economists *create* the type of selfish persons (the *Homo economicus*) they axiomatically assume in their theories. If

this claim indeed holds in reality, the critics are right in emphasizing that economic science makes the much-needed cooperation in the world more difficult. Hirschman (1982, 1466) puts it the following way: "The emphasis on self-interest typical of capitalism makes it more difficult to secure the collective goods and cooperation increasingly needed for the proper functioning of the system in its later stages."

There is evidence that students of economics behave more selfishly than other people (e.g., Frank et al., 1993; 1996; Marwell and Ames, 1981; Frank and Schulze, 2000). The results are mainly based on laboratory experiments with students. These studies cannot exclude that economists see the experimental setting as "an IQ test of sorts" (Frank, 1988, 226). Students may play the equilibrium learned in their economics classes, but they do not apply it to real life situations. In contrast, we use a unique and extremely large data set (more than 96,500 observations) to study the behavior of economics students in a natural setting. At the University of Zurich, every student has to decide each semester whether he or she wants to donate money to two social funds managed by the university. We can observe the decisions of the students over five semesters and compare the behavior of economists with that of students of other disciplines. Most important, the data set enables us to analyze whether a possible difference in behavior is due to indoctrination in economic education or due to selection. Previous studies have had serious difficulties to discriminate between the competing hypothesis that behavioral differences emerge because (1) selfish persons choose to study economics

*We wish to thank Matthias Benz, Colin Camerer, Armin Falk, Ernst Fehr, Björn Frank, Robert H. Frank, Simon Gächter, Lorenz Götte, Reto Jegen, Dorothea Kübler, David N. Laband, David Laibson, George Loewenstein, Felix Oberholzer-Gee, Axel Ockenfels, Matthew Rabin, Günther Schulze, Stephanie Seguino, Tom Stanley, Alois Stutzer, Gordon Tullock, the coeditor of *Economic Inquiry*, and an anonymous referee for helpful remarks.

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1. See Kelman (1987) and Ostrom (1998). The latter warns: "We are producing generations of cynical citizens with little trust in one another, much less in their government. Given the central role of trust in solving social dilemmas, we may be creating the very conditions that undermine our own democratic ways of life" (18).

(selection hypothesis) or (2) training in economics causes students to act more selfishly (indoctrination hypothesis). The data set used allows addressing these two questions. Moreover, the panel structure of the data enables to exclude individual heterogeneity by controlling for personal fixed effects.

Comparing the behavior of economists and noneconomists in a natural setting, we reach significantly different results from previous studies:

1. Political economists (to use the classical term) are not more selfish than the average student, but students of business economics are.

2. The higher level of selfishness of business students is due to self-selection, not indoctrination.

3. Students of the economic sciences (i.e., both political and business economists) are about as selfish as law students. The willingness of economics students to contribute decreases during their studies somewhat but to a lesser extent than medical and veterinary students.

The article proceeds by presenting previous studies in section II. Section III discusses the data used. Section IV submits the analysis and results of our inquiry. Section V draws conclusions.

II. PREVIOUS STUDIES

Frank et al. (1993; 1996) seem to have convinced most of the academic community that an economics education has a negative influence on a student's cooperative behavior.² But the literature on the topic is much less uniform than the conclusion of Frank et al. (1996, 192), who argue that there is "a heavy burden of proof on those who insist that economics training does not inhibit cooperation." Although Carter and Irons (1991, 174), using an ultimatum game experiment, find that "economists are born, not made," Yezer et al. (1996, 177) go as far as to claim that economists

2. Of course, some academics do not agree with Frank et al.: "I am among those who remain skeptical about the significance of self-reported contributions to charity, or about behavior in hypothetical or small-stakes Prisoners' Dilemma experiments" (Hirschleifer, 1994, 1). An indoctrination effect has also been found by Blais and Young (1999), who test the impact of the rational choice model of voting on the political participation in a national election campaign in Canada. Their 10–12-minute introduction to Downs's participation model *ceteris paribus* reduced the turnout of the students involved by 7 percentage points. For a similar experiment, see also Brunk (1980).

are "actually substantially more cooperative than...their counterparts studying other subjects."³ Only two of the previous studies on this topic go beyond laboratory experiments. One of them is a "lost letter" experiment by Yezer et al. (1996). They dropped envelopes containing money in the classrooms of economists and noneconomists. Based on the number of envelopes returned, they calculated that economists are even less selfish than noneconomists. However, the authors cannot control for personal characteristics (e.g., gender and age) because they do not know who picks up the envelope. A second article, looking at real-world behavior, is that of Laband and Beil (1999). They consider differences in the professional associations' dues payment, which are income-based. However, income is self-reported (hence, the correct amount cannot be enforced). With that in mind, the authors undertake a survey of the members' true income and find that sociologists are more likely to cheat than either economists or political scientists. If the monetary incentives for cheating (owing to different dues) are taken into account, the authors believe that there are no significant differences between professional academics. But again, this study does not control for personality variables and cannot reveal to what extent the observed phenomenon is the result of a selection or indoctrination effect. Therefore "The effect of training and/or self-selection on cooperation remains a wide-open problem" (Ledyard, 1995, 161). In contrast to these previous studies, we are able to address these questions in a natural setting.

III. THE DATA

Each semester, all the students at the University of Zurich have to decide of whether or not they want to contribute to two official social funds—in addition to paying the compulsory tuition fee. On the official letter for renewing their registration, the students are asked whether they want to voluntarily give a specific sum of money (CHF7, about US\$4.20) to a fund that offers cheap loans to needy students (Loan Fund) and/or a specific sum of money (CHF5, about US\$3) to a second

3. Further studies unable to find a negative effect of economics education on cooperation are Marwell and Ames (1981), Frey et al. (1993), Bohnet and Frey (1995), Seguno et al. (1996), Cadsby and Maynes (1998), Stanley and Tran (1998), and Frank and Schulze (2000).

fund supporting foreigners who study at the University of Zurich (Foreigner Fund). Without their explicit consent (shown by ticking the appropriate box), students do not contribute to any fund at all. The students sign their assent. Our data refers to the decisions made in the five semesters from the winter semester 1998/99 up to and including the winter semester 2000/2001. The fact that every student of the University of Zurich has to decide each semester if he or she is willing to contribute to one or both of the social funds generates a large number of observations. We examine the choices of 28,586 students who decide an average of 3.4 times, depending on the number of semesters they have attended. The decisions of the five semesters are pooled, which yields 96,783 observations. The data enable us to compare the effect of studying different disciplines on cooperative behavior and provides the opportunity of controlling for a possible effect of economics education.⁴ Table 1 shows the summary statistics of the data set used. The table also reveals the percentage of students contributing to one of the funds.

Students can already specialize in economics at high school. This influence is controlled for by the variable *pre-university knowledge* (in economics). How the study of economics at the University of Zurich is organized allows us to control for different levels of economic knowledge. Initially, students undertake their *basic study*, which takes about two years. After passing an exam covering the basics of micro- and macroeconomics, they enter the *main stage* of their study and choose between political or business economics.⁵ In the U.S. setting, the term *political economics* is simply called *economics*, and *business economics* is often called *business administration*. After graduating, the students may then take up their *Ph.D. study*. The strict official procedures applied when renewing student registration offer a controlled environment and at the same time a natural setting. The results can therefore be compared to the results on giving in fairness games in

economic laboratory experiments. Moreover, the amounts in question are similar to those that have been used in the experiments designed to analyze the issue mentioned.

IV. ANALYSIS AND RESULTS

A first glance at the raw data would suggest that economists are more selfish than other students: 61.8% of the economics students (political and business economists) contribute to at least one of the funds, compared to 68.7% of the students with other majors.⁶ In the following sections, the two possible explanations for this pattern of behavior will be tested: (1) selfish individuals study economics (selection hypothesis). The difference in giving behavior is therefore independent of studying economics. (2) The students adapt their behavior over time to the basic axiom of the theory they study (indoctrination hypothesis). Throughout their studies, economics students become more selfish, according to the principles of economic theory. Because the two explanations are not mutually exclusive, it is important to discriminate between the two hypotheses.

Figure 1 shows the percentage of economists and noneconomists who contribute to at least one of the social funds, depending on how many semesters they studied at the University of Zurich. For economics students, therefore, the *number of semesters* is equivalent to the number of semesters of economics training. Three aspects catch the eye immediately:

1. The difference between economists and noneconomists already exists at the very beginning of their studies, before the students have had a single lecture in economics. This supports the selection hypothesis.

2. A clear pattern of behavior over time is not obvious. The difference between economists and noneconomists does not significantly widen as the students progress with their studies. The differences even decrease right at the beginning of the economics education, reaching a minimum after three years (six semesters) of studies. After this point, the decline in contribution probability seems to be greater for economists. The differences may, of course,

6. Taking all economists into account, 54.87% contribute to both funds, and 4.14% contribute to the Foreigner Fund and 2.79% to the Loans Fund. For noneconomists, the distribution is 61.84%, 4.46%, and 2.35%.

4. The University of Zurich is the biggest university in Switzerland, with 20,000 students altogether, and offers the whole range of disciplines that can be studied in Switzerland.

5. Unlike the situation in most U.S. universities, the two fields of study are quite separate throughout the main stage of study at the University of Zurich. Students of business economics need not take any courses in political economy, and students of political economics need not take any courses in business economics.

TABLE 1
Summary Statistics

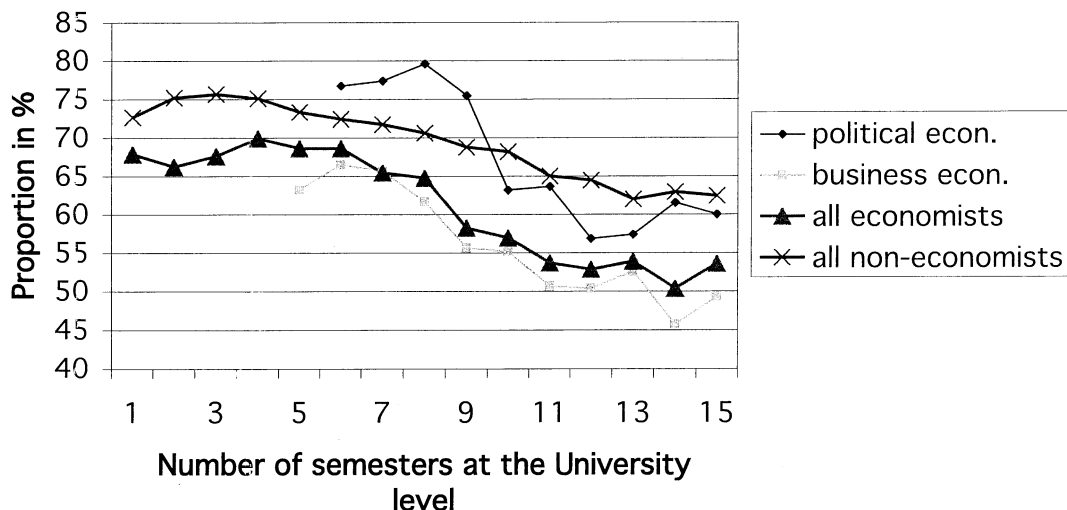
Variables	Numbers of Observations	Percentage of Total Number of Students	Percentage Who Contribute to at Least One Fund
<i>Economists</i>	9,825	10.15	61.80
Basic stage	4,620	47.02	67.21
Freshmen	907		68.03
Main stage	4,273	43.49	56.07
Political economists	488		65.98
Business economists	3,150		54.16
Ph.D.	932	9.49	61.27
Political economists	248		62.90
Business economists	606		59.08
<i>Noneconomists</i>	86,958	89.85	68.65
Basic stage	23,740	27.30	71.12
Freshmen	6,842		72.76
Main stage	48,244	55.48	69.92
Ph.D.	14,976	17.22	60.62
Theology	982	1.01	76.88
Law	15,616	16.14	63.45
Medicine	10,966	11.33	65.53
Veterinary medicine	2,640	2.73	57.61
Arts faculty	43,592	45.04	72.44
Natural science	10,420	10.77	66.60
Computer science	2,742	2.83	65.83
Pre-university economic knowledge	16,882	17.44	65.00
<i>Age, mean (SD)</i>	27.77 (8.29)		
Aged below 26	46,298	47.84	70.53
Age 26–30	26,416	27.29	62.52
Age 31–35	12,770	13.19	65.26
Age 36–40	5,819	6.01	70.22
Age over 40	5,480	5.66	76.22
<i>Gender</i>			
Women	47,808	49.40	68.58
Men	48,975	50.60	67.34
<i>Nationality</i>			
Foreigner	11,052	11.42	62.54
Swiss	85,731	88.58	68.65
Number of semesters, mean (SD)	10.44 (8.15)		
Period 1 (winter semester 1998/99)	19,507	20.16	64.15
Period 2 (summer semester 1999)	18,231	18.84	67.07
Period 3 (winter semester 1999/00)	20,060	20.73	69.06
Period 4 (summer semester 2000)	18,650	19.27	69.10
Period 5 (winter semester 2000/01)	20,335	21.01	70.24

Source: Compiled from data provided by the accounting department of the University of Zurich 1998–2000.

be due to various factors not connected with economics education. Maybe in later semesters, economics students (who passed the exams) differ in their willingness to contribute

from students in the basic stage of study, an effect not linked with their economics training. Such problems will be addressed in the following sections. However, the raw data

FIGURE 1
Proportion of Economists and Noneconomists Who Contribute to the Funds



do not seem to support the indoctrination hypothesis.

3. There are big differences between political and business economists. The curve for the two subgroups of economists starts when the students enter the main stage of their studies in their fifth semester and choose one of two directions in economics. Even after two years of studying economics, political economists are more prepared to give to one of the funds than the average student. The readiness of political economists to donate to one of the funds even increases in the following year. After this peak, the willingness to contribute decreases sharply for political economists. But again, unobservable heterogeneity of the students may be a problem: Most economics students finish their studies within this period. Therefore, the decrease does not necessarily indicate an indoctrination effect. Above all, it would be surprising if an indoctrination effect would be effective only after eight semesters of economics training.

In the following sections, these patterns are tested controlling for the gender and age structure of the different groups. Moreover, the extent of economic knowledge of the students is also controlled for.

A. Is There a Selection Effect?

To distinguish between the selection and the indoctrination hypothesis, we need to take a closer look at the choice of whether to

contribute or not when first starting university (*Freshmen*). Differences between students of various disciplines at the very beginning of their studies (before they've been to a single lecture in economics) support the selection hypothesis.

Table 2 presents the results of a probit analysis. The dichotomous dependent variable equals one if the student contributes to at least one fund, and equals zero if the student chooses not to give any money at all. Throughout the analysis, we look at the minimum contribution ("to at least one of the funds"). Multinomial logit analysis of the estimated models do not change the results at all and are therefore not reported in the article. We control for economic knowledge acquired at high school, the main source of preuniversity economics training. The dummy variable *Pre-university knowledge* equals one if the students attended a high school with an economic orientation and zero otherwise.⁷ A description of variables is provided in the Appendix. Control variables are personal factors (age, gender, nationality, and the numbers of semesters studied at the University of Zurich) and dummy variables for the semester/year in question. As in a probit analysis, the coefficients are

7. A special dummy variable for students who did not obtain their high school qualifications in Switzerland (and for whom no information about potential preuniversity knowledge in economics was available) did not prove to have any effect. Hence, it was not taken into account.

TABLE 2
Contribution of Economists and Noneconomists

Variable	Model I			Model II Subsample: Students Who Changed Their Behavior at Least Once		
	Coefficient	z-Value	Marginal Effect (%)	Coefficient	z-Value	Marginal Effect (%)
Economist (1 = economist)	-0.082**	-3.46	-2.9	-0.068	-1.76	-2.7
<i>Stages of study</i>						
Freshmen	-0.088**	-4.25	-3.1	-0.300**	-7.68	-11.9
Freshman * Economist	-0.022	-0.41	-0.7	0.229*	2.36	8.9
Main stage	0.112a**	8.70	4.0	0.048*	2.22	1.9
Main stage * Economist	-0.192**	-6.15	-6.9	-0.041	-0.79	-1.6
Ph.D.	-0.006	-0.35	-0.2	0.042	1.36	1.7
Ph.D. * Economist	0.128**	2.60	4.6	0.145	1.68	5.7
Pre-university knowledge	-0.109**	-9.58	-3.9	-0.018	-0.96	-0.7
<i>Control variables</i>						
Age 26-30	-0.006	-0.49	-0.2	0.004	-0.20	-0.2
Age 31-35	0.188**	11.02	6.7	0.029	0.99	1.2
Age 36-40	0.363**	16.17	12.9	0.108**	2.66	4.3
Age over 40	0.526**	21.55	18.7	0.077	1.69	3.0
Gender (female = 1)	-0.030**	-3.44	-1.1	0.005	0.34	0.2
Nationality (foreigner = 1)	-0.109**	-8.23	-3.9	-0.032	-1.37	-1.3
Number of semesters	-0.046**	-23.03	-1.6	-0.024**	-6.78	-1.0
(Number of semesters) ²	0.001**	13.73	0.02	0.000**	5.51	0.02
Period 2 (summer semester 1999)	0.076**	5.60	2.7	0.131**	5.45	5.2
Period 3 (winter semester 99/00)	0.138**	10.47	4.9	0.179**	7.82	7.1
Period 4 (summer semester 2000)	0.134**	9.89	4.8	0.111**	4.67	4.4
Period 5 (winter semester 00/01)	0.174**	13.17	6.2	0.108**	4.44	4.3
Constant	0.670**	40.382		0.131**	4.53	
N	96,783			29,874		
Log likelihood	-59,461.91			-20,532.65		

Source: Compiled from data provided by the accounting department of the University of Zurich 1998-2000.

Notes: Dichotomous dependent variable: Contribution to at least one fund = 1; probit estimates. Reference group consists of noneconomists, basic study, without preuniversity economic knowledge, aged below 26, male, Swiss, semester 1998/99.

* $0.01 < p < 0.05$.

** $p < 0.01$.

not easy to interpret, the marginal effects are computed. They show how the probability of contributing changes compared to the reference group. Model I shows the probit estimation for the whole sample, which combines people who never changed their decision in the five semesters and those who did indeed change their behavior in the respective period.

The first part of model I of Table 2 suggests that a selection effect exists. Economists in the broad sense (students cannot choose between business and political economics until they

reach the main stage of their studies) donate less to the funds compared to noneconomists. The probability that an economist contributes is about 3 percentage points less than for a noneconomist. To show that this lower willingness to contribute exists at the very beginning of the studies, the variable for economists has to be interpreted along with "being a freshman in economics" (*Freshman * Economist*). The results suggest that already when the very first choice is made whether to contribute or not (it happens before the first lecture in economics), economics students act more

selfishly than noneconomists do.⁸ The differences between economists and noneconomists at the very beginning of their studies remain if we run the same regression with the subsample for freshmen only.

The estimate also controls for preuniversity education: Having a high school education with an economics orientation is associated with a significantly lower propensity to donate to other students. The probability of contributing is 3.9 percentage points lower. This effect can be either the result of a selection effect or an indoctrination effect. The important point for our study is that although preuniversity economic education has an impact, it does not explain the selection process. Independent of the preuniversity education, a selection of more selfish people opting to study economics takes place.⁹ The personality variables have the following effect: All other influences being equal, the older a student is (above age 30), the more likely he or she is prepared to contribute to the fund. Although the effect of age is insignificant below age 30, it becomes increasingly significant and important after age 30. Women and foreigners are less prepared to donate. The same holds for the number of semesters a student stays at the university. This last variable suggests that repetition tends to reduce willingness to donate.

B. Is There an Indoctrination Effect?

A particularly interesting question is whether the teaching of economic theory has a negative effect on students' cooperative behavior. The more the students of economics learn about the prisoner's dilemma game, the more aware they are that cooperation should tend toward the Nash equilibrium, that is, toward no contribution. For students who are not familiar with economic theory, such a decline in cooperation is not expected to take place. If the difference in giving behavior between the

students of economics and the other disciplines increases with every additional semester, the indoctrination hypothesis is not rejected. To capture specific knowledge in economics, we compare the behavior of the students at each stage of their studies. The reference group consists of noneconomists in the basic stage of their studies. The results of model I in Table 2 provide an inconsistent picture with respect to the indoctrination effect: Moving from the basic stage to the main stage of university education raises students' readiness to help other students financially by 4.0 percentage points. The coefficient on the dummy for *Main stage * Economist* measures the differences between economists and noneconomists when entering the main stage of their studies, and hence serves as a test for possible indoctrination effects. For economics students entering the main stage of their studies, the probability of contributing to the fund is reduced by 6.9 percentage points—in addition to the general effect for entering the main stage of their studies. But this result does not necessarily indicate the impact of indoctrination, because the probability of contributing increases for doctoral students in economics, whereas for doctoral students in other disciplines the willingness to donate decreases. If indoctrination really influences the behavior of students, the effect should be most marked at the doctoral level, when the students have absorbed the largest amount of economics teaching.

The results and interpretation of the indoctrination effect presented are problematic especially in one respect: Students in the main stage of their studies represent a particular selection of people compared to students in the basic stage because a large proportion of students do not pass the exam enabling them to enter the main stage. The same argument can be raised with respect to doctoral students, who certainly differ in many respects from students working only for their master's degree. It may be that people who end up passing the exams are less prepared to contribute to the funds compared to drop-outs. Comparing students in the basic and in the main stage with each other may be misleading, because the two groups differ in a dimension not observable. Thus, a sample selection bias cannot be excluded. To eliminate these doubts, we use the panel structure of the data set and test the indoctrination effect in a conditional logit

8. The overall lower probability (−3.1 percentage points) at the time of the very first decision cannot be compared to first period decisions in fairness experiments, where contribution is normally highest (see, e.g., Ledyard, 1995). The freshmen at the University of Zurich decide before attending any classes and before meeting any other students. Thus, between the first and subsequent decisions, an important variable changes, which can best be described in terms of social distance. For the effect of social distance in games, see Bohnet and Frey (1999) and Hoffman et al. (1996).

9. If only students with no high school economics are in the data set, the results of the probit analysis do not change.

TABLE 3
Contribution of Economists and Noneconomists

Variables	Model I		Model II	
	Coefficient	z-Value	Coefficient	z-Value
Number of semesters	-0.035	-1.444	-0.038	-1.550
Semesters in economics	-0.023	-0.782		
Freshmen	-0.350**	-5.680	-0.417**	-6.166
Freshman * Economist			0.398*	2.516
Main stage	-0.110	-1.594	0.065	0.888
Main stage * Economist			0.115	0.503
Ph.D.	-0.153	-0.943	-0.209	-1.255
Ph.D. * Economist			0.499	0.702
Age	0.107*	2.322	0.107*	2.340
N	29,874		29,874	
Log likelihood	-11153.193		-11150.103	
LR chi ²	91.71		97.89	

Source: Compiled from data provided by the accounting department of the University of Zurich 1998–2000.

Notes: Dichotomous dependent variable: Contribution to at least one fund = 1; conditional fixed effects logit model. Reference group consists of noneconomists, basic study, semester 1998/99.

*0.01 < p < 0.05.

**p < 0.01.

model with personal fixed effects. With this method, we can exclude any biases by holding unobserved personal characteristics constant.

In this kind of model, students are only of interest if they have at least once altered their decision, that is, changed their mind with respect to contributing to the funds, and so the sample is reduced to 7,129 persons. These students decided on average 4.2 times, which leads to 29,874 observations. Model II of Table 2 reruns the probit estimation with the subsample of students, who changed their decision at least once in the period under observation. The results of model II do not show any indoctrination effect. Economists do not change their behavior after the initial decision. The coefficient of *Freshmen* and *Freshmen* × *Economists* therefore cancel each other out. The coefficients of *Main stage* × *Economist* and *Ph.D.* × *Economist* are no longer statistically significant, and in particular, *Main stage* × *Economist* is very small. The variable *Economists*, which includes political and business economists, shows that for people who are observed to have altered their decisions, a behavioral difference between economists and noneconomists still exists, though the level of significance is lower. Model II of Table 2 suggests that when looking only at

the students who changed their decision, there is not much of an indoctrination effect. However, we cannot exclude from this estimation that unobserved personal heterogeneity biases our results.

Table 3 presents the results of a conditional fixed-effects logit model. With this method, we are able to address the indoctrination hypothesis and exclude unobservable heterogeneity among students. This also means that the selection hypothesis cannot be analyzed any more in this context. All the characteristics responsible for the selection effect are captured by the individual fixed effects; thus, the conditional fixed-effect model abstracts from the selection hypothesis and identifies a potential indoctrination effect. In Table 3, a possible indoctrination effect is shown in two ways: In model I, we look at the effect of an additional semester in economics, and in model II, the explicit economic knowledge is captured by the different stages in the studies. Both methods allow us to address the issue of whether students become less generous as they progress in their studies. The coefficients have to be interpreted as the effect of a change in economic knowledge—either through an additional semester in economics or through a shift from one stage to another. The results in Table 3 do not support

the indoctrination effect. The coefficient of an additional *Semester in economics* and the coefficient of the relevant interaction terms *Main stage * Economist* and *Ph.D. * Economist* are far from being statistically significant. Moreover, in model II the variables do not have the right sign for an indoctrination effect.

A robust effect seems to be that students contribute less the first time they have to decide. Thus, the coefficient shows that *Freshmen* give less than students in the basic stage (reference group). For an *Economist*, such a freshman effect does not exist. We have to interpret the coefficient for *Freshmen* and the interaction term *Freshman * Economist* jointly, and they cancel each other out.

The behavior of freshmen in economics is no different from that of economics students in the basic stage of their studies. Once the first decision has been made, the probability of economists contributing does not increase. This can already be seen in the descriptive analysis (Figure 1). Thus the data do *not* support a negative effect of economics education on donating. The possible indoctrination effects of Table 2 are due to unobserved heterogeneity. This result is further supported by looking at two groups of economics students and then comparing the behavior of students of economics with students of other academic disciplines. This is done in the following sections.

C. Behavior of Students of Political and Business Economics

Table 4 focuses on the differences in contributing to the fund between the two types of students of the economic sciences; political economists on the one hand, and business economists on the other hand. Students are allowed to choose between the two economics majors only when they enter the main stage of their studies, that is, after they pass the exams concluding the basic stage of their studies (after approximately two years). Most prior studies (e.g., Frank et al., 1993, and Carter and Irons, 1991) concentrate exclusively on political economists. The analysis presented here allows us to distinguish between political economics students and those who study business economics.

As can be seen in Table 4, controlling for all the factors previously included in Table 2, political economists differ from other students to the same extent as when they first started

university. The effect of political economists entering the main stage (*Main stage * Political Economist*) is positive. Thus, political economists even get less selfish compared to noneconomists, but this effect is not statistically significant. In contrast, the probability of business students contributing to the social funds is—in addition to the general effect—over 7 percentage points lower in the main stage than in the basic stage. The results do not support the effect of education in economics, because political economists do not show any (statistically significant) behavioral differences from noneconomics students. But we—as well as prior studies—are primarily interested in the behavior of political economists, because they learn economic theory the most intensively. Thus, any alleged indoctrination effect should be the greatest in this group. Again we run a conditional fixed-effect logit model (model II in Table 4) to control for unobserved heterogeneity. The results support the conclusion that economics education does not have a negative impact on the willingness to contribute. None of variables testing the indoctrination effect has the right sign or is statistically significant.

As already mentioned, students can only choose between studying political or business economics only after the initial two years, and we therefore do not know if the general effect of *Economist* (in the widest sense) is to be attributed to political or business economists. But the five semesters enable us to observe how students who later chose to study either political or business economics behaved in the basic stage of their studies. The raw data is already convincing: Among business economists, whose behavior we know in the basic stage, 61% donated money to at least one fund. In contrast, 73% of political economists contributed in the basic stage to at least one fund. This suggests that the selection effect identified is almost entirely due to business students.

D. Comparison with Students of Other Disciplines

Most previous studies on the cooperation of economists only compare economists' behavior to one or two particular groups of persons, particularly sociologists (Laband and Beil, 1999; Isaac et al., 1985), biologists and psychologists (Yezer et al., 1996), astronomers (Frank et al., 1993) or nurses (Cadsby and Maynes, 1998). Our large data set allows to compare

TABLE 4
Contribution of Political and Business Economists

Variable	Model I Probit Estimate			Model II Conditional Fixed Effect Logit	
	Coefficient	z-Value	Marginal Effect (%)	Coefficient	z-Value
Economist (in the broad sense)	-0.103**	-4.794	-3.7		
<i>Stages of study</i>					
Freshmen	-0.091**	-4.461	-3.3	-0.421**	-6.265
Freshman * Economist	-0.001	-0.018	-0.03	0.400*	2.532
Main stage	0.106**	8.406	3.8	0.060	0.839
Main stage * Political economist	0.088	1.402	3.1	0.864	1.652
Main stage * Business economist	-0.213**	-6.788	-7.6	0.103	0.575
Ph.D.	-0.008	-0.430	-0.3	-0.198	-1.199
Ph.D. * Political economist	0.178*	2.099	6.3	0.473	0.377
Ph.D. * Business economist	0.099	1.733	3.5	0.341	0.430
Pre-university economic knowledge	-0.109**	-9.568	-3.9		
<i>Control variables</i>					
Age				0.107*	2.329
Age 26-30	-0.007	-0.568	-0.3		
Age 31-35	0.188**	11.046	6.7		
Age 36-40	0.363**	16.164	12.9		
Age over 40	0.526**	21.556	18.7		
Gender (female = 1)	-0.029**	-3.354	-1.0		
Nationality (foreigner = 1)	-0.109**	-8.256	-3.9		
Number of semesters	-0.046**	-23.049	-1.6	-0.039	-1.566
(Number of semesters) ²	0.001**	13.739	0		
Period 2 (summer semester 1999)	0.077**	5.698	2.8		
Period 3 (winter semester 1999/00)	0.140**	10.635	5.0		
Period 4 (summer semester 2000)	0.136**	10.032	4.9		
Period 5 (winter semester 2000/01)	0.176**	13.356	6.3		
Constant	0.672**	40.639			
N	96,783			29,874	
Log likelihood	-59456.66			-11148.81	
				(LR chi ²) 100.48	

Source: Compiled from data provided by the accounting department of the University of Zurich 1998-2000.

Notes: Dichotomous dependent variable: Contribution to at least one fund=1. Reference group consists of noneconomists, basic study, without preuniversity economic knowledge, aged below 26, male, Swiss, semester 1998/99.

*0.01 < p < 0.05.

**p < 0.01.

economists' behavior with students of several other disciplines. Table 5 compares the contribution by the students of various disciplines, again holding personal characteristics and other variables previously included in Table 2 constant.

The reference group is composed of students from the arts faculty, which constitutes the biggest faculty at the University of Zurich (roughly 8,600 students). Looking at the pure

effect of one's chosen subject, students of the economics faculty are about as selfish as law students, whereas a much higher proportion of theology students are prepared to subsidize other students.

When students move to the *main stage* of their studies, their probability of donating increases on average, as already stated. However, large differences between the different disciplines emerge. For instance, being a

TABLE 5
Contribution of Economists and Students of Other Faculties

Variable	Coefficient	z-Value	Marginal Effect (%)
Economics	-0.186**	-7.677	-6.6
Theology	0.213**	3.040	7.6
Law	-0.166**	-6.882	-5.9
Medicine	0.028	0.974	1.0
Veterinary medicine	-0.154**	-3.501	-5.5
Natural science	-0.059*	-2.050	-2.1
Computer science	-0.113**	-3.063	-4.0
Freshmen	-0.113**	-5.514	-4.0
<i>Main stage (interaction terms)</i>			
Political economics	0.099**	4.645	3.5
Business economics	0.092	1.456	3.3
Theology	-0.213**	-6.405	-7.5
Law	-0.007	-0.067	-0.3
Medicine	-0.089**	-3.006	-3.2
Veterinary medicine	-0.119**	-3.164	-4.2
Natural science	-0.225**	-3.391	-8.0
Computer science	-0.114**	-3.183	-4.1
Computer science	-0.108	-1.806	-3.8
<i>Ph.D. (interaction terms)</i>			
Political economics	0.213**	7.141	7.6
Business economics	-0.021	-0.243	-0.8
Theology	-0.111	-1.843	-3.9
Law	-0.278**	-2.478	-9.9
Medicine	-0.340**	-8.272	-12.1
Veterinary medicine	-0.468**	-11.688	-16.6
Natural science	-0.483**	-7.566	-17.2
Computer science	-0.120**	-2.816	-4.3
Computer science	-0.382**	-4.190	-13.6
Pre-university economic knowledge	-0.084**	-7.348	-3.0
N	96,783		
Log likelihood	-59,081.479		

Source: Compiled from data provided by the accounting department of the University of Zurich 1998–2000.

Notes: Dichotomous dependent variable: Contribution to at least one fund = 1; probit estimates. Reference group consists of students of the arts faculty, basic study, without preuniversity economic knowledge, aged below 26, male, Swiss, semester 1998/99. Due to lack of space, the control variables of Table 2 are not shown in the table.

* $0.01 < p < 0.05$.

** $p < 0.01$

student of veterinary medicine lowers the probability of paying into the funds by more than 8.0 percentage points, compared to arts students (reference group). Business economics students give 7.5 percentage points less than art students when entering the main stage—this decrease in the willingness to contribute is as large as for veterinary students. When entering the main stage, students of political economy change their willingness to donate to the same extent as the reference group (students of the arts faculty). Though the interaction term that captures the deviation

from the reference group is positive, it is statistically insignificant. Our results suggest that political economists' willingness to donate money does not diminish as they progress with their studies, compared to students of other disciplines.

When students graduate and take up their Ph.D. studies, the probability of their donating money increases by 7.6 percentage points. For students of law, medicine, and veterinary medicine, the readiness to donate drops—in addition to the general effect (12.1, 16.6, and 17.2 percentage points, respectively). When moving

into the *Ph.D.* stage, political and business economists' willingness to give does not fall in a statistically significant way compared to students in the arts faculty. Once again, our results suggest that to isolate an indoctrination effect, it is crucial who the economists are compared with.

E. Testing for Other Determinants of Giving Behavior

The question of whether there is an indoctrination or a self-selection effect was further studied with the help of an anonymous online survey among the same student population of the University of Zurich as the data set on giving behavior.¹⁰ The response rate was 18%. From this sample, we could use 2,321 replies containing answers to all relevant questions. 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. Model I in Table 6 estimates a very similar model as in Table 2 to see how biased the sample is. This procedure can be undertaken because the survey is closely linked to the natural decision at the university. The results show—compared to Table 2—that the sample is not strongly biased with respect to the effect of the different stages in the study and the control variables.

The most important question asked in the survey was again whether a person contributes money to one or both of the funds. Seventy-three percent responded that they did, compared to the 68% who actually contributed. As the survey responses are totally anonymous, it is not possible to analyze whether the differences are due to students who do not truthfully reply or to the fact that students who behave unselfishly toward the funds are more likely to respond to the survey. But the differences should be kept in mind when interpreting the results.¹¹

10. The online questionnaire is reproduced at www.iew.unizh.ch/grp/frey/fragebogen.htm.

11. Differences between survey answers and actual behavior have also been observed with respect to voting behavior (see Matsusaka and Palda, 1999). For distributional transfers being greater if they are hypothetical rather than real, see the experimental evidence by Eichenberger and Oberholzer-Gee (1998).

The main purpose of the survey is to better control for factors affecting giving behavior unconnected to the issue of indoctrination versus selection. The survey allows us to determine the income situation, assuming that the better off a student is, the more likely he or she is to help others. Those students working to help finance their studies (which is a significant number of students at the University of Zurich) are expected to donate less. In contrast, when parents pay for their studies (and therefore the contribution to the funds), it is likely that students are more generous with respect to their fellow students.¹² In addition, various motives for giving money to the fund were queried: expectations concerning the contribution of other students, one's political orientation on a left/right spectrum (ranging from one to eight; with 8 = the furthest left), the fund's perceived necessity and effectiveness, and the perceived importance of individual participation (on a scale ranging from one to eight with a no opinion option; with 8 = the strongest emphasis on necessity and effectiveness of the funds, and the importance of individual participation). Model II in Table 6 presents the probit estimates, again controlling for age, gender, and the number of semesters attended.

The survey once more suggests that the giving behavior of political economists does not differ significantly from noneconomists as they progress in their studies. Students of business economics give significantly less when they enter the main stage of their studies. Model II in Table 6 reports a higher coefficient for economists in general than for noneconomists, which is due to the differences in attitudes and political orientations in the sample. Economists are on average more critical about the funds and tend to be more to the right of the political spectrum—both factors lower the probability of donation. Because we control for these variables in model II, the coefficient for economists in the broad sense becomes positive and statistically significant. But the differences in values and political orientation do not change the behavior of business economists throughout their studies. They exist already at the beginning of their studies and are independent of economics education.

12. See Andreoni (2001) for an overview about factors influencing giving behavior, Thaler (1985) for mental accounting, and Kirchgässner (1992) for low-cost decisions.

TABLE 6
Factors Affecting Giving Behavior

Variable	Model I			Model II		
	Coefficient	z-Value	Marginal Effect (%)	Coefficient	z-Value	Marginal Effect (%)
Economist (in the broad sense)	0.152	1.281	4.9	0.391**	2.829	11.3
<i>Stages of study</i>						
Main stage	0.045	0.603	1.5	0.080	0.944	2.3
Main stage * Political economist	-0.245	-0.91	-7.9	-0.208	-0.648	-6.0
Main stage * Business economist	-0.427*	-2.523	-13.8	-0.413	-2.087	-12.0
Ph.D.	0.011	0.103	0.4	0.119	0.947	3.5
Ph.D. * Political economist	0.378	0.562	12.2	1.234	1.614	35.7
Ph.D. * Business economist	0.250	0.481	8.1	0.156	0.261	4.5
<i>Income situation</i>						
Income (log)				0.188**	3.88	5.5
Contribution (%) toward own upkeep				-0.003*	-2.249	-0.1
Parents paying fees				0.067	0.785	2.0
<i>Attitudes and expectations</i>						
Expectation about behavior of others				0.019**	11.327	0.6
Political orientation				0.061**	2.617	1.8
Necessity of funds				0.095**	3.49	2.7
Effectiveness of funds				0.085**	3.235	2.5
Importance of contributing				0.241**	10.963	7.0
No opinion on necessity				0.367	1.893	10.6
No opinion on effectiveness				0.479**	3.065	13.9
No opinion on importance				0.851**	4.84	24.6
<i>Control variables</i>						
Age	0.014*	2.153	0.4	0.016	1.917	0.5
Sex (female = 1)	0.056	0.972	1.8	-0.180**	-2.627	-5.2
Number of semesters	-0.019**	-2.83	-0.6	-0.019*	-2.505	-0.6
Constant	0.365*	2.253		-4.780**	-11.393	
N	2,321			2,321		
Log likelihood	-13,22.2735			-979.11015		

Source: Own survey carried out at the University of Zurich 2000.

Notes: Dichotomous dependent variable: Contribution to at least one fund = 1; probit estimates. Reference group consists of noneconomists, basic study, males, who pay their fees themselves.

*0.01 < p < 0.05.

** p < 0.01.

They therefore also support the selection hypothesis that business economists are a special group of people. Similar results are due to Gandal and Roccas (2000), who analyze the values held by economists and noneconomists. They identify differences in value priorities reported by students of economics compared to noneconomists. But these differences already emerge before any economics indoctrination can take place.

The results on income and attitudes are not surprising. As expected, income has a strong positive effect on giving. The more a student finances his or her own living, the less he or she is willing to contribute. The fact that parents pay the fees does not change in a statistically significant way the probability of one's own decision to donate. The variables reflecting students' values all have the expected sign and are statistically significant. Expectations

regarding how many others donate money correlates positively with the decision to contribute. The notion of conditional cooperation is supported by these results (e.g., Sugden, 1984; Fischbacher et al., 2001). Of course, the causality is not obvious due to the false consensus effect (Ross et al., 1977; Dawes et al., 1977). People do not contribute because others do, but they expect others to contribute because they themselves do. The variables used as controls are (with one exception) all statistically significant and have the expected sign. Differences in these determinants of giving behavior cannot explain the behavioral differences between economists and noneconomists.

V. CONCLUSIONS

The analysis of the actual behavior of the students with respect to donating money to a fund as a pure public good, as well as an online survey of the same population, allows us to draw three conclusions:

1. Political economists' willingness to donate money does not diminish by studying economic theory;
2. It is the students of business economics who give significantly less than other students;
3. The lower contribution of business economists, compared to other students, is due to self-selection rather than indoctrination.

These conclusions are based on the real-life behavior of roughly 30,000 students at the University of Zurich, but they are likely to be of general relevance. Zurich provides a good example of a student body in a moderately large city. The students of economics, the focus of our study, receive a similar education in their particular discipline as do their counterparts elsewhere, especially in the United States (for example, many of the textbooks used are American). As a considerable number of the students are at the same time in gainful employment, they tend to be in close contact with the rest of the population. The results reached may therefore well apply to the behavior of economists in general, that is, outside of the university setting.

The conclusions drawn are important for two quite different reasons:

- Political economists need not fear that they have a negative effect on students' behavior with respect to altruistic giving. The students, in particular the graduates studying for a doctoral degree, understand that political

economics does not offer any normative advice with respect to giving.

- The charge often made against political economists, that they produce the type of selfish *Homo economicus* they assume in their theories, is unfounded.

APPENDIX: DESCRIPTION OF VARIABLES

Contribution to Funds Sample

- *Economic education*: Dummies for economists in the broad sense of the word, for political and for business economists, and for high school knowledge of economics. The reference group consists of noneconomists, without any high school knowledge of economics. Dummies for students of every faculty and interaction terms with the stage of study respectively. The reference group consists of arts faculty students.

- *Stage of study*: Dummies for freshmen (students starting university), the main stage, and the Ph.D. stage. The reference group consists of students in the basic stage of their studies. Interaction terms link the dummies for economists and the stage of study.

- *Number of semesters*: The number of semesters at the University of Zurich and the number of semesters squared.

- *Demographic factors*: Dummies for age 26–30, 31–35, 36–40, and over 40; for females; and for foreigners. The reference group consists of people below 26 years of age, males, and Swiss.

Survey Sample

- *Economic education*: See previous definition for this variable.

- *Income situation*: Log of income at one's disposal each month. Students' contribution (in %) toward their own upkeep. Dummy when parents cover the university fees. The reference group consists of students who pay the fees themselves.

- *Values*: Perceived necessity and effectiveness of the funds and perceived importance of individual participation on a scale from one to eight with a no opinion option; 8 = the strongest emphasis on necessity and effectiveness of the funds and the importance of individual participation. Political orientation on a scale from one to eight; 8 = the furthest left. Expectations about the behavior of others in percent (the question was: What do you think is the proportion of students who contribute to one of the funds?).

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