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Efficiency, equality and reciprocity in social preferences: A comparison of students and a representative population

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November 15, 2010

Abstract

The debate between Engelmann and Strobel (2004, 2006) and Fehr, Naef, and Schmidt (2006) highlights the important question of the extent to which lab experiments on student populations can serve to identify the motivational forces present in society at large. We address this question by comparing the lab behavior of a student group and a non-student group, where the non-student group on all observable factors is almost identical to the representative adult population in Norway. All participants take part in exactly the same lab experiment. Our study shows that students may not be informative of the role of social preferences in the broader population. We find that the representative participants differ fundamentally from students both in their level of selfishness and in the relative importance assigned to different moral motives. It is also interesting to note that while we do not find any substantial gender differences among the students, males and females in the representative group differ fundamentally in their moral motivation.

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The relative importance of different motivational forces has been a major issue in recent research on social preferences (Bolton and Ockenfels, 2000; Andreoni and Miller, 2002; Charness and Rabin, 2002; Engelmann and Strobel, 2004; Fisman, Kariv, and Markovits, 2007; Fehr et al., 2006; Cappelen, Drange Hole, Sørensen, and Tungodden, 2007), and it has been argued that there may be important differences across subject pools and economic environments. In particular, Fehr et al. (2006) report results suggesting that the efficiency motive is especially salient among students of economics and business administration, who have been trained in the idea that efficiency is desirable, whereas equality appears to be of major importance for non-economists (ranging, in their study, from students of various other disciplines to low-level employees of banks and financial institutions).¹ On this basis, they argue that the prominence of the efficiency motive in Engelmann and Strobel (2004), where all participants are students in economics and business administration, is due to a subject pool effect.

The debate between Engelmann and Strobel (2004, 2006) and Fehr et al. (2006) highlights the important question of the extent to which lab experiments on student populations can serve to identify the motivational forces present in society at large. We address this question by providing a comparison of the lab behavior of a student group and a non-student group. Our student group consists of second year students in economics and business administration, whereas our non-student group is almost identical to the adult population in Norway on observable factors. Both groups take part in exactly the same lab experiment. To our knowledge, this is the first study on social preferences that attempts to bring a nationally representative adult population into the lab, and we believe that such an endeavor is useful for gaining further understanding of the generality of the findings of lab experiments done on student populations.²

As pointed out by Fehr et al. (2006), social preferences may differ fundamentally across economic environments. They argue that equality is even more important in strategic games than in non-strategic games, but underline that better understanding of the functioning of different motivational forces in different environments is needed. The present study contributes to this by comparing the behavior of students and non-students both in a dictator game (a non-strategic environment) and in a generalized trust game (a strategic environment), where we focus on the relative importance of equality, efficiency and reciprocity in motivating the participants' behavior.³

Our study shows that the representative group differs fundamentally from the students both in their level of selfishness and in the relative importance assigned to different moral

¹See also Fisman, Kariv, and Markovits (2009) for a study of how training in economics may affect the concern for efficiency.

²A related interesting literature has looked at social preferences in non-student groups by conducting survey-experiments (Fehr, Fischbacher, von Rosenblatt, Schupp, and Wagner, 2003; Bellemare, Kröger, and van Soest, 2008).

³Our experiment does not investigate the distinction between a concern for equality and a concern for maximin, see Engelmann and Strobel (2004).

motives. First, the representative group gives away 81.5% more than the student group in the dictator game and returns 70.5% more in the trust game. Second, in the trust game, we find that the efficiency motive is stronger among representative males than among students, whereas representative females do not assign importance to efficiency. Third, only for representative males and students does the concern for equality expressed in the dictator game carry over to the return decision in the trust game. Among representative females, reciprocity concerns crowd out a concern for equality in a strategic environment.

The comparison of the student group and the representative group also illustrates the potential danger of studying gender differences on the basis of a very selected group such as students of economics and business administration. In our student group, males and females appear to have the same moral motives, whereas the behavior of males and females is fundamentally different in the representative group.

It is interesting to compare our findings for the representative group to Almås, Cappelen, Sørensen, and Tungodden (2010), who report results from a social preference lab experiment done on a group of children from 5th grade to 13th grade that is fairly representative for these age groups in Norway.⁴ In particular, it is striking to observe that the male-specific focus on efficiency among representative adults in the present study maps closely to the finding in Almås et al. (2010) that a concern for efficiency mainly develops among males throughout adolescence.⁵ This suggests that social preferences established in childhood have long-lasting effects on individual behavior.

The paper is organized as follows: Section 1 describes the sampling procedure; section 2 provides details on the experimental design; section 3 and section 4 report results from the dictator game and the trust game, respectively; section 5 concludes.

1 Samples and participants

Of the 256 participants in our study, 120 were second year students at the Norwegian School of Economics and Business Administration (NHH). The student group consisted of about 60% males and 40% females, which is in line with the gender distribution in the student population at NHH.

The remaining 136 participants were recruited from a representative sample of the Norwegian population. Two criteria determined the selection of the non-student sample. First, we wanted this sample to be representative of the Norwegian population with respect to age, gender, employment and income. Second, as we wanted all participants in our study to participate in a lab experiment at NHH, we considered it important that non-

⁴There is now a growing experimental literature on moral development in children, see among others Krause, Harbaugh, and Berry (2001); Sutter and Kocher (2007); Fehr, Bernhard, and Rockenbach (2008); Martinsson, Nordblom, Rützler, and Sutter (forthcoming).

⁵Martinsson et al. (forthcoming) report a similar finding in a study of social preferences among children in Sweden and Austria.

student participants did not have to travel too far. Based on data from Statistics Norway, we established that the population living in the 27 basic statistical units closest to NHH is representative for the population in Norway with respect to the selected dimensions.⁶ This region includes parts of the second largest city in Norway as well as less populated rural farming areas.

Following the approval of the experiment by both the Norwegian Social Science Data Services (“Norsk samfunnsvitenskaplig datatjeneste”) and the Norwegian Public Register (“Norsk Folkeregister”), EDB Infobank drew a random subset of 1000 persons from our representative population. We then randomly selected 460 individuals from this subset to be invited to take part in the experiment. Each individual received a personal letter inviting them to participate in a research project involving economic choices, but they were not informed about the details or the purpose of the experiment. The letter also gave the date and time of the session to which they had been assigned.⁷ The response rate for the representative group was 30.2% and for the student group 28.6%.⁸

Table 1 reports the characteristics of the non-student group relative to the representative sample and the Norwegian population at large. The data for Norway and the sample population were collected from Statistics Norway. The participants self-reported age, gender, and employment, but not income.⁹ We collected the income data for the participants from a publicly available tax return database. Since the participants were anonymous in the experiment, we cannot link income data and experimental data at the individual level.

We observe that the non-student group is fairly representative in terms of employment, gender, income, and age, with females being slightly overrepresented. Hence, even though the non-student group may not be fully representative relative to other characteristics, we retain the label representative in describing these participants.

⁶A basic statistical unit is the smallest geographical unit used by Statistics Norway.

⁷In the invitation they were told that they would receive 300 NOK (45 USD) in participation compensation for an experiment that would last for about one hour, and that they could earn more during the experiment. The student subjects received a similar invitation by email and were told that they would receive 100 NOK in participation compensation. The difference in participation compensation was based on the additional travel time and cost that people in the representative population would incur relative to the students in order to participate. Student sessions were held during the day, and representative sessions in the evening.

⁸10 of the invitations to the representative subset were returned to the research group because of wrong address. The response rate was thus 136 out of 450. The total number of second year NHH students was 420, of which 120 participated in our study.

⁹Two students did not report gender and thus are excluded from the analysis

2 Design

All interaction between the participants was anonymous and through a web-interface developed for the experiment.¹⁰ In the first part of the experiment, the participants played standard dictator games. Each participant was involved in four dictator games, two as dictator and two as passive recipient, each time randomly paired with another participant in the same session. The endowment e in each game was either 500 NOK or 1000 NOK. The dictator was asked to choose an amount y for the other person and $(e - y)$ for himself. The choice set of the dictator was limited to amounts divisible by 25 NOK. The participants were not informed about the outcome in the situations where they were recipients until the end of the experiment.

In the second part of the experiment, the participants completed ten trust games, five as sender and five as responder, each time randomly paired with another participant in the same session. In each trust game, both the sender and the responder were allocated an endowment $e_i \in \{100, 200, 300\}$, for $i = 1, 2$, where the sum of the endowments for each pair of players was always 400 NOK. In addition, there was a multiplier of m_1 on the sent amount and a multiplier m_2 on the returned amount, where $m_i \in \{1, 2, 4\}$, for $i = 1, 2$, and the product of the two multipliers in each situation was 4.

All participants first completed their decisions as senders. In each situation, before they made a decision, they were informed about the vector (e_1, e_2, m_1, m_2) , and the sender then decided whether to send an amount $y_1 \leq e_1$ of the endowment to the responder. The responder would then receive $y_2 = m_1 y_1$. After completing all five sender decisions, each participant was presented with an overview of their choices and given the opportunity to revise each of them. All participants then completed their decisions as responders. In each situation, the responder was informed about the vector $(e_1, e_2, m_1, m_2, y_1, y_2)$, and the responder then decided the amount $y_3 \leq e_2 + y_2$ to return to the sender. The sender received $y_4 = m_2 y_3$. When the responders had completed their decisions in all the five situations, they were presented with an overview of their choices and given the opportunity to revise each of them. The total payoff for the sender (π_1) and the responder (π_2) in a particular game is given by:

$$\begin{aligned}\pi_1 &= e_1 - y_1 + m_2 y_3 = e_1 - y_1 + y_4, \\ \pi_2 &= e_2 + m_1 y_1 - y_3 = e_2 + y_2 - y_3.\end{aligned}$$

The choice set of both players was limited to amounts divisible by 25 NOK.

At the end of the experiment, for each person and with equal probability, one of the games in which the participant had been involved was randomly drawn to determine actual payment. The final payment procedure ensured that neither the participants nor

¹⁰Instructions were given in Norwegian. See the appendix for an English translation of the instructions.

the research team were in a position to identify how much each participant earned in the experiment.

3 The dictator game

The distributive situation in the dictator game has three important characteristics that limit the possible motives the dictator may have for sharing. First, the other participant is unable to respond to the decision made by the dictator, which implies that sharing cannot be motivated by self-interest. Second, the total income is fixed, which implies that sharing cannot be motivated by efficiency concerns. Third, the dictator does not respond to a decision made by the other participant, which implies that sharing cannot be motivated by reciprocal concerns.

We interpret the amount given as a measure of the extent to which a concern for equality motivates the dictator to act non-selfishly. Figure 1 provides a histogram of the share given for both subject groups by gender, the average share given is reported in Table 2. We observe that there are large differences between students and representatives. Whereas the mode among students is to take everything for themselves, the mode among representatives is to share equally. On average, representative males give away twice as much as student males (40.3 % versus 19.8 %), and representative females give away 55 % more than student females (41.7 % versus 26.9 %).¹¹ Table 3 shows that the difference between students and representatives is substantial and statistically significant also when controlling for age and employment ($p < 0.001$).¹² In sum, the dictator game provides clear evidence of the strong motivational force of equality in our non-student group, and shows that the great importance of equality may be underestimated if we solely focus on a subject group of students of economics and business administration.

4 The trust game

We now turn to a study of the behavior in the trust game, where the participants potentially may be motivated by efficiency, equality and reciprocity considerations.

Figure 2 and Figure 3 provide histograms for share sent and returned for both subject groups by gender, the average shares are reported in Table 2. We observe that share sent is almost the same for the representative group and the student group (51.7% ver-

¹¹There is no statistically significant difference in share given for 500 NOK and 1000 NOK; 23.6% versus 21.9% for students ($p=0.143$), 41.1% versus 41.3% for representatives ($p=0.868$).

¹²We observe from Table 2 that the difference in average share given between males and females is not statistically significant for representatives ($p = 0.608$), whereas for students it is ($p = 0.035$). If we consider the share of situations where the dictator takes everything there is a statistically significant difference between males and females among students (36.4% versus 17.7%, $p=0.013$), but not among representatives (5.0% versus 3.0%, $p=0.517$).

sus 54.2%), but with some gender differences. Almost half of the student males send everything (43.7%) and, overall, they send more than representative males, whereas representative females send less than student females. In both cases, however, we observe large standard errors and the differences between students and representatives are not statistically significant ($p = 0.16$ for males and $p = 0.14$ for females, correcting for clustering on individuals). In the return decision, students, both males and females, return less than the representatives, with an overall difference of 70.5% (17.6% versus 30.0%). We observe that the share of students returning nothing is more than twice the share of representatives acting in a completely selfish way.

We here focus on the return decision, which provides the most direct test of how the participants trade off selfishness and different moral motivations in a strategic environment. The efficiency motive comes into play through the multiplier on the returned amount, which varies from 1 to 4. When the multiplier is 1, there is no efficiency argument for returning anything, whereas a multiplier of 2 or 4 provides a strong efficiency argument for returning everything. The reciprocity motive comes into play because the responder may want to reward participants who have sent a large share of the endowment. Both these motives, however, may interact with the concern for equality in the return decision; the equality motive may dampen the willingness to act on the efficiency motive, and it may generate reciprocal behavior independent of the reciprocity motive.

To capture the extent to which a concern for equality motivates the return decision, we calculate the amount, y_3^{target} , that each participant has to return to achieve the distribution he or she selected as dictator.¹³ We do so by first solving the following equation for y_3^* ,

$$\frac{\pi_1}{\pi_1 + \pi_2} = \frac{(e_1 - y_1 + m_2 y_3^*)}{(e_1 - y_1 + m_2 y_3^*) + (e_2 + m_1 y_1 - y_3^*)} = s^{dictator},$$

where $s^{dictator}$ is the share given to the other person in the dictator game.¹⁴ The return amount has to be non-negative, and thus we define,

$$y_3^{target} = \max(0, y_3^*). \quad (1)$$

In the following, we use y_3^{target} to control for the importance of the equality motive in the return decision.

Table 4 reports regressions of share returned by gender on the three other-regarding motives, where we control for age and employment. We observe some striking differences between males and females in the representative group. Representative males assign great importance to efficiency concerns, the point estimate of the multiplier is 9.2% and

¹³A similar approach is used in Ashraf, Bohnet, and Piankov (2006).

¹⁴In calculating $s^{dictator}$, we take, for each participant, the average share given away in the dictator game.

thus the estimated difference in share returned between situations with a multiplier of 1 and 4 is 27.6%, whereas the share returned among representative females is not at all sensitive to the multiplier. Representative females exhibit a strong reciprocal motivation in the return decision, but not a concern for equality as expressed in the non-strategic environment. In contrast, the reciprocal motive does not seem to have any force among representative males, who also in the strategic environment assign importance to equality considerations.

A very different picture emerges for the student group. First, students assign far less importance to efficiency than representative males, but much more importance to equality than female representatives. Second, the reciprocity motive has some motivational force among the students, but is less prominent than among female representatives. Third, there are no statistically significant gender differences in the student group, which is in stark contrast to what we find in the representative group. In sum, the trust game shows that the social preferences of representatives and students group are very different.

5 Conclusion

Our study demonstrates clearly that, as suggested by Fehr et al. (2006), student subject groups may not be representative of the social preferences in society at large. They differ fundamentally from a representative group of non-students both in their level of selfishness and in the relative importance assigned to different moral motives. Moreover, we show that while there are no significant gender differences in the student group, males and females in the representative group differ fundamentally in their moral motivation.

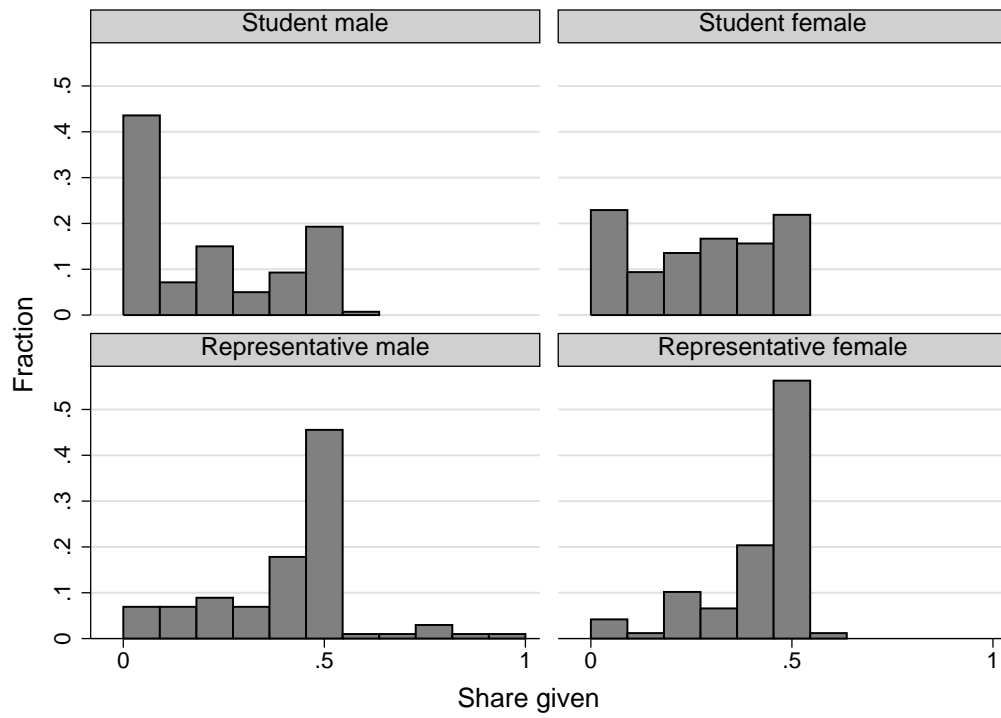
We find that both equality and efficiency are important motivational forces among representative males, whereas representative females seem to move from a concern for equality in non-strategic environments to a focus on reciprocity in economic environments. The fact that all three motives play a role in explaining lab behavior of a group that is fairly representative for the Norwegian population, suggests that these motives are important also when analyzing economic and social phenomena in society at large.

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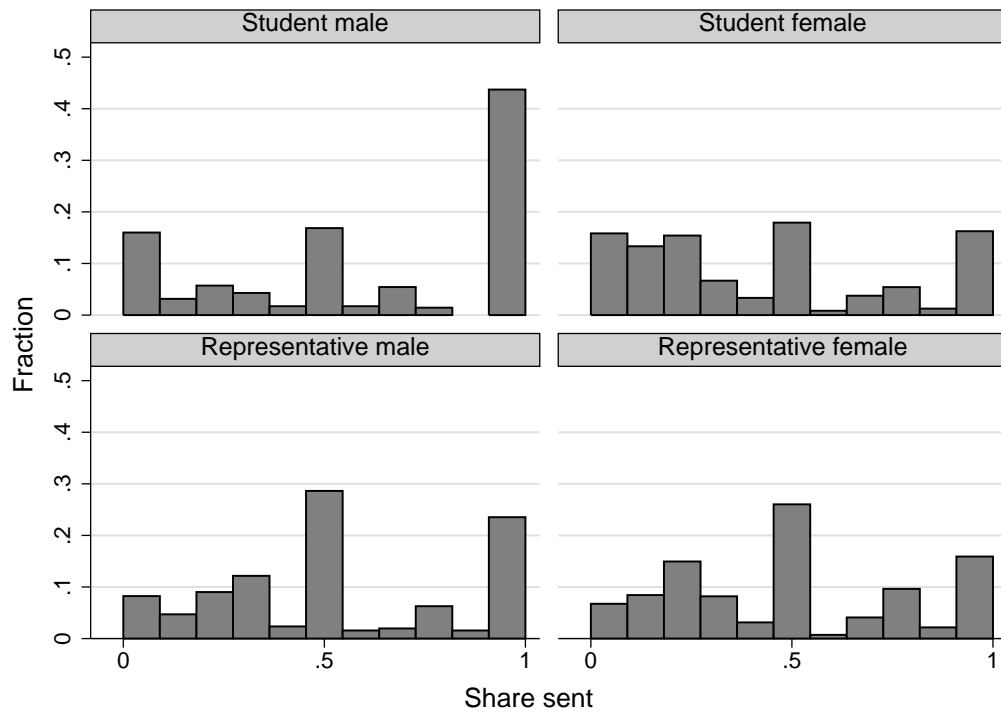
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FIGURE 1: HISTOGRAM OF SHARE GIVEN IN THE DICTATOR GAME



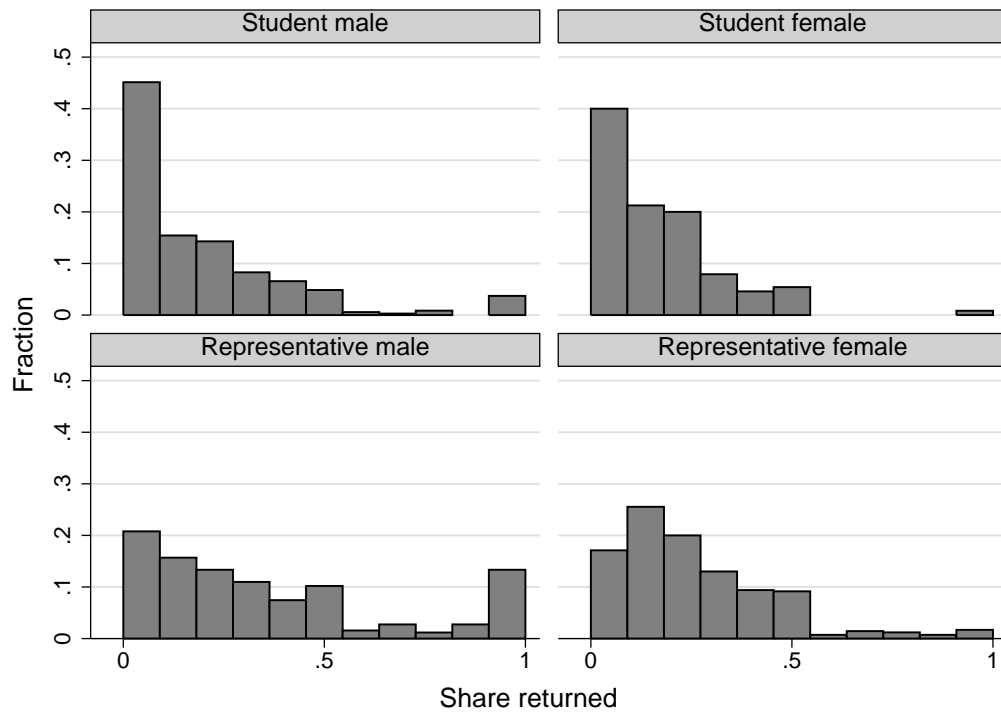
Notes: The figure reports, for each subgroup, the distribution of the share given in the dictator game. Each participant acts as the dictator in two dictator game situations, and each dictator game situation enters here as an independent observation.

FIGURE 2: HISTOGRAM OF SHARE SENT IN THE TRUST GAME



Notes: The figure reports, for each subgroup, the distribution of the share sent in the trust game. Each participant acts as the sender in five trust game situations, and each trust game situation enters here as an independent observation.

FIGURE 3: HISTOGRAM OF SHARE RETURNED IN THE TRUST GAME



Notes: The figure reports, for each subgroup, the distribution of the share returned in the trust game. Each participant acts as the responder in five trust game situations, and each trust game situation enters here as an independent observation.

TABLE 1: AGE, GENDER, EMPLOYMENT AND INCOME DISTRIBUTIONS FOR THE NON-STUDENT GROUP, THE SAMPLE POPULATION, AND THE NORWEGIAN POPULATION

	Non-student group	Sample population	Norway
A. Age			
17-30	25.6	26.8	25.5
31-40	14.3	23.7	22.3
41-50	30.1	19.2	20.6
51-60	16.5	16.5	19.1
61-70	13.5	13.8	12.5
B. Gender			
Male	38.6	48.4	49.6
Female	61.4	51.6	50.4
C. Employment			
Private sector	55.6	58.1	63.8
Public sector	44.4	41.9	36.2
D. Income			
0-99,999	20.9	23.5	24.7
100,000-199,999	24.8	25.7	29.8
200,000-299,999	27.1	24.2	24.8
300,000-399,999	15.5	11.6	10.7
400,000-499,999	6.2	5.8	4.1
500,000 and over	5.4	9.3	5.8

Notes: **Non-student group:** Age, gender, and employment are self-reported by the participants in the experiment. Income is taxable income in NOK, including labor income and capital gains over the year, net of all deductables including interest payments; collected from publicly available tax return database (Year: 2005). **Sample population and Norway:** Age and gender are collected from Statistics Norway (Year: 2006). Employment is collected from Statistics Norway (Year: 2001). Income is collected from Statistics Norway (Year: 2004).

TABLE 2: SHARE GIVEN IN THE DICTATOR GAME, SHARE SENT AND SHARE RETURNED IN THE TRUST GAME

	Student			Representative		
	Male	Female	All	Male	Female	All
A. Share given, dictator game						
Mean	0.198	0.269	0.227	0.403	0.417	0.412
	(0.023)	(0.024)	(0.017)	(0.024)	(0.012)	(0.012)
B. Share sent, trust game						
Mean	0.620	0.429	0.542	0.542	0.502	0.517
	(0.040)	(0.041)	(0.031)	(0.038)	(0.027)	(0.022)
C. Share returned, trust game						
Mean	0.186	0.161	0.176	0.365	0.259	0.300
	(0.021)	(0.016)	(0.014)	(0.037)	(0.016)	(0.018)
<i>n</i>	70	48	118	52	84	136

Notes: The table reports, for each subgroup, the average share given in the dictator game, average share sent in the trust game, and average share returned in the trust game (n is the number of individuals in each subgroup). Each individual acts as dictator in two dictator games, as sender in five trust games, and as responder in five trust games. Standard errors corrected for clustering on individuals in parentheses.

TABLE 3: REGRESSIONS OF SHARE GIVEN IN THE DICTATOR GAME

	Student		Representative		All
	Male	Female	Male	Female	
Above 30 years old			0.049 (0.053)	0.042 (0.036)	0.043 (0.030)
Working, public sector			0.028 (0.086)	-0.022 (0.037)	-0.008 (0.036)
Working, private sector			-0.015 (0.077)	-0.007 (0.034)	-0.014 (0.036)
Female					0.011 (0.028)
Student					-0.182 (0.048)
Female x student					0.061 (0.044)
Constant	0.198 (0.023)	0.269 (0.024)	0.367 (0.077)	0.395 (0.036)	0.380 (0.042)
Observations	140	96	99	159	494
R^2			0.021	0.020	0.231

Notes: The table reports results from OLS regressions of the share given in the dictator game. All students are coded as not working and as below 30 years old. The dummy variable “above 30 years old” is equal to one if the dictator in the situation is above 30 years old, otherwise zero. There are two dummies for working status, one for the public and one for private sector. The excluded working status category is “not working”. Standard errors corrected for clustering on individuals reported in parentheses.

TABLE 4: REGRESSIONS OF SHARE RETURNED IN THE TRUST GAME

	Student		Representative		All
	Male	Female	Male	Female	
Share sent	0.095 (0.036)	0.059 (0.030)	-0.088 (0.064)	0.150 (0.057)	0.058 (0.023)
Share returned target	0.659 (0.101)	0.522 (0.110)	0.713 (0.149)	0.122 (0.138)	0.511 (0.072)
Multiplier return	0.023 (0.010)	0.011 (0.011)	0.092 (0.020)	0.007 (0.014)	0.034 (0.007)
Above 30 years old			0.145 (0.095)	0.035 (0.033)	0.073 (0.039)
Working, public sector			-0.061 (0.102)	-0.008 (0.036)	-0.032 (0.044)
Working, private sector			-0.139 (0.100)	0.009 (0.038)	-0.051 (0.047)
Female					-0.117 (0.038)
Student					-0.109 (0.059)
Female x student					0.077 (0.044)
Constant	0.031 (0.028)	0.047 (0.025)	0.038 (0.102)	0.110 (0.061)	0.145 (0.056)
Observations	350	240	250	395	1235
R^2	0.180	0.229	0.268	0.098	0.230

Notes: The table reports the results from OLS regressions of the share returned in the trust game. Share returned target is defined by (1). The multiplier varies from 1 to 4. For the remaining variable definitions, see Table 3. Standard errors corrected for clustering on individuals reported in parentheses.



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