

# ALTRUISTIC RESPONSES TO THE SEPTEMBER 11 TERRORIST ATTACKS:

## SOME EVIDENCE FROM DICTATOR GAMES

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### INTRODUCTION

After the September 11 terrorist attacks, Americans responded with an unprecedented outpouring of contributions to charitable organizations dedicated to helping the victims of the attacks. In the following six months, the American Red Cross collected \$930 million [American Red Cross, 2002] and a number of new charities were established with the sole aim of providing aid to the victims. Internet sites were set up to help channel contributions to organizations that supported the victims. Contributions were not just monetary; blood donations exceeded the capacity of the American Red Cross and food and time were donated at ground zero to help in the rescue and clean-up effort. In the immediate aftermath of the attack, individuals opened their homes and provided other aid to those affected by the terrorism. The extent to which such altruism will persist remains an open question.

This paper uses economic experiments to compare altruistic behavior before and immediately after the terrorist attacks. Before September 11 we had conducted dictator games in which students were given the option of donating their earnings from the experiment to the American Red Cross.<sup>1</sup> We repeated the experiment in late September after the attacks. This paper compares giving before and after the terrorist attacks and evaluates the extent to which altruistic responses before and after the attack differ by gender, major, religious practice and income level.

In our initial experiment, we were interested in how giving differs with personal characteristics. Because a number of studies show that women are more “other-di-

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rected" than men,<sup>2</sup> we hypothesized that women would give more than men. We expected that business majors would give less than students in other majors. Because religious teaching advocates compassion and helping the needy, we postulated that individuals who practice a religion would donate more than those who do not practice a religion. Finally we anticipated that income would be a determinant of giving but the direction of the effect seemed uncertain. Economic reasoning predicts that higher income individuals would give more to charity either because of the declining marginal utility of income or because charitable giving is a normal good. On the other hand, if lower income individuals identify more closely with the disadvantaged, they may act more compassionately and give more. We hypothesized that the income effects would be larger than this latter effect, and higher income individuals would give more in absolute terms to charity than lower income individuals.

We expected the dictator experiments to reveal a large increase in charitable giving after September 11 for all demographic groups, particularly since the charity to which the donations were made was the American Red Cross, the most prominent charity channeling aid to the victims of the attacks. We postulated that those who were the most generous prior to the events of September 11 might increase giving more because they might be more responsive to the suffering of others. If more generous people increase giving by a greater extent, then, given our hypotheses above, we would expect women to increase giving more than men, non-business majors to increase giving more than business majors, those practicing a religion to increase donations more than those not practicing, and high income subjects to increase giving more than lower income subjects. We also hypothesized that people who had closer connections with the victims would increase giving more than those who did not. Therefore, we expected that the increase in giving would be larger for people with hometowns near the site of the attacks. Similarly, we postulated that business majors might increase their donations more than other majors because they identified with the victims of the attacks, who were in most cases employed by corporate and financial institutions, the career path most business students might be expected to follow. Business majors might also exhibit a stronger response if they perceived the attacks on the World Trade Center to be an assault on a symbol of western capitalism. This tendency for a greater increase in giving could offset the potentially lower increase in giving by business majors due to their initially less generous giving behavior.

The issues above can be addressed in a number of ways. An alternative to the experimental design we have undertaken is the more traditional analysis of survey data on institutions or on individuals before and after September 11. Each alternative technique has its own strengths and weaknesses. In our experiments, because we have data on demographic characteristics of the individuals, we can assess whether people responded differently depending on their gender, profession or major, religion, or income. Institutional surveys only give aggregate giving figures before and after the event. Individual surveys would also have information on demographics, but married couple's giving masks the effects of gender on giving since decisions on gifts are made jointly so that the relative influence of each partner is not known. Differences in giving behavior by men and women is an important issue we wish to address. While our experiment cannot determine how much the increase in giving to the American

Red Cross crowded out other giving, a pattern which might be determined with individual surveys, it is more focused on the impact of September 11 on giving than individual surveys because of its timing and its use of the American Red Cross as the recipient of all donations.<sup>3</sup>

## **EXPERIMENTAL DESIGN**

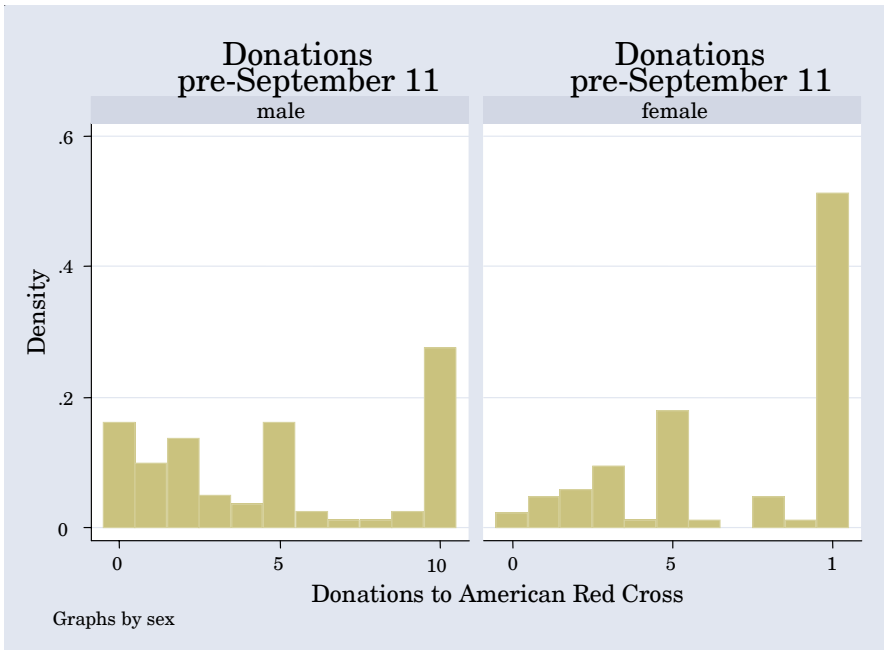
The first set of dictator experiments was performed at Skidmore College in early December 2000 and the second set in late September 2001. In the experiment, the students were given ten one-dollar bills in an envelope and told that this was their payment for participating in the experiment.<sup>4</sup> They were then offered the opportunity to donate some, none, or all of the money to the American Red Cross and to keep any money not donated. The experiment leader explained that the student's decision to donate or not would be completely anonymous. The experimenter instructed the students to leave the room with their envelope and a pen and to walk as far away as they needed to in order to feel that no one could see what they were doing. They were to decide how much, if any, of the money they wanted to donate to the Red Cross and return that amount of money to the envelope. The rest of the money was theirs to keep. They were asked to fill out a short questionnaire that asked them to choose a code word that would be used to link them with the amount they donated. While the researchers would know that the person with the code word donated the amount in the envelope, no one would know which student used that particular code word so their decisions would be totally anonymous. The students were instructed to put the questionnaire back into the envelope with any money they may have decided to donate, seal the envelope without writing anything on the outside of the envelope, return to class and drop the envelope in a box near the door.

## **CHARITABLE GIVING BEFORE AND AFTER SEPTEMBER 11**

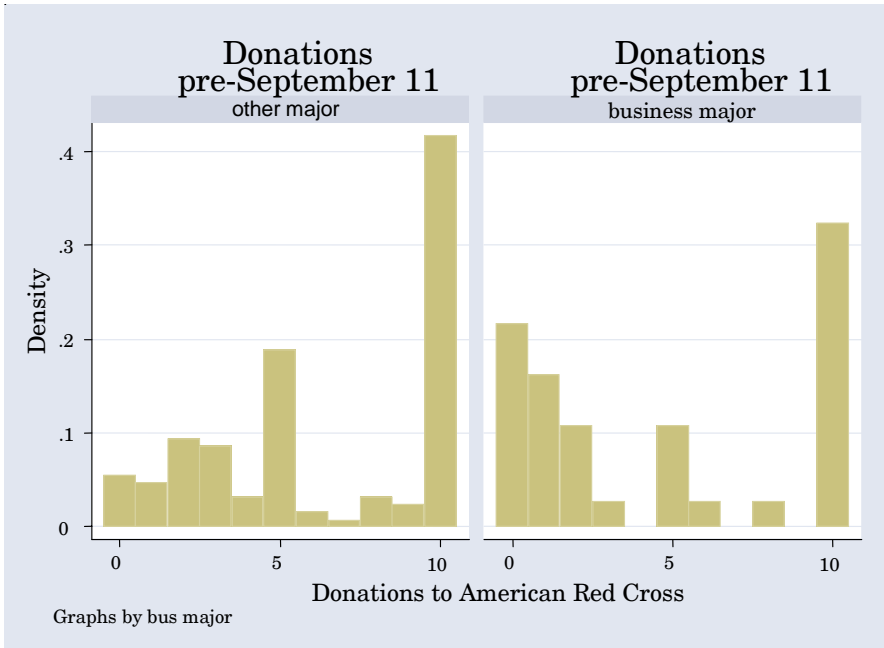
### ***Before September 11***

In the initial dictator games in December 2000 the amount of money donated to the Red Cross before the terrorist attacks was relatively high, with a mean gift of \$5.96 and a median of \$5.00.<sup>5</sup> Only 9 percent of participants kept all the money for themselves, and almost 40 percent donated the entire ten dollars to the American Red Cross. With respect to our hypotheses, women's mean giving (\$7.07) was significantly higher ( $p=0.001$ ) than mean giving by men (\$4.80). While 51 percent of the women donated all the money, only 28 percent of the men did so; only 2.4 percent of the women kept all the money and 16 percent of the men kept it all. The giving distributions by gender,<sup>6</sup> presented in Graph 1, reveal that the median gift of women was 10 while the median gift of men was only 5. A Kolmogorov-Smirnov equality of distributions test (k-smirnov test) rejects the null hypothesis that the two distributions are equal in favor of the alternative that the women's giving distribution is above the men's distribution at the 0.003 significance level. Mean giving by business majors, \$4.62, was much lower than the \$6.35 average for other majors. Similarly, giving

**GRAPH 1**  
**Giving Distributions by Gender: Pre-September 11**



**GRAPH 2**  
**Giving Distributions by Major: Pre September 11**



distributions by major, Graph 2, reveal that non-business majors (median giving=5) gave more than business majors (median giving=2.5), and a k-smirnov test rejects the null hypothesis that the two distributions are equal at the 0.008 significance level in favor of the alternative that giving for business majors is less than giving of other majors. The other hypotheses, that individuals practicing a religion would give more than those not practicing and that giving would increase with income, were not supported. However, giving by the individuals in the highest income category, family income above \$500,000, was significantly higher than giving by respondents in the other income categories, when comparing mean level of giving, median level of giving, and total distributions of giving.

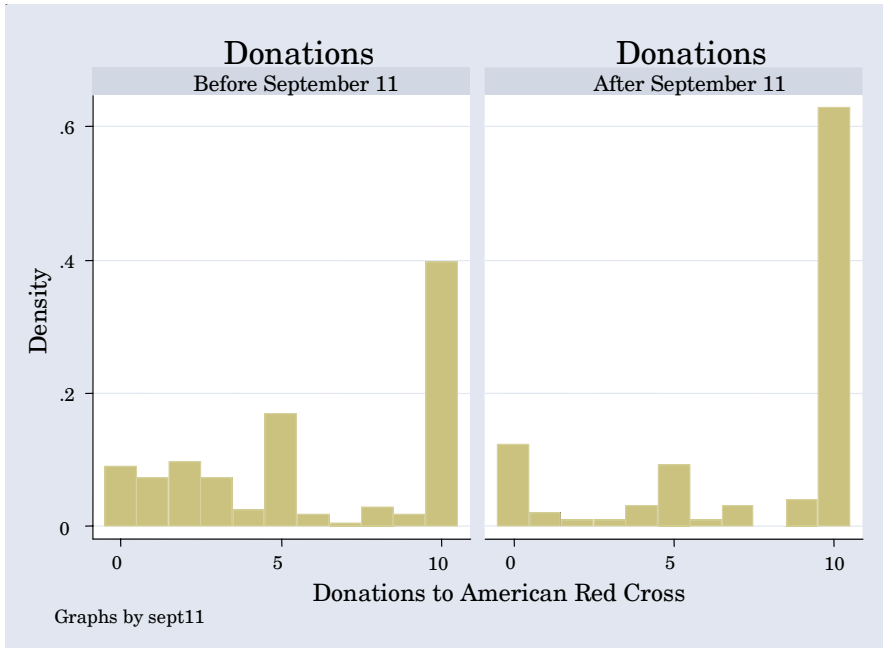
### ***Comparing Giving Before and After September 11***

Individual gift giving after September 11 showed similar patterns to those before September 11, with women giving significantly more to charity than men ( $p=.024$  for k-smirnov test of equality of distributions) and no differences in giving according to whether an individual practices a religion. Giving did not increase monotonically with income, and there were no differences in giving according to whether the individuals had given a donation in the previous month, or according to whether the individual's hometown was in the NY or the DC metropolitan area. In contrast to before September 11, after September 11 business majors gave more to the American Red Cross than non-business majors although the difference was not significant.

The high level of average gift giving before September 11, together with the large number of individuals who gave the full \$10.00, poses problems in looking at changes in giving after September 11 since the ability to increase giving is inherently limited. Still, Graph 3 shows that giving did go up markedly after September 11. Mean giving increased from \$5.96 to \$7.60 (difference significant at the .01 level), median level of giving increased from 5 to 10; and the percentage who donated all the money rose from 39.6 percent to 62.9 percent. Interestingly, the percentage of students who kept the full amount, donating none, increased, although not significantly. The k-smirnov test rejects the hypothesis that the distributions are equal in favor of higher giving after September 11 at the 0.001 significance level. K-smirnov tests also reject equality of giving distributions in favor of higher levels of giving after September 11 than before at p-levels below 0.085 for the following groups: males; females; business majors; non-business majors; individuals practicing a religion; those not practicing a religion; individuals with family income between \$60,00 and \$150,00; and individuals with family incomes between \$150,000 and \$500,000. Only giving by individuals in the lowest and highest income groups did not increase significantly after September 11.<sup>7</sup> The increase in mean giving by business majors was particularly large, rising from \$4.62 to \$8.10. Giving by non-business majors rose from \$6.35 to \$7.46, resulting in business majors donating more than other majors after September 11.

Using univariate statistics to compare increases in giving across groups is problematic because groups, that were initially generous before September 11, are limited

**GRAPH 3**  
**Giving Distributions before and after September 11**



in how much their generosity can increase; \$10.00 is the maximum donation. Comparing means, the dollar change in mean donation was larger for men ( \$1.73) than women (\$1.45), for business majors (\$3.48) than non-business majors (\$1.11), for subjects not practicing a religion (\$1.78) than those practicing (\$1.32), and for lower income (\$1.68) than higher income subjects (-\$2.92). The means seem to show that the increase in giving is greater for those groups that were less generous before September 11 rather than for those who were initially most generous. But given the high levels of generosity before September 11, these results are unavoidable. The problems encountered when comparing measures of central tendency are best exemplified by examining changes in median levels of giving. Men seem to reveal greater increases in generosity than women as their median level of giving increases by \$5.00 while the median level for women does not change. But note that the median level of giving for women before September 11 was 10, the highest possible value. The only possible change in median is downward. In fact most groups' median value of giving after September 11 was 10, so the individuals who seem to have responded most generously to the events of September 11 are necessarily those who were least generous before September 11. Comparing responses to September 11 across groups is only really possible using analysis that controls for the censoring of the data in the experiment.

**TOBIT ANALYSIS OF PRE AND POST-SEPTEMBER 11 GIVING**

To try to address the problems associated with censorship in giving, we model the taste for altruism and the resulting charitable gift as a two limit tobit model. The taste for giving is represented by a latent variable  $y_i^* = \beta x_i + u_i$  which follows a normal distribution.  $\beta$  is a  $k \times 1$  vector of parameters and  $x_i$  is a  $k \times 1$  vector of observable individual characteristics. While we do not always observe the latent variable we do observe  $y_i$ , the charitable gift, which will be censored when  $y_i^*$  is below some lower limit (LL) and above some upper limit (UL)

$$y_i = 0 \text{ if } y_i^* \leq LL; \quad y_i = \beta x_i + u_i \text{ if } LL > y_i^* < UL; \quad y_i = 10 \text{ if } y_i^* \geq UL$$

Maximum likelihood estimation is used to estimate values of the parameters. The vector of  $x$  characteristics includes dummy variables representing gender, business major, practicing a religion, and four income categories. We estimate a pre-September regression, a post-September regression, and two pooled regressions. The post-September 11 regression also includes dummy variables for: donated in the last few weeks, lives in the New York metropolitan area, and lives in the Washington DC metropolitan area. In the pooled regressions, we first add a dummy for September 11 and then we interact the September 11 dummy with all the other variables. All tobit regression results are presented in Table 1.

The tobit estimates for the pre-September 11 round (column 1) reveal that the only significant determinants of giving are gender and highest income. All else equal and controlling for censorship, women gave \$3.38 more of their ten dollar earnings than men, and the highest income individuals gave \$7.13 more of their earnings than their lower income counterparts. The effect of major, which was significant in k-smirnov tests, becomes insignificant when using multivariate techniques, and the remaining coefficients are also statistically insignificant. In column 2 the coefficients from the tobit run on the post-September 11 data show that females still gave more than men and the differential is even larger. Controlling for censorship, women donated \$10.70 more than their male counterparts. Except for one of the income categories, none of the other variables has a significant effect on giving in the post-September game. As a result, female is the only demographic variable that consistently affects giving across the two sets of experiments.

Column 3 presents the results from the first pooled regression. The coefficient on the dummy for September 11 is significant at the .01 level (row 10). After correcting for the upper and lower bounds on giving in the dictator games, donations increased by \$3.48 after the terrorist attacks. This increase in dollar donations represents a 58 percent increase of the original donation. The interaction terms in column 4 (rows 11-16) determine whether some groups are more or less responsible for the higher giving after September 11. The coefficient on the interaction between female and September 11 (row 11), for example, estimates the difference in the change in giving by women, as compared to men, controlling for censorship. A likelihood ratio test of the joint significance of the interaction terms rejects the hypothesis that they are all zero at the 0.12 level, and most of the coefficients on the interaction terms are insignificant,



**TABLE 1**  
**Tobit Estimates Of Giving Before And After September 11**  
**(standard errors in parentheses)**

Variable	(1) Before September 11	(2) After September 11	(3) Pooled Sample	(4) Pooled Sample
1. Female	3.38** (1.12)	10.12** (3.31)	5.10** (1.10)	3.70** (1.30)
2. Business Major	- 1.98 (1.31)	5.25 (3.65)	-0.27 (1.28)	-2.13 (1.53)
3. Practice Religion	1.10 (1.14)	1.70 (2.76)	1.31 (1.09)	1.18 (1.34)
4. Income \$60,000 - \$150,000	0.63 (1.38)	7.08+ (3.70)	1.97 (1.33)	0.77 (1.61)
5. Income \$150,000 - \$500,000	0.11 (1.43)	3.54 (3.86)	1.13 (1.41)	0.21 (1.67)
6. Income over \$500,000	7.13* (2.81)	1.16 (4.57)	3.97+ (2.17)	8.02* (3.29)
7. Donated in Last Month		- 3.62 (3.04)		
8. Home in NY, NJ, CT		- 5.08 (3.14)		
9. Home in D.C. metropolitan area		-1.37 (7.14)		
10. Post-September 11			3.48** (1.14)	-0.68 (2.66)
11. Female- September 11 Interaction				2.99 (2.29)
12. Business- September 11 Interaction				6.12* (2.86)
13. Practice Religion- September 11 Interaction				-0.64 (2.26)
14. Income \$60,000-\$150,000 September 11 Interaction				4.17 (2.80)
15. Income \$150,000 - \$500,000 - September 11 Interaction				2.63 (3.04)
16. Income over \$500,000 - September 11 Interaction				-6.64 (4.46)
17. Constant	5.06** (1.36)	8.33+ (4.00)	3.41** (1.36)	5.07** (1.59)
Sample size	164	96	260	260
Likelihood Ratio	27.12	18.84	41.95	52.93
$p > \chi^2$	0.00	0.03	0.00	0.00

\*\* Coefficient is significantly different from zero at the .01 level.

\* Coefficient is significantly different from zero at the .05 level.

+ Coefficient is significantly different from zero at the .10 level.

implying that differences in responses to the tragedy across groups are not significant. The one striking exception is the large, positive, and significant coefficient on the business major interaction term (row 12). The change in giving by business majors is estimated to be over \$6 more than the change in giving of non-business majors. The coefficient on the female interaction term is also large and positive (row 11), implying that females responded even more generously than men to the tragedy; however, the coefficient is only significant at the 0.19 level.<sup>8</sup>



## CONCLUSION

The dictator games provide evidence of a substantial increase in altruistic behavior directed towards victims after the September 11 terrorist attacks. Mean donations increased by \$1.64 out of \$10.00 and the distribution of giving shifted toward more altruism. The tobit estimations imply that after adjustment for the lower and upper bounds for donations in the dictator experiments, giving increased by \$3.29 after the terrorist attacks. The structure of the experiment cannot determine whether these increases in giving were absolute increases or whether giving to victims crowded out other giving.

We find significant differences in altruistic behavior of women and men. Women donated more than men both before and after the terrorist attacks. In addition, far more women acted as perfect altruists, giving all the money in the experiment to the Red Cross, while far more men acted perfectly selfishly by keeping all the money. Both genders increased giving significantly after the terrorist attacks. Because nearly twice as many women as men gave away all the money in the pre-September 11 experiments, it was more difficult for women as a group to increase mean giving. Therefore, while the mean dollar change in giving was larger for men than women, the tobits, which control for censorship of the data, indicate a larger change in giving for women than men, though this is significant only at the 0.19 level.

Business majors appear to have reacted more strongly to the terrorist attacks than other majors. While business majors gave less than other majors before September 11, they gave more after the attacks. The dollar change in mean giving was greater for business majors than for other majors, and tobit analysis estimated the increase in giving by business majors to be \$6.25 greater than that of non-business majors.

This study, based on a unique opportunity to study giving behavior before and after September 11, confirms the existence of significant gender differences in altruism. It also points to the strong impact of 9/11 on a subset of the population - college business majors - previously characterized by low levels of altruism. Further study is required to determine whether the change is limited to victims of 9/11, whether the change in attitude is temporary or long-term, and whether this type of crisis giving crowds out other giving.

## APPENDIX A

### *Experiment Instructions*

Hello – I'm Professor \_\_\_\_\_ and I'll be leading our experiment today. This is a very simple and quick experiment. It should not take more than 20 minutes. You will be paid for participating, as is usual for most academic research experiments. Your participation is entirely voluntary and you may leave if you do not want to participate.

Professor \_\_\_\_\_ is passing out unmarked envelopes. Each envelope contains a large sheet of paper folded around 10 one-dollar bills. This money is your payment for participating in the experiment. You will have earned it for the time you have spent in the experiment. It now belongs to you. We are going to give you the choice of

**APPENDIX A — *Continued***

me or all of this money and donating some or all of this money to the Red Cross. The Red Cross is a non-profit organization that provides disaster relief (such as floods or earthquakes) and other programs. We pledge to send all the money you decide to donate to the Red Cross and will notify your professor of the total amount given.

Your instructions for the experiment are the following: You are to leave the classroom taking your envelope and a pen with you. Walk far enough away to find a spot where you are alone and no one can see what you are doing. Decide how much, if any, of the \$10 you want to keep and how much, if any, of the \$10 you want to give to the Red Cross. Choose a code word. This can be any word from the English language. Answer the questions on the sheet of paper. Be sure to include your code word. Your choice will be entirely anonymous; no one will have any way of knowing what you decide to do. No one will ask you to reveal your code word. This is solely for purposes of the analysis of the experiment. Wrap any dollars you want to give to the Red Cross in the sheet of paper. Try to do this privately so that others cannot see what you are choosing to do. Place this in the envelope and seal it. Do not write anything on the outside of the envelope – this is to be totally anonymous. You may keep the remaining dollars, if any. Try to do this within three minutes and return to the room. Drop the sealed envelope in the box by the door and return to your seat.

***Final questionnaire***

As you return to your seat, Professor \_\_\_\_\_ is handing you a questionnaire. When you have completed it, fold it up and drop it in the box. Be sure to include the same code word you used in the previous rounds of the experiment. Thank you for your willingness to participate in this experiment.

**APPENDIX B*****Exit Questionnaire***

CODE WORD \_\_\_\_\_

1. Major (declared or planned) \_\_\_\_\_

2. Gender:

Male \_\_\_\_\_ Female \_\_\_\_\_

3. What religion do you consider yourself?

Religion \_\_\_\_\_ None \_\_\_\_\_

Practicing \_\_\_\_\_ Non-Practicing \_\_\_\_\_

**APPENDIX B — Continued**

4. Circle your family's annual income:

- |                         |                          |
|-------------------------|--------------------------|
| 1. Under \$20,000       | 6. \$100,000 - \$150,000 |
| 2. \$20,000 - \$40,000  | 7. \$150,000 - \$200,000 |
| 3. \$40,000 - \$60,000  | 8. \$200,000 - \$500,000 |
| 4. \$60,000 - \$80,000  | 9. Over \$500,000        |
| 5. \$80,000 - \$100,000 |                          |

5. Give the city and state in which you permanently reside. \_\_\_\_\_

6. Have you donated money, time, or products to a charity in the last 4 weeks?

\_\_\_\_ Yes \_\_\_\_ No

7. What part of the \$10.00 did you keep? \_\_\_\_\_

**NOTES**

We would like to thank Haverford College and the Leavey School of Business at Santa Clara University for support for this research and the faculty and students at Skidmore College who participated in the experiments.

1. These experiments were initially done to analyze how an individual's altruistic giving changes once he or she is paired with a partner. The results of this sequential experiment are presented in Kamas, Baum, and Preston [2005]. However the first round of the initial experiments gave students the opportunity to give anonymously to the American Red Cross. This first round is compared to identical experiments conducted two weeks after the September 11th terrorist attacks.
2. For a discussion of some of the experimental evidence on this point, see Eckel and Grossman [2000a].
3. The experiment was conducted before there was any publicity about possible mismanagement of the funds received by the American Red Cross in response to September 11th.
4. The experiments were conducted in diverse classes in order to obtain a representative sample in terms of major, gender, and year in college. The alternative of recruiting students based on monetary incentives was rejected because the group of students who respond to such incentives might value money more highly or have a greater need for money at the time of the experiment than the average person. This is consistent with the results found in Eckel and Grossman [2000b] where giving was higher in a classroom situation than with recruited students. The students were told that their participation was entirely voluntary and that they could leave if they did not want to participate. One student chose not to participate. The instructions for the experiments are provided in Appendix A and the questionnaires given to the students are in Appendix B. In the post-September 11th experiments, the questionnaire was expanded slightly to ask the location of the respondent's hometown and whether the respondent had given to a charity within the last several weeks.
5. Previous dictator games with charitable organizations as recipients have shown that, on average, subjects give \$3.10 of \$10.00 to the charity, keeping the remaining money for themselves (Eckel and Grossman, 1996). Higher giving would be expected in a classroom setting than with recruited students since the group of students is randomly selected rather than being attracted by the pecuniary reward, as discussed in footnote 4. The higher giving here, however, is not the effect of

influence by the professors because the experiment leaders were not the course professors, the professors were not in the vicinity where the decisions were made, and the professors were not given information about the dollar amounts donated. While the money was presented as payment for participation in the experiment, students in classes may not feel that the money belongs to them in the same way that students who participate after being recruited do; this may increase average giving in classroom settings. However, since we are interested in differences in giving between different demographic groups and changes in giving pre- and post-September 11, the absolute level of giving is not important.

6. This was also found by Eckel and Grossman [1998], Kamas, Baum, and Preston [2005], Lane and Messe [1971], Seguino et al., [1996] and Selten and Ockenfels [1998]. Other studies have found conflicting results; see Andreoni and Vesterlund [2001], Bolton and Katok [1995], Croson and Buchan [1999], and Solnick [2001].
7. In fact average giving by the highest income group went down after September 11th. However the gender composition of the highest income was predominantly female (four fifths) before September 11th and predominantly male (two thirds) after September 11th.
8. Note that the coefficients from rows 1-8 in column 1 and in column 4 are very similar. T tests cannot reject they are identical at conventional significance levels. As a result we can be confident that we have picked up a majority of the September 11th effects on giving with the September 11th dummy variable and the interaction terms.

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