Who Cooperates in Repeated Games?*

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We explore to what extent social preferences, as measured by dictator game giving, explain cooperation in noisy repeated games. Giving is correlated with cooperation when the returns to cooperation are low, but there is no correlation when the returns to cooperation are high. There is also no correlation between dictator game giving and leniency (waiting for multiple defections before retaliating) or forgiveness (returning to cooperation after a retaliation). Furthermore, inequity aversion does not favor cooperative strategies, which are common in our data and earn high payoffs. We conclude that cooperation in repeated games is primarily motivated by long-term payoff maximization.

Key words: cooperation, prisoner's dilemma, social preferences, dictator game, inequity aversion, survey.

JEL codes: C72, C91, D03.

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1. Introduction

The overall fraction of subjects who cooperate in the infinitely repeated prisoner's dilemma (PD) depends on the payoff parameters, but it is typically observed that there is some cooperation even when cooperation is not an equilibrium, and some defection when cooperative equilibria exist. Moreover, there is substantial heterogeneity across subjects in a given treatment: Some may cooperate in most periods while others cooperate hardly at all. This raises the question of who these cooperators are, and whether they differ in other measurable characteristics from the subjects who do not cooperate. In particular, the data raise the question of whether the cooperators are motivated by more than just maximizing their own monetary payoff. Although other-regarding motivations clearly play an important role in generating cooperative behavior in one-shot interactions, the extent to which they affect play in repeated games remains largely unknown in part because it is difficult to identify these motivations in repeated games.

To better understand the role of social preferences in repeated games, we relate each subject's play in a repeated prisoner's dilemma (PD) to their generosity in a dictator game (DG). We also investigate how inequity aversion (Fehr and Schmidt 1999) and pure altruism compare to monetary payoff maximization as explanations of the strategies used in the PD. We also use responses to survey questions to explore the motivations underlying cooperative play in the repeated PD, as well as to explore whether self-reported prosocial behavior outside the laboratory is a good indicator of experimental behavior in the PD and DG. Finally, we examine how individual characteristics correlate with both types of experimental behavior and the survey questions.

Overall, our results suggest that the main reason subjects cooperate in the repeated PD is to maximize their monetary payoff. When cooperation does not maximize monetary payoffs, those that give more in the DG are somewhat more likely to cooperate, but when the monetary payoffs strongly support cooperation, social preferences do not seem to be a key explanatory variable. This is supported by our finding that inequity aversion does not favor cooperative strategies, which are common in our data and earn high payoffs.

To reach this conclusion, we examine data from experimental games and surveys conducted as part of the research reported in our companion paper Fudenberg et al. (2010). There the focus was on the type of strategies subjects used in the repeated PD, and particularly on the effect of 'trembling hand' errors in PD execution.

In the current paper, we first investigate the correlation between cooperative play in the PD and giving in the DG. In the repeated PD, subjects could either cooperate or defect in each round, with a constant probability of a subsequent round and a chance that each player's decision will be changed to the opposite. In the DG, subjects split $6 between themselves and a person who is not present at the same time as the deciding subject. The returns to cooperation were varied across four different benefit-to-cost (b/c) ratios. While cooperation varied with the b/c ratio, giving in the DG did not.[1] Furthermore, we find that giving in the DG is not correlated with playing C in the first period of the repeated game, except perhaps in the one treatment where cooperation is not an equilibrium; and that giving in the DG is only correlated with the overall frequency of cooperation in the two lowest payoff treatments where cooperative strategies did not out-earn non-cooperative strategies. In addition, we find no correlation between DG giving and either leniency (waiting for multiple defections before punishing) or forgiveness (returning to cooperation after punishing), both of which are substantially more frequent when the returns to cooperation are high. While leniency and forgiveness are not associated with DG giving, strategies which are lenient and forgiving earned the best payoffs in the specifications with high returns to cooperation (Fudenberg et al. 2010). Thus social preferences seem to play a role only when cooperation is not supported by self-interest. When the monetary payoffs strongly support cooperation, social preferences do not seem to be a key explanatory variable.

We also explore the implications of social preferences for play in our PD game through the use of the Fehr and Schmidt inequity aversion model (1999). In Fudenberg et al. (2010) we identified a number of strategies that performed well given the distribution of play. Many of these strategies are lenient and forgiving. Here we investigate the expected utility of these strategies if subjects had utility as described by the inequity aversion model. We use a set of parameter values most often used by Fehr and Schmidt (see Fehr and Schmidt 2010), and find that the model gives the highest utility to subjects that always defect in the lowest b/c ratio, while giving the highest utility to a rather infrequently played exploitive or 'suspicious' strategy in the treatments with cooperative equilibria. Moreover, the FS model gives very little utility to lenient strategies, which are common in the specifications with cooperation equilibria and earn large monetary payoffs. Thus the FS model does not favor cooperative strategies, and is not successful at predicting the strategies played by subjects in the

[1] We do not mean to suggest that subjects do not have social preferences. Rather, these results show that variation in cooperation across treatments is not motivated primarily by social preferences, but instead by strategic reasoning.

specifications which support cooperation. We also examine a simple altruistic preference where subjects derive some benefit from their partner's payoff. We find that although altruism can potentially explain the cooperation we observe at low payoff specifications, it too makes incorrect predictions when the returns to cooperation are large. Thus altruism is also not a good predictor of cooperation in the specifications with cooperative equilibria.

Third, we analyze subjects' motivations for cooperating in the repeated PD. Subjects indicated how well various motivations (both self-interested and other-regarding) explain their cooperation decisions. In particular, we focus on what motivates subjects to be lenient. We also analyze the relationship between these motivations and cooperative play in the PD. At the individual level, we find that across all payoff specifications, a large majority of subjects reported maximizing their long-term payoff as a more important motivator of leniency than either a desire to increase their partner's payoff, to do the morally right thing or to avoid upsetting their partner. At the aggregate level, we find that in the payoff specifications which had higher cooperation rates, subjects rated the desire to maximize payoff as a stronger motivation for cooperation, while other motivations were either unrelated to cooperation or constant across specifications. We also find that subjects who are more inclined to attribute unprovoked defections to error are more lenient, but that DG giving is not predictive of this tendency to give the opponent the benefit of the doubt.

Fourth, we examine the correlation between behavior that is observed in the experiments and that is self-reported in survey questions related to the domains of benevolence and universalism. Answers to these survey questions have been previously related to both how spouses/partners and peers answer these questions on behalf of the subjects' behaviors, as well as to benevolence and universalism values (Bardi and Schwarz 2003). However, we find that these questions do not predict experimental behavior in either the PD or DG.

Finally, we explore whether specific individual characteristics are correlated with experimental behavior. We find that women are significantly less cooperative in the PD, as well as some evidence of economics majors cooperating less in the PD and giving less in the DG. We find no gender difference in DG giving.[2]

[2] We also find that subjects with incomplete demographics surveys are less cooperative than those with complete surveys. This suggests that including demographic controls from surveys where experimenters rely on voluntary completion of the survey can bias the results. We discuss this further in section 3.3.

There have been several past studies on the correlation of demographic variables and cooperation. The evidence on whether college major matters for cooperation is mixed (e.g., Frank et al. 1995, Dreber et al. 2008), as is the evidence on the importance of gender for cooperation (e.g., Croson and Gneezy 2009) and the role of socio-economic variables (e.g., Glaeser et al. 2000, Gächter et al. 2004). A recent meta-analysis of the DG, however, found that women give more and are thus more prosocial than men, and that older individuals give more than younger individuals (Engel 2010).[3]

As far as we know, this is the first paper that links social psychology survey questions with behavior in both the PD and DG while also correlating behavior in the two games with each other.[4] Harbaugh and Krause (2000) is perhaps the most related previous paper; they had subjects (children) first play a finitely repeated public goods game and then a modified DG, and they find that DG giving is correlated with first-round contributions but not last-round contributions, although their sample in this treatment is less than 30 subjects.[5] Our use of survey questions is related to previous studies linking experimental behavior to survey questions, where the focus has been on the trust game and trust attitudes (e.g., Glaeser et al. 2000, Fehr et al. 2003, Sapienza et al. 2007) or on cooperative play and trust attitudes (Ahn et al. 2003, Gächter et al. 2004). The results thus far are mixed, with some papers finding that attitudinal trust questions are not good at predicting experimental behavior (Glaeser et al. 2000, Ahn et al. 2003) whereas others find that they are (Fehr et al. 2003, Gächter et al. 2004).[6] In the setting of the DG, Carpenter et al. (2008) find that the specific survey questions for altruism used in their study is positively correlated with DG giving.

Cabral et al. (2010) provides an interesting recent example of how different models of generous behavior can be tested using only data on play in one game. By varying whether

[3] See Camerer (2003), Cárdenas and Carpenter (2008) and Engel (2010) for reviews of the dictator game.
[4] See Camerer and Fehr (2002) for a discussion of the advantages of experiments over surveys to measure social preferences.
[5] Several papers have run the DG before the main treatment instead of afterwards. Cabrales et al. (2010) had subjects first play a symmetric simultaneous-move version of a DG and then participate in a stylized labor market. They find that heterogeneous social preferences are a significant determinant of choice, and that uncertainty-aversion is a stronger determinant of choices than fairness. Ambrus and Pathak (forthcoming) also had subjects first play a DG and then a main treatment with a public goods game, but their design was quite different, as they matched subjects in the second round who made similar DG contributions, and they told subjects that this was the case.
[6] Sapienza et al. (2007) explain part of the mixed results with the fact that trust has both a belief-based component and a preference based one, where survey questions like the one used in the World Value Survey captures mainly the former component and questions about past trusting behavior mainly the latter. Sapienza et al. (2007) argue that since the type of subject pool differs between the studies so does variation in the former component and thus the correlation results; Glaeser et al. (2000) and Sapienza et al. (2007) used students (undergraduates vs. MBAs) as their subjects whereas Fehr et al. (2003) used a representative sample in Germany.

subjects know if the current round in an interaction is the last or not, Cabral et al. (2010) test for and reject a specific model of "kindness" (backward-looking reciprocation) in a repeated game and conclude that the majority of subjects are selfish; their test leaves open the larger question of the role of more general social preferences.

2. Experimental setup

The purpose of the experiment is to correlate cooperativeness in the infinitely repeated PD with giving in the DG while varying the returns to cooperation, and correlate experimental behavior with self-reported motivations for cooperative play and pro-social behaviors outside the lab, as well as individual characteristics.

Subjects were recruited through the Computer Lab for Experimental Research (CLER) at Harvard Business School, to come to the Harvard Decision Science Laboratory in Cambridge, MA. A total of 384 subjects[7], mainly undergraduate students from schools in the Boston metro area, participated in our experiments that ran from September 2009 to October 2010. In each of the 18 sessions, 12-32 subjects interacted anonymously via computer using the software Z-tree (Fischbacher 2007) when playing the infinitely repeated PDs as well as the DG.

Our experimental procedure has five components. First, subjects play a repeated PD. Second, subjects play a DG. Third, subjects answer questions about the motivation to cooperate in the PD. Fourth, subjects answer attitudinal questions on benevolence and universalism. Finally, subjects answer a questionnaire in order to provide us with information on various demographic variables, including age, gender, major, risk preferences and education.

2.1 Prisoner's dilemma

We use the data from an infinitely repeated PD with error originally reported in Fudenberg et al. (2010).In this previous paper, the data was analyzed to determine what strategies people use in repeated games with error. In each round, subjects chose between cooperation (C) and defection (D). We used an 'equal gains from switching' formulation of the PD (as in Dreber et al. 2008), so that cooperation meant paying a cost of c units for the other to gain a benefit of b units, while defection was passive and leads to 0 units for both

[7] We focus our analysis on the main treatments of Fudenberg et al. (2010), which have 278 subjects in total. The other subjects participated in control experiments using different error rates.

players, where 30 units = \$1.[8]We fixed c=2, and considered 4 treatments in which b/c=1.5, b/c=2, b/c=2.5 and b/c=4. The probability of a subsequent round (i.e. continuation probability) was δ=7/8. When an interaction finished, subjects were rematched according to the turnpike protocol (as in Dal Bó (2005)). We introduced error in execution, such that with error probability E=1/8, an intended move was changed to the opposite move.[9] Subjects knew when their own move had been changed but not when the move of the other player had been changed. Subjects were given a show-up fee of \$10 plus their earnings from the repeated PD and a \$6 DG (see below). On average subjects made \$22 per session, with a range from \$14 to \$36. Sessions lasted approximately 90 minutes.See the online appendix 0-A1 for the experimental instructions, and Fudenberg et al. (2010) for further details.

In our current analysis, we use four different cooperation measures. First, we look at how often the subject cooperated in the first round of each interaction. This behavior is an indication of whether the subject was playing a fundamentally cooperative or non-cooperative strategy. Second, we consider how often the subject cooperated in all rounds, indicating their overall cooperativeness. Thirdly, we consider how often the subject showed leniency by cooperating in a history in which both subjects played C in all but the previous round, while in the previous round the other subject played D. Lastly, we consider how often the subject was forgiving, by cooperating in a history in which (i) at she chose C in the first round, (ii) in at least one previous round, she chose C while the other subject chose D and (iii) in the immediately previous round she played D. As in Fudenberg et al. (2010), we focus on decisions made in the last 4 interactions of each session to minimize learning effects.[10]

2.2 Dictator game

After the repeated prisoner's dilemmas, subjects played a dictator game where they were asked to divide \$6 between themselves and an anonymous recipient that was not a participant in the prisoner's dilemma but would be recruited at a later date. Subjects were informed that the recipient would receive no payment other than what the subject chose to

[8] Although not all PDs can be described using this formulation, it allows one to easily vary the payoff to cooperation by adjusting the b/c ratio.

[9] As controls, we also conducted two additional treatments where b/c=4 and either E=1/16 or E=0. These treatments are not the focus of this paper, as they did not provide enough data to be conclusive. Nonetheless, we provide an analysis of the E=0 condition in Appendix G to provide preliminary evidence about who cooperates in repeated games without error. We find largely equivalent results to those from the games with noise: DG giving has little predictive power for explaining cooperation in the repeated PD.

[10] As a robustness check we compare the results from the analysis of the last 4 interactions with the results based on an analysis of all interactions. The results are qualitatively the same for all the main results unless otherwise noted. See Appendix B for details.

give. In our analysis, we use the amount given in the dictator game as our experimental measure of prosocial preferences.

2.3 Motivations for cooperating in the prisoner's dilemma

To further explore motivations for cooperation, we had subjects complete a series of questions to elicit the motivation behind subjects' choice of playing C vs. D in the prisoner's dilemma. Subjects indicated the extent to which their motivation for cooperating following each outcome of the previous round (CC, CD, DC or DD) was to (i) maximize their long-term payoff, (ii) help the other player earn money, (iii) do the morally right thing or (iv) avoid upsetting the other player.[11]See the online appendix 0-B1 for the motivations questions.

For example, subjects were given questions such as "Imagine that last round you played C while the other played D. When you choose to now play C, to what extent is it motivated by (i) earning the most points in the long run (ii) helping the other person earn points, (iii) feeling it's the moral thing to do or (iv) not wanting to upset the other person."For each motivation (i) through (iv), the subject indicated a number between 1 and 7, where 1 is "not at all" and 7 is "very much so." This question in particular looks at the motivation for leniency, a strategic feature that was both common and successful in treatments with cooperative equilibria according to the analysis of Fudenberg et al. (2010). We also included free-response questions where subjects were asked to describe their strategies. This latter data was used to inform the choice of strategies analyzed in Fudenberg et al. (2010).

In the current analysis, we focus on the extent to which the self-interested motivation of (i) "earning the most points in the long run" is the strongest motivator for playing C. We first look at the motivation behind being lenient (playing C after CD), comparing (i) with the other motivations (ii)-(iv). We then look at the importance of each specific motivator across the four possible states in the PD, by making composite measures that are the sum of (i) over all four states (CC, CD, DC, DD), the sum of (ii), the sum of (iii) and the sum of (iv), and testing their importance in determining first round and overall cooperation.

2.4 Attitudinal questions on benevolence and universalism

After the behavioral experiments, subjects answered questions related to prosocial behavior and values in the domains of benevolence and universalism that were previously used in Bardi and Schwartz (2003). Here benevolence concerns behaviors that represent a motivation to help and support individuals who are close to the subject, and universalism

[11] For other ways of measuring the motivation for cooperation in the PD, see e.g., Ahn et al. (2003).

concerns behaviors that represent a prosocial motivation towards others in general (i.e. not only for individuals close to the subjects).[12]The questions ask how frequently subjects have engaged in specific behaviors during the past six months. Subjects use a Likert scale from 0-4 to indicate how often they have engaged in each behavior relative to their opportunities to do so, where 0 indicates "Never" and 4 indicates "All the Time". For example, one component of the benevolence scale is the frequency with which one "Help[s] out a colleague at work or school who made a mistake," while a component of the universalism scale is the frequency of "Donat[ing] money to alleviate suffering in foreign countries (e.g., hunger relief, refugee assistance)." See online appendix 0-C1 for all questions used to construct the benevolence and universalism scales.

In the analysis, we sum the scores that subjects gave to the 10 questions for benevolence and the 8 questions for universalism separately.

3. Results

See Appendix A for a summary of the variables used in the analysis.

3.1 Prisoner's dilemma and dictator game correlations

To test the correlation between cooperation and social preferences, we run OLS regressions over frequency of cooperation[13], with b/c ratio and subject's donation in the DG as independent variables, with robust standard errors clustered on session. First we consider cooperation in the first round of each interaction, and find no significant relationship between the amount given in the DG and first round cooperation.[14] This is illustrated in Figure 1. To test whether the effect of DG giving varies across b/c ratios, we next include an interaction term between b/c ratio and DG giving. Doing so produces a marginally significant negative interaction term (p=0.078) and evaluating the net coefficient[15] of DG giving for each b/c ratio finds a marginally significant positive effect of donation at b/c=1.5 (p=0.056) and no significant effect at higher b/c ratios. Thus is seems that when no cooperative equilibria exist

[12] These terms are commonly used in the psychological literature in connection with pro-sociality (e.g, Luk and Bond 1993, Kasser and Ahuvia 2002).

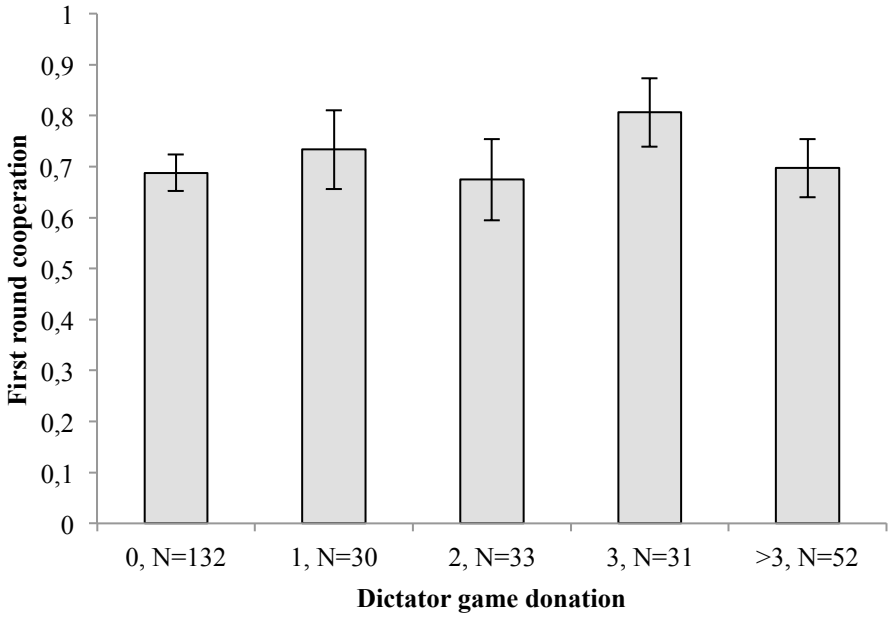
[13] We report the results of OLS regression on average cooperation frequency (by subject, clustered on session) because OLS coefficients are directly interpretable. In the online Appendix H we replicate all of the regressions in the main text using logistic regression over each individual cooperation decision (clustered on subject and session), as well as using Tobit regression on average cooperation frequency (by subject, clustered on session) to account for the fact that average cooperation frequency is bounded on the interval [0,1]. We find qualitatively equivalent results, except for a few cases that we explicitly note..

[14] We do not report p-values greater than 0.10 in the text. See the regression tables in the Appendix for all coefficients and p-values.

[15] The net coefficient is the main effect coefficient for DG giving plus the product of the interaction term coefficient and the b/c value in question.

(at b/c=1.5), social preferences may play some role in the decision about whether or not to play a cooperative strategy. But at higher b/c ratios, DG giving is not predictive of choosing a cooperative strategy[16].

Figure 1. First round cooperation and DG giving.

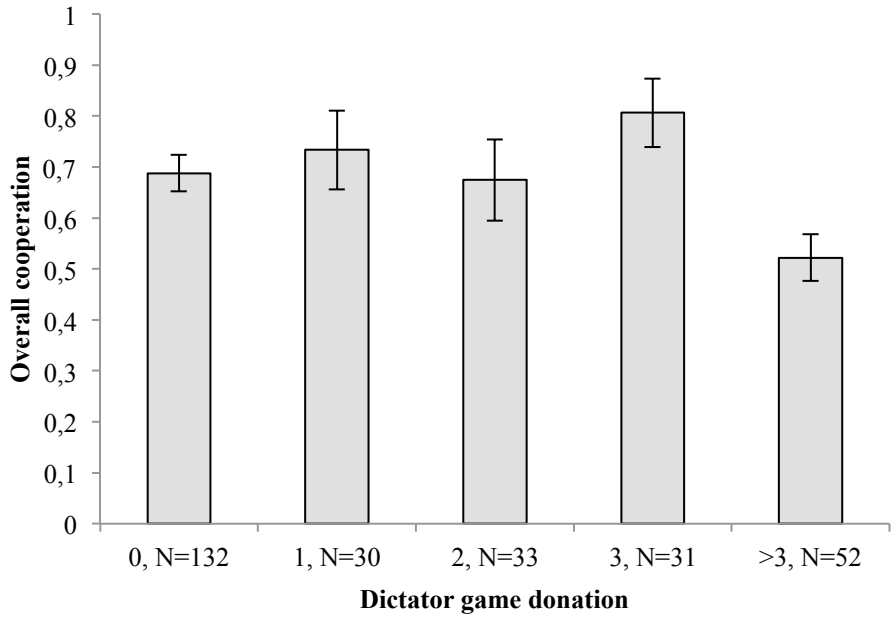


Next we consider overall cooperation in all rounds. We find a marginally significant positive relationship between DG giving and overall cooperation frequency (p=0.095). See Figure 2. As with first-round cooperation, including an interaction between b/c ratio and DG giving shows a marginally significant negative interaction between b/c ratio and DG giving (p=0.080). Examining the net coefficient of DG giving for each b/c ratio finds a significant positive effect of donation at b/c=1.5 (p=0.018) and b/c=2 (p=0.031), and no significant effect at b/c=2.5 or b/c=4.[17] Similarly to first round cooperation, we find that social preferences may play some role in cooperation decisions at the lower b/c ratios, where cooperative strategies do not earn high payoffs (see Fudenberg et al. 2010), but that in the payoff specifications where cooperation is payoff maximizing, social preferences are not predictive of play.

[16] The marginally significant effect at b/c=1.5 disappears when using Tobit regression instead of OLS; here we find no significant interaction between DG giving and b/c ratio, as well as no significant effect of DG giving.

[17] When we add demographic controls (age, gender, major and education) the marginally significant effects reported for the interactions between the b/c ratio and DG giving become significant for both first round cooperation (interaction b/c*DG p=0.011; b/c=1.5 p<0.001; b/c=2 p=0.011) and overall cooperation (interaction b/C*DG p=0.038; b/c=1.5 p<0.001; b/c=2 p=0.003). The effect of DG giving when not including the interactions remains marginally significant for overall cooperation (p=0.064). See Appendix Tables B1 and B2, where there is also an analysis of all interactions. However, there may be some bias based on who does or does not complete the questionnaire: see section 3.3 for more discussion.

Figure 2. Overall cooperation and DG giving.



We next test whether there is correlation between either leniency or forgiveness and DG giving. In histories where there is the possibility for leniency (because the opponent played D in the previous round, and no previous D moves had occurred) there is no significant relationship between DG giving and cooperation, as can be seen in Figure 3. We also find no significant interaction between b/c ratio and DG giving.[18] In histories with the possibility of forgiveness, we find a marginally significant positive relationship between DG giving and cooperation (p=0.079), as can be seen in Figure 4. However this relationship becomes non-significant when including demographic controls for age, gender, major and education level.[19]As for leniency, we find no significant interaction between b/c ratio and DG giving

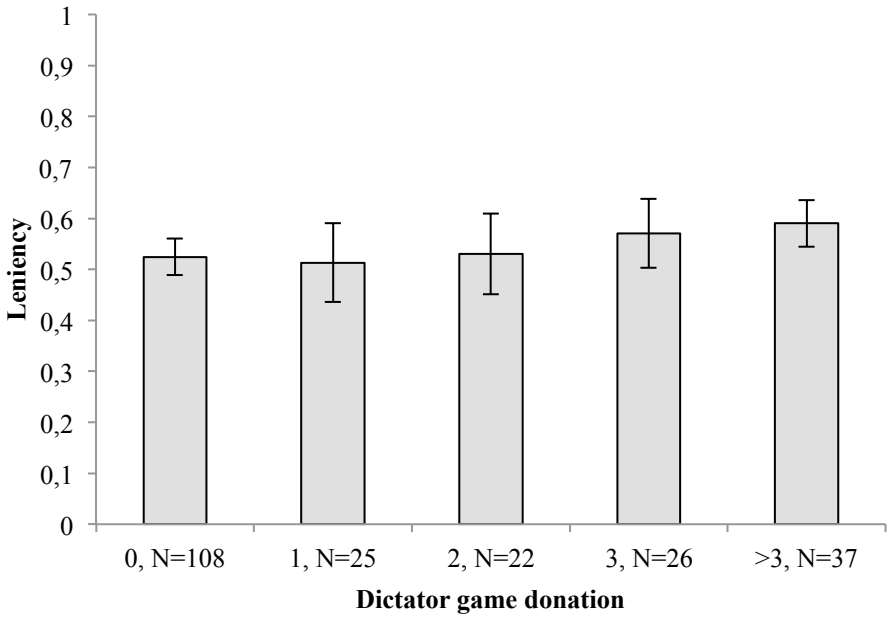
[18] Controlling for demographics does not change the results qualitatively. See Appendix Table B3. Moreover, in a regression controlling for b/c ratio, there is no significant difference in leniency between those that who do and do not complete the questionnaire.

[19] See Appendix table B4. In a regression controlling for b/c ratio, there is no significant difference in forgiveness between those that who do and do not complete the questionnaire. Additionally, the results for forgiveness vary somewhat depending on the regression model used. With logistic regression over each decision, there is no significant main effect of DG giving, but there is a significant negative interaction between DG giving and b/c (coeff=-0.108, p=0.044), which becomes marginally significant when including demographic controls (coeff=-0.115, p=0.051); and using Tobit regression, there is a significant main effect of DG giving (coeff=0.048, p=0.024) which becomes marginally significant when including demographic controls (coeff=0.044, p=0.065), but no significant interaction between DG giving and b/c ratio. In sum, regardless of which regression model is used, there is an at most marginally significant relationship between DG giving and forgiveness when including demographic controls. See Appendix H for regression tables.

when considering histories with the possibility of forgiveness. Thus we do not find consistent evidence of a connection between DG giving and leniency or forgiveness.[20]

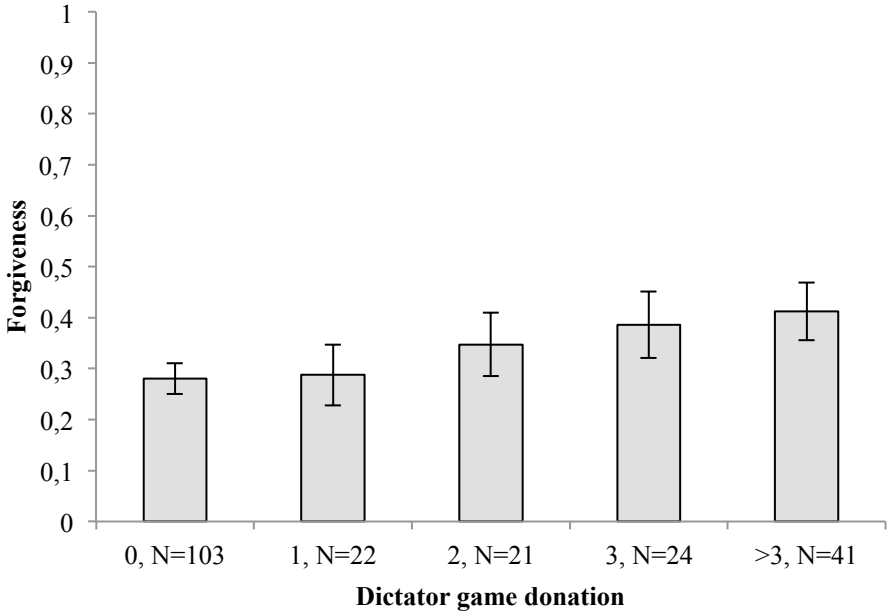
Taken together, this analysis shows that if social preferences are important for cooperation in the prisoner's dilemma, it is so only in the payoff specifications with the least cooperative play, and thus social preferences cannot explain why Fudenberg et al. (2010) found that cooperation increases with the returns to cooperation or why lenient and forgiving strategies are common in the high b/c treatments.

Figure 3. Leniency and DG giving.



[20] We also test whether leniency and forgiveness are significantly related to DG giving when analyzing all interactions. See Appendix Tables B3 and B4. Leniency is significantly positively related to DG giving when looking at all interactions (p=0.001), as well as in just the first 4 interactions (p=0.028). Thus it appears that the relationship between leniency and DG giving disappears with learning. For forgiveness, the results when analyzing all interactions are similar to the analysis of the last 4 interactions.

Figure 4. Forgiveness and DG giving.



We also investigate the implications of social preferences for play in the repeated PD game. Among the various models describing social preferences, we choose to apply the Fehr and Schmidt (henceforth FS) inequity aversion model (1999) to compute the expected utilities for the strategies identified in Fudenberg et al. (2010).[21] In the FS model, subjects get disutility from unequal outcomes, i.e. both from having less as well as more than other subjects. While the FS model does not capture many important aspects of social preferences such as reciprocity, spite and efficiency concerns (e.g. Rabin 1993, Levine 1998, Brandts and Sola 2001, Charness and Rabin 2002, Cox et al. 2008), and does not allow for a preference for ex-ante equality (see e.g. Bolton et al. 2005, Krawcyck and le Lec 2006, Fudenberg and Levine 2010), it is a parsimonious and widely used specification that is easy to implement and provides a straightforward basis of comparison to monetary payoff maximization.[22] Furthermore, the simplest versions of reciprocity seem unlikely to explain leniency, as when the opponent deviates, reciprocity suggests retaliation and not forbearance.

We compare the FS inequity averse utility for each strategy given the observed distribution of play, using $\alpha=2$ and $\beta=0.6$, where α measures the loss from disadvantageous inequity (i.e. when the opponent's money payoff exceeds the subject's) and β measures the

[21] For other work linking experimental play to the FS model, see for example Bellemare et al. (2008). In a study on a representative Dutch sample playing the DG and the ultimatum game they find that inequity aversion seems to be a more important motivator in the general population than among students.
[22] There is some debate about just how widely and accurately the FS model applies; see Binmore and Shaked (2010) and Fehr and Schmidt (2010).

loss from advantageous inequity.[23]To apply the FS model to the set of 11 strategies used by subjects in Fudenberg et al. (2010), we take the 11x11 payoff matrix, and for each payoff entry p(i,j) we calculate the FS payoff

$$p_{FS}(i,j) = p(i,j) - \alpha \max\left[p(j,i) - p(i,j), 0\right] - \beta \max\left[p(i,j) - p(j,i), 0\right].$$

We multiply the vector of observed strategy frequencies with the FS payoff matrix to get the expected payoff of each strategy. The results, as well as the expected payoffs based purely on monetary payoffs and the observed frequencies of each strategy, are displayed in Table 1.

Table 1. Frequencies, money payoffs and FS payoffs of observed strategies.[24]

	b/c=1.5			b/c=2			b/c=2.5			b/c=4		
	Freq	Money payoff	FS Payoff	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff
ALLC	0.00	-1.25	-28.68	0.03	6.92	-14.30	0.00	13.27	-8.14	0.06	28.13	-6.51
TFT	0.19	2.40	-3.71	0.06	8.71	3.87	0.09	14.64	9.38	0.07	29.01	19.90
TF2T	0.05	1.53	-11.33	0.00	8.69	-0.34	0.17	14.65	5.19	0.20	**29.67**	14.96
TF3T	0.01	0.90	-15.65	0.03	8.44	-3.47	0.05	14.53	2.08	0.09	29.56	9.88
2TF2T	0.00	1.86	-8.85	0.11	8.89	1.68	0.11	**14.72**	7.02	0.12	29.62	17.44
GRIM	0.14	3.02	-0.45	0.07	8.40	4.03	0.11	12.33	7.38	0.04	23.99	14.35
GRIM2	0.06	2.37	-4.12	0.18	9.03	4.42	0.02	13.98	8.69	0.05	27.90	18.21
GRIM3	0.06	1.79	-8.82	0.28	9.02	2.13	0.24	14.67	7.06	0.11	29.23	16.49
2TFT	0.06	2.87	-0.77	0.07	8.59	5.22	0.02	13.58	9.40	0.03	27.08	19.53
ALLD	0.29	**3.73**	**1.00**	0.17	8.53	2.65	0.14	11.33	4.32	0.23	21.04	9.76
D-TFT	0.15	2.89	-0.31	0.00	**9.19**	**5.31**	0.05	14.66	**9.93**	0.00	28.76	**20.90**

[23] We focus on this particular pair of values as it seems to be most widely used (see Fehr and Schmidt 2010). We also consider three other parameter sets in Appendix C. We see qualitatively similar results, in that in the payoff specifications with high returns on cooperation, the strategies with highest FS utility are always less lenient and/or forgiving that those favored by monetary payoff maximization.

[24] See online appendix 0-D for strategy definitions.

We see that the FS model assigns a low payoff to the lenient strategies, which are versions of Tit-for-tat, 2-tits-for-1-tatand Grim that wait for 2 (TF2T, 2TF2T, Grim2) or 3 (TF3T,Grim3) defections before punishing. Yet these lenient strategies were very common, and also earned high money payoffs. The lenient strategies obtain low FS payoffs because with certain less cooperative partners they were exploited. In terms of own monetary payoffs, these loses were outweighed by high payoffs received when playing other highly cooperative strategies. But because the FS model strongly penalizes disadvantageous inequity, the losses incurred against the exploitive strategies are amplified when calculating FS payoff.

Therefore the strategy which does best using FS payoff is very conservative and hesitant to cooperate. In all three treatments with cooperative equilibria, the strategy with the highest FS payoff is D-TFT (or 'suspicious TFT'). This strategy opens with D, and thereafter plays the action the other player used in the previous period. Although this makes some sense in the context of inequity aversion, it does not do a good job of predicting the observed frequencies. Selfish payoff maximization (against the observed frequencies) does much better.

It is also interesting to note that we observe considerable strategic diversity in our data, and consistent with this, numerous strategies have very close to the maximal monetary payoff.[25] Considering FS utility, however, there is generally one single dominating strategy which is substantially more successful than others.

Another implication of the FS analysis is that when b/c=1.5, FS and self-interest both favor ALLD. Yet as reported above, we find some indication of a positive relationship between DG giving and cooperation at b/c=1.5. This finding suggests an alternate social preference: simple altruism. To explore this possibility, we calculate the altruistic payoff of each strategy given the observed distribution of play. A strategy *i* earning money payoff p(i,j) against strategy *j* receives an altruistic payoff of

$$p_A(i,j) = p(i,j) + \gamma\, p(j,i)$$

where γ represents the extent to which the player values the partner's money payoff. We find that a value of γ=0.22 can fairly well predict behavior at b/c=1.5, where the uncooperative

[25] We also observe a large fraction of subjects playing ALLD in these specifications, which is not consistent with payoff maximization. We believe this particular heterogeneity results from ALLD being a self-confirming equilibrium: It is hard for players that never cooperate to learn about the payoff advantages of cooperation. The same logic does not seem to apply to FS payoffs and leniency. Lenient strategies earn low FS payoffs because of exploitation by defectors. Subjects using lenient strategies will observe some opponents who consistently defect despite the lenient player's cooperation. Thus the potential false belief here concerns something that occurs when using the given strategy. This is different from the case of ALLD, where the false belief concerns how opponents would respond if the subject changed their own play to cooperation.

strategies ALLD and D-TFT are roughly as common as the cooperative (and non-lenient) strategies TFT, 2TFT and Grim, and all receive similar altruistic utilities. This altruistic preference, however, predicts too much cooperation when the returns to cooperation are high. At b/c=4, for example, the strategies with the highest altruistic utility are ALLC and TF3T, which only punishes following 3 Ds in a row, neither of which are frequently played. See Appendix D. Thus pure altruism also does not seem to do a good job of describing the data.

Together, these results provide further evidence that the cooperation in general, and the leniency in particular, observed in Fudenberg et al. (2010) is primarily the result of strategic considerations rather than of social preferences.

3.2 Motivations to cooperate and survey questions

First we look at the questions related to motivations for cooperation. We particularly focus on the extent to which the alternative (i) "earning the most points in the long run" is the main motivator for playing C.

We start by exploring the motivation for lenient behavior (when a subject cooperates following a period in which she had cooperated while her partner had defected). We find that (i) is higher than all other motivations in all four b/c treatments. See Appendix Table E2. That is, even though subjects may give some importance to all motivations, between 65% and83% of subjects rated (i) higher than (ii), 66% to 80% rated (i) higher than (iii), and 71% to 90% rated (i) higher than (iv). Earning the most points in the long run thus seems to be an important motivation for playing C after the other person just played D, which is an important element of leniency and forgiveness.

We ask the same question about motivation for playing C in the other three possible states (C after CC, C after DC, C after DD). Within each other state, we find the same pattern, with most subjects listing profit maximization as their most important motivator.[26]

To look at how each motivator predicts actual cooperation in the PD, we made four composite measures, namely the sum of (i) over all four states (CC, CD, DC, DD), the sum of (ii), the sum of (iii), and the sum of (iv). Regressing firstround cooperation, overall cooperation, cooperation in histories with the possibility of leniency and cooperation in histories with the possibility of forgiveness against all these composite cooperation motivations, while controlling for b/c ratio, we find that "earning the most points in the long

[26] See Appendix Tables E1-E4 for the importance of motivation (i) relative to the other motivations for cooperating in each of the four possible states in the

run" is significantly positively correlated with firstround cooperation ($p<0.001$), overall cooperation ($p<0.001$), leniency ($p=0.010$) and forgiveness ($p=0.026$). The motivation "not wanting to upset the other person" is a significant positive predictor of first round cooperation ($p=0.049$), overall cooperation ($p=0.003$) and forgiveness ($p=0.007$), but not leniency, while the other motivations are not predictive of any of the four measures.[27]Motivations may play different roles in the different payoff specifications, so we also performed additional regressions including interaction terms between the b/c ratio and the two significant motivations ((i) and (iv)). We find a marginally significant positive interaction between b/c ratio and the profit-maximization motivation (i) for firstround cooperation ($p=0.088$) and a significant positive interaction for forgiveness ($p=0.040$), whereas there is no significant interaction between b/c ratio and the profit-maximization motivation for overall cooperation or leniency. The interaction between b/c ratio and the upset motivation (iv) is significant and negative for first round cooperation ($p=0.023$) but not for the other motivations. Thus there is some evidence of profit maximization being more important for cooperation when the returns to cooperation are higher (in higher b/c ratios), whereas the upset motivation is if anything less important for cooperation when the returns to cooperation are higher. These self-report measures complement the analysis of FS and altruistic utility versus monetary payoff maximization. Both sets of analyses suggest that the desire to earn the most points is the most important motivator of cooperation across payoff specifications.

We also asked subjects the extent to which they interpreted an opponent's D following a round of mutual cooperation as due to error rather than being intentional (using a 7 point Likert scale). As one might expect, we find that this self-report measure is significantly positively correlated with cooperation in histories with the possibility of leniency ($p=0.002$), as well as first round cooperation ($p=0.001$) and overall cooperation ($p=0.006$), but not forgiveness.[28]We use this measure to ask whether altruists are more inclined to give opponents the benefit of the doubt. Consistent with our previous analyses, we find no significant relationship between DG giving and this measure of attributing defection following mutual cooperation to error rather than intention, and no significant interaction between DG giving and b/c ratio.

[27] See Appendix Table E5. For an analysis including demographic controls as well as an analysis of all interactions, see Tables 0-F1 and 0-F2 in the online appendix.
[28] We report the results of ordinal logistic regression taking the self-report measure as the dependent variable. See Appendix E for regression tables.

The responses to the psychological survey are also consistent with social preferences not playing a key role in repeated games, as neither benevolence nor universalism is related to first round cooperation, overall cooperation, cooperation in histories with leniency or cooperation in histories with forgiveness. See Appendix Tables F1 and F2.[29] There is also no evidence of a correlation between benevolence and universalism with DG giving. See Appendix Table F3. We conclude that these questions on self-reported prosocial behavior are not good predictors of experimental behavior in either the repeated PD or the DG.[30]

3.3 Individual characteristics

In this section we examine whether individual characteristics can predict cooperative play in the repeated PD or giving in the DG.

A first, most basic individual characteristic is the willingness to complete the post-experimental demographics survey. We compare the 26 subjects with incomplete demographics surveys with the 252 subjects with complete surveys. Looking at first round cooperation, subjects who don't fill out the survey are less cooperative (63% vs. 72%), though this is not significant in a regression controlling for b/c ratio. The difference is however significant for overall cooperation (39% vs. 52%) in a regression analysis (p=0.038). These results suggest that including demographic controls potentially biases the results, as the subjects who fill out the demographics survey appear to be more cooperative. Importantly for our subsequent gender analysis, we find no significant difference in the fraction of women reported in the demographics compared to the actual fraction of women determined from the subject pool administrator's sign-up sheets (chi^2 test, p=0.436). As reported earlier, we also find no significant difference in leniency and forgiveness between those with complete and incomplete demographics surveys.

We now ask how different demographic features predict play. In the first column in Tables2-6, we evaluate the predictive power of the demographic variables gender (female=1) and major (economics=1) for cooperation in the first round, overall cooperation, cooperation in histories with the possibility for leniency, cooperation in histories with the possibility for

[29] The results are similar when we control for demographic variables and when we look at all interactions (see Tables 0-G1-G4 in the online appendix). Using Tobit regression, however, we find a significant *negative* relationship between benevolence and leniency (coeff=-0.046, p=0.048) when no controls are included, and a marginally significant relationship (coeff=-0.045, p=.009) when including the demographic controls. As the logit regression agrees with the OLS, and 79% of the cooperation frequencies in this regression are either 0 or 1, we feel that the significant Tobit result is probably spurious.

[30] An interesting extension for future work would be to compare the survey questions used here with the NEO personality inventory used in Carpenter et al. (2008), since that paper finds an association between DG giving and the NEO personality inventory for altruism.

forgiveness, and DG giving, respectively. In the second column in each of these tables we add the control variables for age and education, where the latter consists of several binary variables that correspond to the questions in the survey.[31]Previous work has consistently found women to be more risk averse than men (e.g., Eckel and Grossman 2008a,Croson and Gneezy 2009, Dreber et al. 2010), thus differences in risk preferences could be responsible for a gender effect we observe. To evaluate this possibility, we perform two additional analyses controlling for risk preferences. In the third column we rerun column 1 where we have added the answer to a hypothetical investment question. Column 4 does the same thing for a question on risk perception or general risk taking. Both risk questions are from Dohmen et al. (forthcoming). In column 5 we interact gender and b/c ratio and economics major and b/c ratio.

We find that being female is consistently negatively related to the two first measures of cooperation, even when controlling for risk preferences. The results from column 1 in Tables 2 and 3 suggest that women cooperate significantly less than men, both in the first round (p=0.001) and overall (p=0.016), while economics majors only seem to cooperate less than others overall (p=0.005) but not in the first round. These effects are robust to the inclusion of other control variables; see Tables 2and 3.[32] We find no significant interaction between gender and b/c ratio or economics major and b/c ratio. We also find that self-rated risk taking is negatively correlated with first round cooperation (p=0.025).

Table 2. First round cooperation and individual characteristics.

	(1)	(2)	(3)	(4)	(5)
b/c	0.069	0.069	0.066	0.067	0.060
	(2.21)**	(2.03)*	(1.98)*	(2.01)*	(1.52)
Female	-0.138	-0.096	-0.143	-0.167	-0.246
	(4.72)***	(3.26)***	(4.45)***	(5.31)***	(3.76)***
Economics major	-0.088	-0.110	-0.109	-0.138	0.114
	(1.34)	(1.40)	(1.58)	(1.79)	(0.72)
Investment Q			0.014		
			(1.26)		
General risk taking				-0.029	
				(2.59)**	
b/c*female					0.041
					(1.30)
b/c*econ					-0.076
					(1.29)
Education & age controls	No	Yes	No	No	No
Constant	0.610	0.086	0.592	0.810	0.634
	(6.18)***	(0.23)	(5.16)***	(5.45)***	(5.70)***
Observations	267	252	254	252	267
R-squared	0.05	0.09	0.07	0.07	0.06
Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%					

[31] See the online appendix 0-E.
[32] For an analysis of all interactions see Tables 0-H1-H4 in the online appendix.

Table 3. Overall cooperation and individual characteristics.

	(1)	(2)	(3)	(4)	(5)
b/c	0.089	0.089	0.085	0.083	0.108
	(2.84)**	(3.28)***	(2.77)**	(2.81)**	(2.47)**
Female	-0.074	-0.046	-0.078	-0.085	-0.003
	(2.86)**	(1.81)*	(2.78)**	(2.54)**	(0.05)
Economics major	-0.110	-0.131	-0.124	-0.135	-0.042
	(2.20)**	(2.43)**	(2.36)**	(2.64)**	(0.37)
Investment Q			0.003		
			(0.45)		
General risk taking				-0.011	
				(1.07)	
b/c*female					-0.028
					(1.10)
b/c*econ					-0.026
					(0.47)
Education & age controls	No	Yes	No	No	No
Constant	0.325	0.020	0.338	0.422	0.277
	(3.43)***	(0.08)	(3.42)***	(3.15)***	(2.41)**
Observations	267	252	254	252	267
R-squared	0.11	0.13	0.10	0.10	0.11
Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%					

Gender is not related, however, to leniency or forgiveness. Economics major is not related to leniency, but economics majors are less forgiving (p=0.027).[33] There are no significant interactions between gender and b/c ratio or economics major and b/c ratio. Older subjects also appear to be more lenient than younger (p=0.001).[34]

Table 4. Leniency and individual characteristics.

	(1)	(2)	(3)	(4)	(5)
b/c	0.107	0.101	0.104	0.098	0.098
	(2.76)**	(2.31)**	(2.30)**	(2.37)**	(1.89)*
Female	-0.013	-0.016	-0.014	0.014	-0.050
	(0.25)	(0.27)	(0.24)	(0.20)	(0.32)
Economics major	-0.098	-0.086	-0.093	-0.062	-0.120
	(1.71)	(1.32)	(1.63)	(1.01)	(0.90)
Investment Q			0.012		
			(0.83)		
General risk taking				0.022	
				(1.64)	
b/c*female					0.015
					(0.25)
b/c*econ					0.009
					(0.17)
Education &age controls	No	Yes	No	No	No
Constant	0.278	-0.440	0.260	0.168	0.300
	(2.17)*	(1.74)	(1.77)	(1.01)	(1.86)*
Observations	210	200	202	200	210
R-squared	0.06	0.09	0.07	0.06	0.06
Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%					

[33] Though this is not significant in the analysis of all interactions. See Table 0-H4 in the online appendix.
[34] The age coefficient is 0.039.

Table 5. Forgiveness and individual characteristics.

	(1)	(2)	(3)	(4)	(5)
b/c	0.097	0.096	0.103	0.099	0.116
	(3.36)***	(3.45)***	(3.77)***	(3.50)***	(2.61)**
Female	-0.075	-0.076	-0.078	-0.089	0.010
	(1.77)	(1.68)	(1.71)	(1.83)*	(0.10)
Economics major	-0.127	-0.160	-0.150	-0.166	-0.089
	(2.55)**	(2.83)**	(2.90)**	(3.35)***	(0.82)
Investment Q			-0.004		
			(0.59)		
General risk taking				-0.010	
				(0.76)	
b/c*female					-0.032
					(0.68)
b/c*econ					-0.016
					(0.32)
Education & age controls	No	Yes	No	No	No
Constant	0.119	0.159	0.113	0.179	0.072
	(1.64)	(0.68)	(1.37)	(1.59)	(0.75)
Observations	203	192	193	192	203
R-squared	0.11	0.15	0.13	0.13	0.12
Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%					

Considering the DG, gender is not significantly related to DG giving (see Table 6), and there is some evidence of economics majors giving less than other majors (p=0.077). There is no significant interaction between gender and b/c or economics major and b/c. Table 6 also shows that DG giving does not vary significantly with b/c ratio, an important fact for our analysis of DG giving and cooperation across treatments.

Table 6. DG giving and individual characteristics.

	(1)	(2)	(3)	(4)	(5)
b/c	0.012	0.032	0.038	0.023	0.118
	(0.15)	(0.36)	(0.39)	(0.24)	(1.04)
Female	0.218	0.238	0.223	0.236	0.911
	(1.13)	(0.87)	(1.05)	(0.95)	(1.72)
Economics major	-0.440	-0.409	-0.413	-0.398	-1.039
	(2.00)*	(1.81)	(1.89)*	(1.70)	(1.85)*
Investment Q			0.079		
			(1.79)		
General risk taking				0.033	
				(0.63)	
b/c*female					-0.287
					(1.77)
b/c*econ					0.239
					(1.31)
Education & age controls	No	Yes	No	No	Yes
Constant	0.998	0.616	0.742	0.747	0.747
	(3.95)***	(0.63)	(2.37)**	(2.17)*	(2.03)*
Observations	233	218	220	218	233
R-squared	0.02	0.03	0.03	0.02	0.03
Robust t statistics in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%					

In sum, our data suggest that women consistently cooperate less than men in terms of first round cooperation in the PD as well as overall cooperation, across all payoff specifications, while there is no gender difference in leniency or forgiveness, or in DG giving. Economics majors cooperate less overall, and there is some evidence that they may be less forgiving. There is also some evidence of economics majors giving less in the DG.

4. Discussion

To gain insight into who cooperates in repeated games, we had the same subjects play a repeated prisoner's dilemma and a dictator game, and fill out a questionnaire on attitudes, motivations and individual characteristics. We find that in most cases, cooperators do not give more in the DG than defectors. We have previously shown that subjects cooperate considerably more in treatments with cooperative equilibria compared to treatments without cooperative equilibria (Fudenberg et al. 2010). Though there was substantial heterogeneity in strategies played, the most successful strategies in the former treatments were lenient, in not retaliating for the first defection, and forgiving, in often returning to cooperation after inflicting a punishment. One reason for this variation in cooperation could be due to variation in social preferences between the different treatments, where some subjects cooperate or not for reasons that take other players' payoffs into account. However, we do not find evidence that DG giving is predictive of either leniency or forgiveness. Furthermore, we find that Fehr and Schmidt inequity aversion preferences give very little utility to cooperative, and in particular lenient, strategies in our data, and that neither inequity aversion nor pure altruism is successful in predicting the strategies played by subjects in the specifications which support cooperation.

When selfish payoffs strongly support cooperation, social preferences, as indicated by our various measures, do not seem to be a key factor in explaining who cooperates or not or what strategies people use. Furthermore, play in general, and in particular leniency, seems to be motivated by payoff maximization rather concerns for the other players.

We also find that women cooperate less than men when we look at first round or overall cooperation overall. Previous literature on gender differences in the prisoner's dilemma shows mixed results, with some experiments finding that women cooperate more than men while others find the opposite.[35] Croson and Gneezy (2009) review these results and

[35] See Charness and Rustichini (forthcoming) for further study of gender and cooperation in different contexts.

suggest that these inconsistencies depend on women being more sensitive to subtle cues in the experimental context than men, which perhaps applies to our results as well.[36]

In sum, some subjects have social preferences, and social preferences may play a role when the PD payoffs do not support cooperation. However DG giving does not change with the benefits to cost ratio in the PD while cooperation does, and thus social preferences are not the best explanation of how play changes with the payoff matrix of the stage game. Strategic considerations appear to be more important: Subjects who cooperate in repeated PD games are primarily motivated by their own money earnings.

[36] See also Eckel and Grossman (2008b) or Bertrand (2010) for a discussion of gender differences in social preferences and possible explanations.

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Appendix A – Summary table

Table A. Summary table of means. Standard deviations in parenthesis.

	b/c = 1.5	**b/c = 2**	**b/c = 2.5**	**b/c = 4**	**All**
First round C	0.54 (0.44)	0.75 (0.36)	0.79 (0.39)	0.76 (0.41)	0.71 (0.41)
Overall C	0.32 (0.24)	0.49 (0.26)	0.61 (0.29)	0.58 (0.33)	0.50 (0.31)
Leniency	0.28 (0.40)	0.56 (0.43)	0.68 (0.42)	0.64 (0.42)	0.54 (0.44)
Forgiveness	0.15 (0.18)	0.27 (0.29)	0.40 (0.31)	0.43 (0.36)	0.33 (0.32)
DG giving	1.1 (1.64)	1 (1.66)	0.97 (1.15)	1.17 (1.26)	1.07 (1.44)
Benevolence	28.87 (4.43)	27.16 (4.50)	27.52 (5.06)	27.83 (4.67)	27.90 (4.69)
Universalism	15.20 (4.51)	14.92 (5.70)	15.67 (4.64)	15.28 (5.14)	15.28 (4.96)
Max payoff*	19.96 (6.68)	21.63 (7.15)	22.97 (6.08)	23.44 (6.20)	21.92 (6.63)
Help*	9.19 (5.37)	11.35 (5.93)	10.70 (6.48)	11.65 (7.54)	10.61 (6.37)
Moral*	10.48 (6.36)	11.40 (6.47)	11.60 (6.93)	13.27 (8.15)	11.61 (7.00)
Upset*	7.94 (4.73)	9.98 (5.94)	11.17 (6.54)	10.92 (6.97)	9.92 (6.15)
Female^	0.5 (0.50)	0.44 (0.50)	0.52 (0.50)	0.59 (0.50)	0.52 (0.50)
Economics major^	0.17 (0.38)	0.12 (0.33)	0.13 (0.34)	0.16 (0.37)	0.15 (0.36)
Age (years old)	20.55 (2.37)	20.48 (2.78)	20.43 (2.44)	21.73 (3.00)	20.89 (2.73)
Education (1-5)	2.66 (1.15)	2.64 (1.21)	2.88 (1.02)	3.26 (1.12)	2.91 (1.14)

*Motivations.

^Female=1 if female, 0 if male. Economics major=1 if economics major, 0 otherwise.

Appendix B – Correlations between cooperation measures and DG giving

Table B1. First round cooperation and DG giving.

	(1)	(2)	(3)	(4)	(5)	(6)
	First round C last 4 rounds				First round C all rounds	
b/c	0.090	0.132	0.090	0.154	0.087	0.117
	(2.90)**	(3.55)***	(2.75)**	(3.62)***	(3.48)***	(4.70)***
DG giving	0.012	0.094	0.023	0.153	0.015	0.072
	(0.80)	(2.25)*	(1.14)	(4.31)***	(1.26)	(2.37)**
b/c*DG		-0.037		-0.057		-0.026
		(1.99)*		(3.18)**		(1.98)*
Female			-0.115	-0.131		
			(3.57)***	(3.47)***		
Economics major			-0.098	-0.092		
			(0.95)	(0.89)		
Age			0.035	0.039		
			(2.01)*	(2.27)**		
Educ 2			-0.536	-0.476		
			(4.78)***	(4.59)***		
Educ 3			-0.008	-0.020		
			(0.10)	(0.23)		
Educ 4			-0.257	-0.256		
			(2.54)**	(2.63)**		
Educ 5			-0.234	-0.245		
			(1.18)	(1.35)		
Constant	0.478	0.384	-0.123	-0.321	0.459	0.393
	(4.67)***	(3.62)***	(0.32)	(0.86)	(5.55)***	(4.82)***
Observations	240	240	218	218	240	240
R-squared	0.04	0.05	0.13	0.16	0.05	0.05
Robust t statistics in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Table B2. Overall cooperation and DG giving.

	(1)	(2)	(3)	(4)	(5)	(6)
	Overall C last 4 rounds				Overall C all rounds	
b/c	0.112	0.143	0.110	0.144	0.101	0.125
	(3.64)***	(4.28)***	(4.35)***	(4.48)***	(4.64)***	(5.51)***
DG giving	0.023	0.081	0.026	0.097	0.023	0.070
	(1.86)*	(2.57)**	(2.11)*	(3.90)***	(2.51)**	(3.10)**
b/c*DG		-0.026		-0.031		-0.021
		(1.97)*		(2.43)**		(1.99)*
Female			-0.055	-0.064		
			(2.02)*	(1.99)*		
Economics major			-0.133	-0.130		
			(1.90)*	(1.86)*		
Age			0.021	0.023		
			(1.77)	(1.93)*		
Educ 2			-0.369	-0.336		
			(6.04)***	(5.92)***		
Educ 3			-0.009	-0.015		
			(0.17)	(0.28)		
Educ 4			-0.188	-0.187		
			(2.69)**	(2.89)**		
Educ 5			-0.197	-0.203		
			(1.01)	(1.07)		
Constant	0.205	0.138	-0.127	-0.233	0.229	0.175
	(2.31)**	(1.64)	(0.57)	(1.14)	(3.52)***	(2.90)**
Observations	240	240	218	218	240	240
R-squared	0.13	0.14	0.21	0.22	0.13	0.14
Robust t statistics in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Table B3. Leniency and DG giving.

	(1)	(2)	(3)	(4)	(5)	(6)
	Leniency last 4 rounds				Leniency all rounds	
b/c	0.141	0.137	0.134	0.141	0.141	0.151
	(3.43)***	(3.05)**	(3.10)**	(2.86)**	(3.90)***	(4.16)***
DG giving	0.010	0.001	0.017	0.034	0.037	0.057
	(0.69)	(0.03)	(1.29)	(0.93)	(4.53)***	(3.35)***
b/c*DG		0.004		-0.007		-0.009
		(0.21)		(0.38)		(1.15)
Female			-0.019	-0.022		
			(0.27)	(0.33)		
Economics major			-0.034	-0.035		
			(0.60)	(0.64)		
Age			0.042	0.042		
			(4.06)***	(4.04)***		
Educ 2			0.000	0.000		
			(.)	(.)		
Educ 3			-0.026	-0.028		
			(0.45)	(0.45)		
Educ 4			-0.184	-0.183		
			(1.45)	(1.46)		
Educ 5			-0.479	-0.476		
			(3.51)***	(3.58)***		
Constant	0.185	0.194	-0.586	-0.605	0.148	0.125
	(1.55)	(1.55)	(2.02)*	(2.09)*	(1.45)	(1.27)
Observations	190	190	175	175	220	220
R-squared	0.08	0.08	0.11	0.11	0.12	0.12
Robust t statistics in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Table B4. Forgiveness and DG giving.

	(1)	(2)	(3)	(4)	(5)	(6)
	Forgiveness last 4 rounds				Forgiveness all rounds	
b/c	0.110	0.123	0.110	0.122	0.068	0.084
	(5.28)***	(4.91)***	(7.19)***	(6.98)***	(4.47)***	(8.21)***
DG giving	0.029	0.055	0.027	0.054	0.024	0.056
	(1.98)*	(1.64)	(1.53)	(1.44)	(2.05)*	(2.03)*
b/c*DG		-0.012		-0.012		-0.014
		(1.12)		(1.06)		(1.69)
Female			-0.078	-0.082		
			(1.39)	(1.46)		
Economics major			-0.136	-0.140		
			(2.16)*	(2.22)*		
Age			0.007	0.007		
			(0.54)	(0.54)		
Educ 2			0.000	0.000		
			(.)	(.)		
Educ 3			-0.100	-0.103		
			(2.94)**	(2.99)**		
Educ 4			-0.162	-0.159		
			(1.81)	(1.76)		
Educ 5			-0.044	-0.037		
			(0.21)	(0.18)		
Constant	0.009	-0.019	-0.003	-0.030	0.100	0.064
	(0.15)	(0.26)	(0.01)	(0.12)	(2.31)**	(1.99)*
Observations	181	181	165	165	205	205
R-squared	0.12	0.12	0.19	0.19	0.10	0.11
Robust t statistics in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Appendix C – Fehr Schmidt payoffs for different parameter values

The original Fehr Schmidt (1999) paper compared the self-interested α=0, β=0 parameter set to three different inequity averse parameter sets (α=0.5, β=0.25; α=1, β=0.6; α=4, β=0.6), while subsequent papers considered just the parameter set α=2, β=0.6. For parsimony our main analysis uses the latter parameter set. Here we show the FS payoffs for each strategy in our data using the other three parameter sets. Although the results differ across parameter sets, they are qualitatively similar in that in the specifications with large returns on cooperation, the strategies with highest FS payoff are less lenient and/or forgiving than the strategies with the highest monetary payoffs.

Table C1. Low inequity aversion: α=0.5, β=0.25.

	b/c=1.5			b/c=2			b/c=2.5			b/c=4		
	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff
ALLC	0.00	-1.25	-8.11	0.03	6.92	1.61	0.00	13.27	7.92	0.06	28.13	19.47
TFT	0.19	2.40	0.84	0.06	8.71	7.40	0.09	14.64	**13.15**	0.07	29.01	26.44
TF2T	0.05	1.53	-1.69	0.00	8.69	6.43	0.17	14.65	12.28	0.20	**29.67**	25.98
TF3T	0.01	0.90	-3.24	0.03	8.44	5.47	0.05	14.53	11.42	0.09	29.56	24.64
2TF2T	0.00	1.86	-0.82	0.11	8.89	7.09	0.11	**14.72**	12.79	0.12	29.62	**26.55**
GRIM	0.14	3.02	1.97	0.07	8.40	6.87	0.11	12.33	10.54	0.04	23.99	20.60
GRIM2	0.06	2.37	0.71	0.18	9.03	7.78	0.02	13.98	12.51	0.05	27.90	25.19
GRIM3	0.06	1.79	-0.86	0.28	9.02	7.29	0.24	14.67	12.74	0.11	29.23	25.98
2TFT	0.06	2.87	1.85	0.07	8.59	7.54	0.02	13.58	12.21	0.03	27.08	24.66
ALLD	0.29	**3.73**	**2.59**	0.17	8.53	6.08	0.14	11.33	8.41	0.23	21.04	16.34
D-TFT	0.15	2.89	1.97	0.00	**9.19**	**7.87**	0.05	14.66	13.00	0.00	28.76	26.05

Table C2. Moderate inequity aversion: α=1, β=0.6.

	b/c=1.5			b/c=2			b/c=2.5			b/c=4		
	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff
ALLC	0.00	-1.25	-14.97	0.03	6.92	-3.69	0.00	13.27	2.57	0.06	28.13	10.81
TFT	0.19	2.40	-0.73	0.06	8.71	5.99	0.09	14.64	**11.49**	0.07	29.01	**23.58**
TF2T	0.05	1.53	-4.90	0.00	8.69	4.17	0.17	14.65	9.91	0.20	**29.67**	22.29
TF3T	0.01	0.90	-7.38	0.03	8.44	2.49	0.05	14.53	8.31	0.09	29.56	19.72
2TF2T	0.00	1.86	-3.50	0.11	8.89	5.28	0.11	**14.72**	10.85	0.12	29.62	23.46
GRIM	0.14	3.02	0.75	0.07	8.40	4.90	0.11	12.33	8.20	0.04	23.99	16.23
GRIM2	0.06	2.37	-0.99	0.18	9.03	**6.44**	0.02	13.98	10.90	0.05	27.90	22.18
GRIM3	0.06	1.79	-3.53	0.28	9.02	5.54	0.24	14.67	10.78	0.11	29.23	22.66
2TFT	0.06	2.87	0.73	0.07	8.59	6.28	0.02	13.58	10.51	0.03	27.08	21.69
ALLD	0.29	**3.73**	**1.00**	0.17	8.53	2.65	0.14	11.33	4.32	0.23	21.04	9.76
D-TFT	0.15	2.89	0.92	0.00	**9.19**	6.21	0.05	14.66	10.85	0.00	28.76	22.58

Table C3. Strong inequity aversion: α=4, β=0.6.

	b/c=1.5			b/c=2			b/c=2.5			b/c=4		
	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff	Freq	Money Payoff	FS Payoff
ALLC	0.00	-1.25	-56.11	0.03	6.92	-35.53	0.00	13.27	-29.56	0.06	28.13	-41.14
TFT	0.19	2.40	-9.67	0.06	8.71	-0.37	0.09	14.64	5.16	0.07	29.01	12.53
TF2T	0.05	1.53	-24.18	0.00	8.69	-9.36	0.17	14.65	-4.27	0.20	**29.67**	0.30
TF3T	0.01	0.90	-32.19	0.03	8.44	-15.38	0.05	14.53	-10.36	0.09	29.56	-9.80
2TF2T	0.00	1.86	-19.56	0.11	8.89	-5.50	0.11	**14.72**	-0.63	0.12	29.62	5.41
GRIM	0.14	3.02	-2.83	0.07	8.40	2.31	0.11	12.33	5.74	0.04	23.99	10.57
GRIM2	0.06	2.37	-10.40	0.18	9.03	0.39	0.02	13.98	4.27	0.05	27.90	10.27
GRIM3	0.06	1.79	-19.41	0.28	9.02	-4.69	0.24	14.67	-0.38	0.11	29.23	4.14
2TFT	0.06	2.87	-3.78	0.07	8.59	3.10	0.02	13.58	7.19	0.03	27.08	15.21
ALLD	0.29	**3.73**	**1.00**	0.17	8.53	2.65	0.14	11.33	4.32	0.23	21.04	9.76
D-TFT	0.15	2.89	-2.78	0.00	**9.19**	**3.52**	0.05	14.66	**8.10**	0.00	28.76	**17.53**

Appendix D – Altruistic utilities

Here we show the frequencies, monetary payoffs and altruistic utilities earned by each strategy in Fudenberg et al. (2010) using γ=0.22 (i.e. people value the other player's payoff 22% as much as their own).

Table D1. Altruistic utilities.

	b/c=1.5			b/c=2			b/c=2.5			b/c=4		
	Freq	Money Payoff	Altruistic Payoff	Freq	Money Payoff	Altruistic Payoff	Freq	Money Payoff	Altruistic Payoff	Freq	Money Payoff	Altruistic Payoff
ALLC	0.00	-1.25	1.49	0.03	6.92	10.77	0.00	13.27	18.55	0.06	28.13	38.12
TFT	0.19	2.40	3.52	0.06	8.71	10.88	0.09	14.64	17.94	0.07	29.01	35.56
TF2T	0.05	1.53	3.27	0.00	8.69	11.59	0.17	14.65	18.91	0.20	**29.67**	37.79
TF3T	0.01	0.90	2.91	0.03	8.44	11.61	0.05	14.53	**19.09**	0.09	29.56	**38.22**
2TF2T	0.00	1.86	3.44	0.11	8.89	11.63	0.11	**14.72**	18.79	0.12	29.62	37.41
GRIM	0.14	3.02	3.55	0.07	8.40	9.47	0.11	12.33	14.01	0.04	23.99	27.53
GRIM2	0.06	2.37	3.50	0.18	9.03	11.25	0.02	13.98	17.22	0.05	27.90	34.27
GRIM3	0.06	1.79	3.34	0.28	9.02	**11.73**	0.24	14.67	18.65	0.11	29.23	36.87
2TFT	0.06	2.87	**3.60**	0.07	8.59	10.26	0.02	13.58	16.09	0.03	27.08	32.33
ALLD	0.29	**3.73**	3.54	0.17	8.53	8.25	0.14	11.33	11.26	0.23	21.04	21.53
D-TFT	0.15	2.89	3.53	0.00	**9.19**	10.64	0.05	14.66	17.03	0.00	28.76	33.81

Appendix E– Motivations to cooperate

Table E1. Motivations for C after CC.

b/c	(i)>(ii)	(i)>(iii)	(i)>(iv)
1.5	0.76	0.73	0.83
2	0.82	0.80	0.83
2.5	0.81	0.77	0.81
4	0.71	0.67	0.79

Table E2. Motivations for C after CD (leniency).

b/c	(i)>(ii)	(i)>(iii)	(i)>(iv)
1.5	0.65	0.66	0.71
2	0.75	0.79	0.77
2.5	0.83	0.80	0.80
4	0.83	0.75	0.90

Table E3. Motivations for C after DC.

b/c	(i)>(ii)	(i)>(iii)	(i)>(iv)
1.5	0.70	0.62	0.70
2	0.67	0.67	0.67
2.5	0.78	0.76	0.70
4	0.65	0.62	0.76

Table E4. Motivations for C after DD.

b/c	(i)>(ii)	(i)>(iii)	(i)>(iv)
1.5	0.67	0.66	0.70
2	0.73	0.77	0.77
2.5	0.81	0.75	0.81
4	0.73	0.67	0.78

Table E5. Motivations for cooperation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First round C last 4		Overall C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.040	0.008	0.066	0.014	0.081	0.339	0.077	-0.159
	(1.32)	(0.16)	(2.72)**	(0.52)	(2.04)*	(2.33)**	(3.99)***	(1.16)
Profit max	0.031	0.021	0.023	0.015	0.021	0.041	0.016	-0.004
	(8.65)***	(2.75)**	(9.76)***	(3.61)***	(3.24)**	(2.36)**	(2.66)**	(0.44)
Help	-0.004	-0.004	0.000	0.000	-0.006	-0.006	-0.001	-0.000
	(0.66)	(0.66)	(0.09)	(0.11)	(0.92)	(1.02)	(0.20)	(0.00)
Moral	0.006	0.007	0.002	0.002	0.006	0.006	-0.004	-0.004
	(1.12)	(1.30)	(0.47)	(0.55)	(1.18)	(1.26)	(0.84)	(0.83)
Upset	0.009	0.026	0.012	0.019	0.006	0.011	0.017	0.015
	(2.28)**	(3.21)**	(4.03)***	(2.25)*	(0.89)	(0.54)	(3.45)***	(1.34)
b/c*profitmax		0.004		0.004		-0.010		0.009
		(1.92)*		(3.00)**		(1.55)		(2.40)**
b/c*upset		-0.007		-0.003		-0.002		0.001
		(2.72)**		(1.10)		(0.26)		(0.21)
Constant	-0.195	-0.137	-0.312	-0.200	-0.188	-0.713	-0.377	0.117
	(2.10)*	(0.96)	(5.60)***	(2.88)**	(1.34)	(2.69)**	(3.45)***	(0.40)
Observations	228	228	228	228	178	178	169	169
R-squared	0.34	0.35	0.50	0.51	0.13	0.14	0.25	0.26
Robust t statistics in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Table E6. Self-reported perception that an opponent's D after mutual cooperation is due to error (using a 7 point Likert scale), correlated with cooperation in the PD and giving in the DG. As the Likert scale is ordinal rather than scalar, we use ordinal logistic regression, clustered on session.

	(1)	(3)	(5)	(7)	(9)	(10)
b/c	0.0472	0.0580	0.0534	0.0557	0.0582	-0.0274
	(0.304)	(0.323)	(0.228)	(0.195)	(0.223)	(0.184)
Overall C	3.661***					
	(1.327)					
First round C		2.221***				
		(0.681)				
Leniency			1.291***			
			(0.424)			
Forgiveness				0.518		
				(0.362)		
DG Giving					0.174	-0.0780
					(0.154)	(0.438)
b/c*DG giving						0.0776
						(0.162)
Constant - cut 1	-1.053	-1.354	-3.614***	-4.098***	-2.559**	-2.832***
	(0.813)	(1.091)	(1.290)	(1.307)	(0.996)	(0.834)
Constant - cut 2	1.077**	0.699	-0.701*	-1.211*	-0.793	-1.063*
	(0.500)	(0.801)	(0.396)	(0.628)	(0.749)	(0.617)
Constant - cut 3	1.756***	1.336	-0.0242	-0.551	-0.247	-0.515
	(0.661)	(0.905)	(0.525)	(0.700)	(0.776)	(0.710)
Constant - cut 4	2.201***	1.748*	0.459	-0.135	0.121	-0.146
	(0.694)	(0.945)	(0.647)	(0.838)	(0.832)	(0.778)
Constant - cut 5	3.300***	2.763***	1.612**	0.835	1.066	0.799
	(0.734)	(0.951)	(0.637)	(0.871)	(0.886)	(0.834)
Constant - cut 6	4.912***	4.307***	3.036***	2.263***	2.561***	2.293***
	(0.667)	(0.828)	(0.574)	(0.799)	(0.985)	(0.742)
Observations	116	116	92	89	116	116
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Appendix F– Correlations between cooperation measures, DG, benevolence and universalism

Table F1. Cooperation and benevolence.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First round C last 4		Overall C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.059	-0.100	0.083	0.086	0.107	0.227	0.101	0.231
	(1.80)	(1.15)	(2.57)**	(1.34)	(2.73)**	(1.80)*	(3.90)***	(2.32)**
Benevolence	-0.004	-0.019	-0.001	-0.000	-0.009	0.002	-0.001	0.011
	(1.22)	(2.53)**	(0.32)	(0.09)	(1.76)	(0.12)	(0.19)	(1.47)
b/c*Benev		0.006		-0.000		-0.004		-0.005
		(1.59)		(0.04)		(1.00)		(1.47)
Constant	0.670	1.093	0.304	0.297	0.522	0.214	0.077	-0.256
	(4.60)***	(5.26)***	(2.58)**	(1.93)*	(2.45)**	(0.56)	(0.75)	(1.15)
Observations	276	276	276	276	216	216	210	210
R-squared	0.02	0.03	0.07	0.07	0.07	0.07	0.10	0.10
Robust t statistics in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Table F2. Cooperation and universalism.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First round C last 4		Overall C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.061	-0.028	0.085	0.098	0.108	0.069	0.101	0.151
	(1.84)*	(0.39)	(2.64)**	(1.53)	(2.73)**	(0.73)	(3.85)***	(1.59)
Universalism	-0.001	-0.017	0.001	0.003	0.002	-0.005	0.000	0.009
	(0.23)	(1.64)	(0.18)	(0.35)	(0.41)	(0.36)	(0.05)	(0.73)
b/c*Univers		0.006		-0.001		0.003		-0.003
		(1.18)		(0.21)		(0.57)		(0.55)
Constant	0.560	0.798	0.271	0.235	0.225	0.330	0.055	-0.080
	(4.69)***	(5.18)***	(2.56)**	(1.73)	(1.56)	(1.17)	(0.57)	(0.43)
Observations	277	277	277	277	217	217	210	210
R-squared	0.02	0.03	0.08	0.08	0.06	0.06	0.10	0.10
Robust t statistics in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Table F3. DG giving, benevolence and universalism.

	(1)	(2)	(3)	(4)
b/c	0.011	0.008	0.010	0.012
	(0.12)	(0.08)	(0.11)	(0.13)
Benevolence	0.024		0.009	
	(1.42)		(0.62)	
Universalism		0.021		0.006
		(1.51)		(0.49)
Female			0.245	0.256
			(0.93)	(0.96)
Economics major			-0.388	-0.384
			(1.64)	(1.67)
Age			0.017	0.025
			(0.28)	(0.42)
Educ 2			-1.293	-1.275
			(3.25)**	(3.22)**
Educ 3			-0.137	-0.142
			(0.59)	(0.61)
Educ 4			-0.264	-0.280
			(0.73)	(0.78)
Educ 5			0.231	0.152
			(0.29)	(0.19)
Constant	0.355	0.719	0.473	0.480
	(0.69)	(2.19)*	(0.42)	(0.51)
Observations	238	239	216	217
R-squared	0.01	0.01	0.03	0.03
Robust t statistics in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Appendix G– The no-error control

Table G1. First round cooperation and DG giving, no error.

	(1)	(2)	(3)	(4)	(5)	(6)
	First round C last 4				First round C all	
DG	-0.006	-0.006	-0.017	-0.017	0.014	0.014
	(0.11)	(0.11)	(0.50)	(0.50)	(0.32)	(0.32)
Female			-0.004	-0.004		
			(0.02)	(0.02)		
Economics major			0.219	0.219		
			(1.26)	(1.26)		
Age			-0.013	-0.013		
			(0.94)	(0.94)		
Educ 2			0.000	0.000		
			(.)	(.)		
Educ 3			0.075	0.075		
			(0.57)	(0.57)		
Educ 4			0.064	0.064		
			(0.32)	(0.32)		
Educ 5			0.382	0.382		
			(3.13)	(3.13)		
Constant	0.840	0.840	1.044	1.044	0.769	0.769
	(7.24)*	(7.24)*	(2.20)	(2.20)	(7.70)*	(7.70)*
Observations	30	30	29	29	30	30
R-squared	0.00	0.00	0.05	0.05	0.01	0.01
Robust t statistics in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Table G2.Overall cooperation and DG giving, no error.

	(1)	(2)	(3)	(4)	(5)	(6)
	Overall C last 4				Overall C all	
DG	0.034	0.034	0.018	0.018	0.050	0.050
	(1.13)	(1.13)	(8.11)*	(8.11)*	(1.90)	(1.90)
Female			0.041	0.041		
			(0.50)	(0.50)		
Economics major			0.237	0.237		
			(5.17)	(5.17)		
Age			-0.047	-0.047		
			(161.73)***	(161.73)***		
Educ 2			0.000	0.000		
			(.)	(.)		
Educ 3			0.042	0.042		
			(0.59)	(0.59)		
Educ 4			0.015	0.015		
			(0.10)	(0.10)		
Educ 5			0.628	0.628		
			(29.60)**	(29.60)**		
Constant	0.738	0.738	1.679	1.679	0.675	0.675
	(13.40)**	(13.40)**	(21.56)**	(21.56)**	(12.16)*	(12.16)*
Observations	30	30	29	29	30	30
R-squared	0.04	0.04	0.26	0.26	0.10	0.10
Robust t statistics in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Table G3. Leniency and DG giving, no error.

	(1)	(2)	(3)	(4)	(5)	(6)
	Leniency last 4				Leniency all	
DG	0.223	0.223	0.310	0.310	0.151	0.151
	(4.82)	(4.82)	(13.21)**	(13.21)**	(3.98)	(3.98)
Female			-0.522	-0.522		
			(6.89)*	(6.89)*		
Economics major			0.351	0.351		
			(1.24)	(1.24)		
Age			0.042	0.042		
			(2.08)	(2.08)		
Educ 2			0.000	0.000		
			(.)	(.)		
Educ 3			-0.624	-0.624		
			(2.50)	(2.50)		
Educ 4			-0.436	-0.436		
			(4.40)	(4.40)		
Educ 5			-0.370	-0.370		
			(1.77)	(1.77)		
Constant	0.238	0.238	-0.229	-0.229	0.336	0.336
	(8.88)*	(8.88)*	(0.90)	(0.90)	(6.48)*	(6.48)*
Observations	20	20	19	19	27	27
R-squared	0.29	0.29	0.74	0.74	0.30	0.30
Robust t statistics in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

Table G4. Forgiveness and DG giving, no error.

	(1)	(2)	(3)	(4)	(5)	(6)
	Forgiveness last 4				Forgiveness all	
DG	0.114	0.114	0.081	0.081	0.032	0.032
	(17.87)**	(17.87)**	(0.45)	(0.45)	(2.82)	(2.82)
Female			0.013	0.013		
			(0.03)	(0.03)		
Economics major			0.000	0.000		
			(.)	(.)		
Age			-0.076	-0.076		
			(1.16)	(1.16)		
Educ 2			0.000	0.000		
			(.)	(.)		
Educ 3			0.411	0.411		
			(4.20)	(4.20)		
Educ 4			0.041	0.041		
			(1.12)	(1.12)		
Educ 5			0.000	0.000		
			(.)	(.)		
Constant	0.330	0.330	1.726	1.726	0.244	0.244
	(2.53)	(2.53)	(1.14)	(1.14)	(2.27)	(2.27)
Observations	16	16	15	15	22	22
R-squared	0.09	0.09	0.40	0.40	0.03	0.03
Robust t statistics in parentheses						
* significant at 10%; ** significant at 5%; *** significant at 1%						

NOT FOR PUBLICATION

Online Appendix - Who Cooperates in Repeated Games?

Appendix 0-A: Sample instructions PD game

Instructions:

Thank you for participating in this experiment.

Please read the following instructions carefully. If you have any questions, do not hesitate to ask us. Aside from this, no communication is allowed during the experiment.

This experiment is about decision making. You will be randomly matched with other people in the room. None of you will ever know the identity of the others. Everyone will receive a fixed show-up amount of $10 for participating in the experiment. In addition, you will be able to earn more money based on the decisions you and others make in the experiment. Everything will be paid to you in cash immediately after the experiment.

You will interact numerous times with different people. Based on the choices made by you and the other participants over the course of these interactions, you will receive between $0 and $30, in addition to the $10 show-up amount.

You begin the session with 50 units in your account. Units are then added and/or subtracted to that amount over the course of the session as described below. At the end of the session, the total number of units in your account will be converted into cash at an exchange rate of 30 units = $1.

The Session:

The session is divided into a series of interactions between you and other participants in the room.

In each interaction, you play a random number of rounds with another person. In each round you and the person you are interacting with can choose one of two options. Once the interaction ends, you get randomly re-matched with another person in the room to play another interaction.

The setup will now be explained in more detail.

The round

In each round of the experiment, the same two possible options are available to both you and the other person you interact with: A or B.

The payoffs of the options (in units)

Option	You will get	The other person will get
A:	−2	+8
B:	0	0

If your move is A then you will get −2 units, and the other person will get +8 units.

If you move is B then you will get 0 units, and the other person will get 0 units.

Calculation of your income in each round:

Your income in each round is the sum of two components:
• the number of units you get from the move you played
• the number of units you get from the move played by the other person.

Your round-total income for each possible action by you and the other player is thus

		Other person	
		A	B
You	A	+6	-2
	B	+8	0

For example:
If you play A and the other person plays A, you would both get +6 units.
If you play A and the other person plays B, you would get -2 units, and they would get +8 units.
If you play B and the other person plays A, you would get +8 units, and they would get -2 units.
If you play B and the other person plays B, you would both get 0 units.

Your income for each round will be calculated and presented to you on your computer screen.

The total number of units you have at the end of the session will determine how much money you earn, at an exchange rate of 30 units = $1.

Each round you must enter your choice within 30 seconds, or a random choice will be made.

A chance that the your choice is changed

There is a 7/8 probability that the move you choose actually occurs. But with probability 1/8, your move is changed to the opposite of what you picked. That is:

When you choose A, there is a 7/8 chance that you will actually play A, and 1/8 chance that instead you play B. The same is true for the other player.

When you choose B, there is a 7/8 chance that you will actually play B, and 1/8 chance that instead you play A. The same is true for the other player.

Both players are informed of the moves which actually occur. Neither player is informed of the move chosen by the other. Thus with 1/8 probability, an error in execution occurs, and you never know whether the other person's action was what they chose, or an error.

For example, if you choose A and the other player chooses B then:

• With probability (7/8)*(7/8)=0.766, no changes occur. You will both be told that your move is A and the other person's move is B. You will get -2 units, and the other player will get +8 units.

- With probability (7/8)*(1/8)=0.109, the other person's move is changed. You will both be told that your move is A and the other person's move is A. You both will get +6 units.

- With probability (1/8)*(7/8)=0.109, your move is changed. You will both be told that your move is B and the other person's move is B. You will both get +0 units.

- With probability (1/8)*(1/8)=0.016, both your move and the other person's moves are changed. You will both be told that your move is B and the other person's move is A. You will get +8 units and the other person will get -2 units.

Random number of rounds in each interaction

After each round, there is a 7/8 probability of another round, and 1/8 probability that the interaction will end. Successive rounds will occur with probability 7/8 each time, until the interaction ends (with probability 1/8 after each round). Once the interaction ends, you will be randomly re-matched with a different person in the room for another interaction. Each interaction has the same setup. You will play a number of such interactions with different people.

You will not be paired twice with the same person during the session, or with a person that was previously paired with someone that was paired with you, or with someone that was paired with someone that was paired with someone that was paired with you, and so on. Thus, the pairing is done in such a way that the decisions you make in one interaction cannot affect the decisions of the people you will be paired with later in the session.

Summary

To summarize, every interaction you have with another person in the experiment includes a random number of rounds. After every round, there is a 7/8 probability of another round. There will be a number of such interactions, and your behavior has no effect on the number of rounds or the number of interactions.

There is a 1/8 probability that the option you choose will not happen and the opposite option occurs instead, and the same is true for the person you interact with. You will be told which moves actually occur, but you will not know what move the other person actually chose.

At the beginning of the session, you have 50 units in your account. At the end of the session, you will receive $1 for every 30 units in your account.

You will now take a very short quiz to make sure you understand the setup.

The session will then begin with one practice round. This round will not count towards your final payoff.

Appendix 0-B – Motivations Questionnaire

In this part of the survey, think back through the decisions you made over the course of the session, and in the following questions try to characterize the way you made your choices.

1. Imagine that in the previous round, your action was A, and the other person's action was also A. How likely would you be to choose A this round (circle one)?

0/10 1/10 2/10 3/10 4/10 5/10 6/10 7/10 8/10 9/10 10/10

When you chose to play A in this situation, to what extent was it because
(circle number, where 1 is not at all and 7 is very much so)

(a) You thought it would earn you the most points in the long run
1 2 3 4 5 6 7
(b) You wanted to help the other person earn more points
1 2 3 4 5 6 7
(c) It felt like the morally right thing to do
1 2 3 4 5 6 7
(d) You felt like it would make the other person upset if you didn't
1 2 3 4 5 6 7

Free response for other motivations we didn't list:

When you chose to play B in this situation, to what extent was it because

(a) you thought it would earn you the most points in the long run
1 2 3 4 5 6 7
(b) You wanted to stop the other person from earning more points
1 2 3 4 5 6 7
(c) You wanted to punish the other person
1 2 3 4 5 6 7
(d) You wanted to earn more points than the other person
1 2 3 4 5 6 7

Free response for other motivations we didn't list:

2. Imagine that in the previous round, your action was A, and the other person's action was B.

How likely would you be to choose A this round (circle one)?

0/10 1/10 2/10 3/10 4/10 5/10 6/10 7/10 8/10 9/10 10/10

When you chose to play A in this situation, to what extent was it because
(circle number, where 1 is not at all and 7 is very much so)

(a) You thought it would earn you the most points in the long run
1 2 3 4 5 6 7
(b) You wanted to help the other person earn more points
1 2 3 4 5 6 7
(c) It felt like the morally right thing to do
1 2 3 4 5 6 7
(d) You felt like it would make the other person upset if you didn't
1 2 3 4 5 6 7

Free response for other motivations we didn't list:

When you chose to play B in this situation, to what extent was it because
(a) you thought it would earn you the most points in the long run
1 2 3 4 5 6 7
(b) You wanted to stop the other person from earning more points
1 2 3 4 5 6 7
(c) You wanted to punish the other person
1 2 3 4 5 6 7
(d) You wanted to earn more points than the other person
1 2 3 4 5 6 7

Free response for other motivations we didn't list:

3. Imagine that in the previous round, your action was B, and the other person's action was A.

How likely would you be to play A this round (circle one)?

0/10 1/10 2/10 3/10 4/10 5/10 6/10 7/10 8/10 9/10 10/10

When you chose to play A in this situation, to what extent was it because
(circle number, where 1 is not at all and 7 is very much so)

(a) You thought it would earn you the most points in the long run
1 2 3 4 5 6 7
(b) You wanted to help the other person earn more points
1 2 3 4 5 6 7
(c) It felt like the morally right thing to do
1 2 3 4 5 6 7
(d) You felt like it would make the other person upset if you didn't
1 2 3 4 5 6 7

Free response for other motivations we didn't list:

When you chose to play B in this situation, to what extent was it because
(a) you thought it would earn you the most points in the long run
1 2 3 4 5 6 7
(b) You wanted to stop the other person from earning more points
1 2 3 4 5 6 7
(c) You wanted to punish the other person
1 2 3 4 5 6 7
(d) You wanted to earn more points than the other person
1 2 3 4 5 6 7

Free response for other motivations we didn't list:

4. Imagine that in the previous round, your action was B, and the other person's action was also B.

How likely would you be to play A this round (circle one)?

0/10 1/10 2/10 3/10 4/10 5/10 6/10 7/10 8/10 9/10 10/10

When you chose to play A in this situation, to what extent was it because
(circle number, where 1 is not at all and 7 is very much so)

(a) You thought it would earn you the most points in the long run
1 2 3 4 5 6 7
(b) You wanted to help the other person earn more points
1 2 3 4 5 6 7
(c) It felt like the morally right thing to do
1 2 3 4 5 6 7
(d) You felt like it would make the other person upset if you didn't
1 2 3 4 5 6 7

Free response for other motivations we didn't list:

When you chose to play B in this situation, to what extent was it because
(a) you thought it would earn you the most points in the long run
1 2 3 4 5 6 7
(b) You wanted to stop the other person from earning more points
1 2 3 4 5 6 7
(c) You wanted to punish the other person
1 2 3 4 5 6 7
(d) You wanted to earn more points than the other person
1 2 3 4 5 6 7

Free response for other motivations we didn't list:

When the other person's action was B after a round when you had both played A, to what extent did you interpret the other person's action as intentional versus due to error?

(Intentional) (Error)
1 2 3 4 5 6 7

Please describe any aspects of your decisions and strategy in the experiment that were not captured by the questions above:

Appendix 0-C – Benevolence and Universalism Questionnaire

Behaviors Questionnaire Instructions:

In this questionnaire we are interested in common behaviors. The following pages list these behaviors. We would like you to estimate **how frequently you have engaged in each behavior** during the past 6 months. Think of how often you have engaged in each behavior **relative to your opportunities** to do so.

For example, consider the behavior described as "Say hello to my neighbours". Estimate how frequently you have said hello to your neighbours relative to the times you have seen your neighbours in the past 6 months.

Please use the following scale:

0	1	2	3	4
Never	Rarely	Sometimes	Frequently	All the Time

0 – I have never engaged in this behavior.
1 – I have engaged in this behavior in about one quarter of the times I had opportunities to do so.
2 – I have engaged in this behavior in about half of the times I had opportunities to do so.
3 – I have engaged in this behavior in more than half of the times I had opportunities to do so.
4 – I have engaged in this behavior every time I had an opportunity to do so.

How frequently do I (fill in a number):

1. Help out a colleague at work or school who made a mistake. _____
2. Donate money to alleviate suffering in foreign countries (e.g., hunger relief, refugee assistance). _____
3. Do my friends and family favors without being asked. _____
4. Use environmentally friendly products (e.g., recycled paper products). _____
5. Lend things to people I know (e.g., class notes, books, milk). _____
6. Make sure everyone I know receives equal treatment, even if I don't personally like him/her. _____
7. Keep promises I have made. _____
8. Take time to understand other people's world views. _____
9. Spend time with my friends when they are down to try to cheer them up. _____
10. Sign petitions to support environmental protection efforts. _____
11. Give small gifts to my friends and family for no reason. _____
12. Show my objections to prejudice (e.g., against racial groups, the homeless). _____
13. Forgive another person when they have hurt my feelings. _____
14. Actively support human rights causes through contributions, demonstrations, etc. _____
15. Emphasize the good qualities of other people when I talk about them. _____
16. Rejoice in the successes of others around me. _____
17. Participate in projects to protect the environment (e.g., beach clean-up). _____
18. Help my friends with school projects, moving, driving to the airport, etc. _____

Appendix 0-D – Strategy descriptions

Strategy	Abbreviation	Description
Always Cooperate	ALLC	Always play C
Tit-for-Tat	TFT	Play C unless partner played D last round
Tit-for-2-Tats	TF2T	Play C unless partner played D in both of the last 2 rounds
Tit-for-3-Tats	TF3T	Play C unless partner played D in all of the last 3 rounds
2-Tits-for-1-Tat	2TFT	Play C unless partner played D in either of the last 2 rounds (2 rounds of punishment if partner plays D)
2-Tits-for-2-Tats	2TF2T	Play C unless partner played 2 subsequent Ds in the last 3 rounds (2 rounds of punishment if partner plays D twice in a row)
Grim	Grim	Play C until either player plays D, then play D forever
Lenient Grim 2	Grim2	Play C until 2 subsequent rounds occur in which either player played D, then play D forever
Lenient Grim 3	Grim3	Play C until 3 subsequent rounds occur in which either player played D, then play D forever
Always Defect	ALLD	Always play D
Exploitive Tit-for-Tat	D-TFT	Play D in the first round, then play TFT

Appendix 0-E – Individual Characteristics Survey

Your gender (circle one): Female Male

Your age: _____

Your major: _____

Your minor(s): _____
_____
_____

Imagine you have just won $250,000 in the lottery. Almost immediately after you collect, you receive the following financial offer from a reputable bank, the conditions of which are as follows:

> You have a chance to double your money within two years. It is equally possible that you could lose half of the amount invested. That is, there is a 50% chance your investment will be doubled and 50% chance of your investment being halved.

What share of your lottery winnings would you be prepared to invest in this financially risky yet potentially lucrative investment? (Circle one)

$0
$25,000
$50,000
$75,000
$100,000
$125,000
$150,000
$175,000
$200,000
$225,000
$250,000

Highest level of education completed:

Less than a high school degree
High School Diploma
Vocational Training
Attended College
Bachelor's Degree
Graduate Degree

Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?

(Unwilling to take risks) 0 1 2 3 4 5 6 7 8 9 10 (Fully prepared to take risk)

Appendix 0-F –Motivations to cooperate

Table 0-F1. Motivations to cooperate, with demographic controls.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First round C last 4		Overall C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.040	-0.053	0.061	-0.029	0.070	0.451	0.069	-0.320
	(1.08)	(0.83)	(2.45)**	(1.20)	(1.81)	(3.60)***	(3.91)***	(2.75)**
Payoff max	0.029	0.010	0.024	0.011	0.023	0.053	0.019	-0.015
	(5.76)***	(0.87)	(8.87)***	(2.65)**	(3.90)***	(3.71)***	(2.98)**	(1.30)
Help	-0.002	-0.001	0.002	0.002	-0.003	-0.004	-0.001	0.000
	(0.35)	(0.24)	(0.70)	(0.90)	(0.47)	(0.62)	(0.18)	(0.10)
Moral	0.004	0.005	0.000	0.001	0.003	0.004	-0.004	-0.003
	(0.70)	(0.82)	(0.17)	(0.27)	(0.69)	(0.80)	(0.83)	(0.73)
Upset	0.009	0.031	0.009	0.019	0.007	0.014	0.012	0.011
	(2.18)*	(3.66)***	(3.11)**	(2.24)*	(0.95)	(0.65)	(2.15)*	(1.00)
Female	-0.069	-0.076	-0.029	-0.032	-0.014	-0.017	-0.075	-0.075
	(1.47)	(1.60)	(0.84)	(0.91)	(0.19)	(0.23)	(1.55)	(1.60)
Economics major	-0.047	-0.058	-0.091	-0.096	-0.012	-0.004	-0.140	-0.173
	(0.49)	(0.62)	(1.65)	(1.83)	(0.21)	(0.07)	(2.41)**	(3.07)**
Age	0.028	0.026	0.017	0.016	0.036	0.037	0.011	0.008
	(1.68)	(1.62)	(2.02)*	(2.13)*	(3.49)***	(3.17)**	(0.76)	(0.55)
Educ 2	-0.154	-0.193	-0.042	-0.082	0.000	0.000	0.000	0.000
	(1.81)	(2.14)*	(0.87)	(1.85)*	(.)	(.)	(.)	(.)
Educ 3	-0.027	-0.028	-0.015	-0.012	-0.036	-0.050	-0.125	-0.114
	(0.38)	(0.44)	(0.32)	(0.27)	(0.48)	(0.62)	(2.95)**	(2.89)**
Educ 4	-0.140	-0.127	-0.078	-0.069	-0.126	-0.133	-0.145	-0.129
	(1.31)	(1.23)	(1.09)	(1.01)	(1.01)	(1.06)	(1.95)*	(1.72)
Educ 5	0.021	0.070	0.059	0.097	-0.276	-0.355	0.084	0.162
	(0.14)	(0.63)	(0.49)	(0.94)	(1.35)	(1.54)	(0.40)	(0.67)
b/c*payoffmax		0.008		0.006		-0.015		0.016
		(2.39)**		(3.72)***		(2.93)**		(3.50)***
b/c*upset		-0.009		-0.004		-0.003		0.000
		(2.63)**		(1.20)		(0.34)		(0.03)
Constant	-0.658	-0.408	-0.594	-0.365	-0.929	-1.714	-0.479	0.396
	(1.84)*	(1.17)	(3.67)***	(2.53)**	(3.07)**	(5.25)***	(1.39)	(0.79)
Observations	209	209	209	209	166	166	156	156
R-squared	0.37	0.39	0.54	0.55	0.16	0.18	0.30	0.33
Robust t statistics in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Table 0-F2. Motivations to cooperate, all interactions.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First round C all		Overall C all		Leniency all		Forgiveness all	
b/c	0.041	-0.016	0.059	-0.010	0.085	0.126	0.041	0.023
	(1.40)	(0.34)	(3.00)**	(0.43)	(3.03)**	(1.95)*	(2.32)**	(0.16)
Payoff max	0.029	0.016	0.022	0.011	0.022	0.023	0.008	0.009
	(7.73)***	(2.18)*	(8.55)***	(3.00)**	(8.61)***	(5.66)***	(1.68)	(1.13)
Help	-0.002	-0.002	0.001	0.001	-0.001	-0.001	-0.000	-0.000
	(0.42)	(0.41)	(0.29)	(0.35)	(0.16)	(0.17)	(0.23)	(0.17)
Moral	0.008	0.008	0.004	0.004	0.001	0.002	0.002	0.002
	(2.28)**	(2.47)**	(2.23)*	(2.37)**	(0.28)	(0.35)	(0.68)	(0.60)
Upset	0.006	0.022	0.008	0.016	0.009	0.016	0.010	0.006
	(1.67)	(2.72)**	(3.17)**	(2.23)*	(1.97)*	(1.03)	(2.91)**	(0.64)
b/c*payoffmax		0.005		0.004		-0.001		-0.000
		(2.30)**		(3.74)***		(0.37)		(0.00)
b/c*upset		-0.007		-0.003		-0.003		0.002
		(2.81)**		(1.34)		(0.52)		(0.44)
Constant	-0.182	-0.068	-0.259	-0.109	-0.260	-0.358	-0.135	-0.090
	(1.90)*	(0.46)	(6.70)***	(1.68)	(2.58)**	(1.95)*	(1.33)	(0.36)
Observations	228	228	228	228	208	208	193	193
R-squared	0.35	0.36	0.53	0.54	0.22	0.22	0.23	0.23
Robust t statistics in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Appendix 0-G – Benevolence and Universalism

We also include demographic variables when analyzing the correlation between the cooperative measures, benevolence and universalism. See Tables 0-G1 and 0-G2. We also analyze all interactions. See Tables 0-G3 and 0-G4. The results are qualitatively similar to Tables F1 and F2.

Table 0-G1. Cooperation, benevolence and demographics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First round C last 4		Overall C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.068	0.061	0.088	0.177	0.097	0.244	0.100	0.284
	(1.96)*	(0.40)	(3.17)***	(1.94)*	(2.22)**	(1.45)	(3.54)***	(2.59)**
Benevolence	-0.001	-0.001	0.000	0.009	-0.010	0.004	0.000	0.017
	(0.17)	(0.10)	(0.05)	(1.05)	(1.52)	(0.24)	(0.06)	(2.08)*
Female	-0.095	-0.095	-0.048	-0.050	-0.004	-0.006	-0.081	-0.084
	(3.15)***	(3.20)***	(1.70)	(1.77)	(0.07)	(0.12)	(1.58)	(1.71)
Economics major	-0.108	-0.108	-0.129	-0.132	-0.080	-0.085	-0.164	-0.173
	(1.39)	(1.38)	(2.41)**	(2.47)**	(1.26)	(1.31)	(2.83)**	(3.06)**
Age	0.026	0.026	0.014	0.013	0.039	0.039	0.001	0.001
	(1.49)	(1.46)	(1.27)	(1.15)	(4.54)***	(4.59)***	(0.08)	(0.07)
Educ 2	-0.589	-0.589	-0.417	-0.418	0.000	0.000	0.000	0.000
	(6.23)***	(6.19)***	(6.91)***	(6.88)***	(.)	(.)	(.)	(.)
Educ 3	0.004	0.004	0.001	-0.000	-0.029	-0.032	-0.097	-0.100
	(0.05)	(0.05)	(0.03)	(0.00)	(0.52)	(0.55)	(2.93)**	(2.83)**
Educ 4	-0.213	-0.213	-0.162	-0.161	-0.117	-0.125	-0.112	-0.117
	(2.41)**	(2.40)**	(2.73)**	(2.75)**	(1.22)	(1.23)	(1.45)	(1.52)
Educ 5	-0.171	-0.172	-0.184	-0.176	-0.510	-0.511	0.035	0.039
	(1.02)	(1.01)	(1.33)	(1.28)	(3.30)***	(3.30)***	(0.22)	(0.25)
b/c*Benev		0.000		-0.003		-0.005		-0.007
		(0.04)		(0.90)		(0.94)		(1.89)*
Constant	0.135	0.152	0.074	-0.149	-0.175	-0.550	0.164	-0.304
	(0.29)	(0.31)	(0.26)	(0.51)	(0.55)	(1.05)	(0.52)	(0.77)
Observations	250	250	250	250	198	198	191	191
R-squared	0.09	0.09	0.13	0.13	0.09	0.09	0.16	0.17
Robust t statistics in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Table 0-G2. Cooperation, universalism and demographics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First round C last 4		Overall C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.068	0.023	0.089	0.133	0.098	0.069	0.101	0.168
	(2.00)*	(0.29)	(3.26)***	(2.72)**	(2.20)**	(0.62)	(3.50)***	(1.67)
Universalism	-0.001	-0.009	-0.001	0.007	0.001	-0.004	-0.002	0.010
	(0.29)	(0.74)	(0.16)	(0.86)	(0.24)	(0.24)	(0.34)	(0.84)
Female	-0.094	-0.095	-0.046	-0.045	-0.013	-0.014	-0.080	-0.079
	(3.18)***	(3.28)***	(1.77)	(1.65)	(0.22)	(0.24)	(1.65)	(1.64)
Economics major	-0.111	-0.107	-0.132	-0.136	-0.082	-0.079	-0.167	-0.170
	(1.48)	(1.50)	(2.54)**	(2.68)**	(1.32)	(1.31)	(3.03)**	(3.05)**
Age	0.027	0.028	0.017	0.017	0.039	0.039	0.001	0.001
	(1.65)	(1.67)	(1.41)	(1.40)	(4.92)***	(4.97)***	(0.10)	(0.08)
Educ 2	-0.590	-0.596	-0.415	-0.410	0.000	0.000	0.000	0.000
	(6.39)***	(6.49)***	(6.93)***	(7.06)***	(.)	(.)	(.)	(.)
Educ 3	0.002	0.002	-0.002	-0.001	-0.035	-0.034	-0.096	-0.097
	(0.03)	(0.03)	(0.03)	(0.03)	(0.62)	(0.57)	(2.95)**	(2.93)**
Educ 4	-0.216	-0.217	-0.168	-0.168	-0.123	-0.120	-0.113	-0.114
	(2.55)**	(2.52)**	(2.83)**	(2.92)**	(1.18)	(1.09)	(1.45)	(1.49)
Educ 5	-0.181	-0.189	-0.209	-0.201	-0.502	-0.502	0.034	0.039
	(1.09)	(1.11)	(1.43)	(1.45)	(3.49)***	(3.48)***	(0.20)	(0.24)
b/c*Univers		0.003		-0.003		0.002		-0.004
		(0.50)		(0.82)		(0.36)		(0.74)
Constant	0.104	0.218	0.029	-0.082	-0.468	-0.388	0.193	0.014
	(0.28)	(0.57)	(0.12)	(0.28)	(1.97)*	(1.08)	(0.78)	(0.04)
Observations	251	251	251	251	199	199	191	191
R-squared	0.09	0.09	0.13	0.14	0.09	0.09	0.16	0.16
Robust t statistics in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Table 0-G3. Benevolence and cooperation in all interactions.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First round C all		Overall C all		Leniency all		Forgiveness all	
b/c	0.054	-0.043	0.072	0.088	0.097	0.170	0.073	0.072
	(1.73)	(0.48)	(2.69)**	(1.21)	(2.82)**	(1.00)	(4.88)***	(0.44)
Benevolence	-0.003	-0.012	-0.000	0.001	0.001	0.008	0.003	0.003
	(0.76)	(1.37)	(0.07)	(0.22)	(0.20)	(0.52)	(0.81)	(0.25)
b/c*Benev		0.003		-0.001		-0.003		0.000
		(0.95)		(0.20)		(0.42)		(0.01)
Constant	0.616	0.873	0.311	0.270	0.237	0.049	0.026	0.028
	(3.99)***	(3.62)***	(2.94)**	(1.60)	(1.27)	(0.12)	(0.21)	(0.08)
Observations	276	276	276	276	251	251	236	236
R-squared	0.02	0.02	0.07	0.07	0.06	0.06	0.10	0.10
Robust t statistics in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Table 0-G4. Universalism and cooperation in all interactions.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First round C all		Overall C all		Leniency all		Forgiveness all	
b/c	0.056	0.008	0.073	0.064	0.098	0.148	0.072	0.056
	(1.78)	(0.12)	(2.74)**	(0.99)	(2.86)**	(1.84)*	(5.01)***	(0.84)
Universalism	0.001	-0.007	0.003	0.001	0.005	0.014	0.003	0.001
	(0.37)	(0.80)	(0.85)	(0.12)	(0.95)	(1.16)	(0.99)	(0.07)
b/c*Univers		0.003		0.001		-0.003		0.001
		(0.71)		(0.16)		(0.71)		(0.24)
Constant	0.513	0.639	0.265	0.290	0.198	0.063	0.066	0.110
	(5.00)***	(4.51)***	(3.23)***	(2.25)**	(1.83)*	(0.35)	(1.02)	(0.79)
Observations	277	277	277	277	252	252	237	237
R-squared	0.02	0.02	0.08	0.08	0.07	0.07	0.10	0.10
Robust t statistics in parentheses								
* significant at 10%; ** significant at 5%; *** significant at 1%								

Appendix 0-H –Cooperation and individual characteristics, all interactions.

Table 0-H1. First round cooperation and individual characteristics, all interactions.

	(1)	(2)	(3)	(4)	(5)
b/c	0.065	0.065	0.061	0.063	0.050
	(2.24)**	(2.00)*	(1.95)*	(1.96)*	(1.40)
Female	-0.152	-0.109	-0.154	-0.169	-0.287
	(4.61)***	(3.64)***	(4.47)***	(4.60)***	(3.68)***
Economics major	-0.078	-0.098	-0.096	-0.123	0.123
	(1.35)	(1.48)	(1.64)	(1.92)*	(1.14)
Age		0.023			
		(1.47)			
Educ 2		-0.542			
		(5.88)***			
Educ 3		0.039			
		(0.48)			
Educ 4		-0.173			
		(2.02)*			
Educ 5		-0.137			
		(0.80)			
Investment Q			0.009		
			(0.97)		
General risk taking				-0.024	
				(1.99)*	
b/c*female					0.051
					(1.38)
b/C*econ					-0.075
					(1.63)
Constant	0.603	0.133	0.597	0.765	0.641
	(7.30)***	(0.39)	(6.41)***	(5.15)***	(7.15)***
Observations	267	252	254	252	267
R-squared	0.06	0.10	0.07	0.07	0.07
Robust t statistics in parentheses					
* significant at 10%; ** significant at 5%; *** significant at 1%					

Table 0-H2. Overall cooperation and individual characteristics, all interactions.

	(1)	(2)	(3)	(4)	(5)
b/c	0.078	0.080	0.072	0.073	0.087
	(3.17)***	(3.44)***	(2.82)**	(2.92)**	(2.94)**
Female	-0.077	-0.044	-0.076	-0.085	-0.065
	(3.90)***	(2.69)**	(3.62)***	(3.10)**	(1.59)
Economics major	-0.091	-0.109	-0.100	-0.118	0.009
	(1.84)*	(2.07)*	(2.03)*	(2.38)**	(0.09)
Age		0.014			
		(1.32)			
Educ 2		-0.343			
		(6.11)***			
Educ 3		0.020			
		(0.36)			
Educ 4		-0.145			
		(2.39)**			
Educ 5		-0.161			
		(1.18)			
Investment Q			0.007		
			(1.59)		
General risk taking				-0.012	
				(1.26)	
b/c*female					-0.005
					(0.27)
b/C*econ					-0.038
					(0.79)
Constant	0.348	0.072	0.355	0.443	0.326
	(4.74)***	(0.33)	(4.33)***	(3.75)***	(4.04)***
Observations	267	252	254	252	267
R-squared	0.10	0.14	0.10	0.10	0.11
Robust t statistics in parentheses					
* significant at 10%; ** significant at 5%; *** significant at 1%					

Table 0-H3. Leniency and individual characteristics, all interactions.

	(1)	(2)	(3)	(4)	(5)
b/c	0.099	0.095	0.094	0.093	0.100
	(2.82)**	(2.49)**	(2.39)**	(2.51)**	(1.84)*
Female	0.012	0.008	0.003	0.023	0.027
	(0.39)	(0.26)	(0.10)	(0.66)	(0.30)
Economics major	-0.019	-0.051	-0.013	-0.020	-0.052
	(0.27)	(0.74)	(0.19)	(0.27)	(0.28)
Age		0.030			
		(2.58)**			
Educ 2		0.000			
		(.)			
Educ 3		-0.067			
		(1.57)			
Educ 4		-0.102			
		(1.68)			
Educ 5		-0.499			
		(3.48)***			
Investment Q			0.014		
			(1.44)		
General risk taking				0.010	
				(1.05)	
b/c*female					-0.006
					(0.17)
b/c*econ				0.012	
					(0.21)
Constant	0.267	-0.249	0.253	0.227	0.265
	(2.11)*	(1.15)	(1.80)*	(1.58)	(1.56)
Observations	242	230	231	230	242
R-squared	0.06	0.10	0.06	0.06	0.06
Robust t statistics in parentheses					
* significant at 10%; ** significant at 5%; *** significant at 1%					

Table 0-H4. Forgiveness and individual characteristics, all interactions.

	(1)	(2)	(3)	(4)	(5)
b/c	0.071	0.076	0.072	0.074	0.075
	(4.62)***	(5.08)***	(4.99)***	(4.95)***	(3.07)**
Female	-0.021	-0.020	-0.024	-0.026	0.033
	(0.91)	(0.85)	(0.95)	(0.81)	(0.59)
Economics major	-0.056	-0.065	-0.054	-0.059	-0.139
	(1.58)	(1.79)	(1.49)	(1.67)	(1.42)
Age		-0.002			
		(0.24)			
Educ 2		0.000			
		(.)			
Educ 3		-0.037			
		(1.08)			
Educ 4		-0.060			
		(0.88)			
Educ 5		-0.012			
		(0.09)			
Investment Q			-0.001		
			(0.17)		
risk				-0.002	
				(0.27)	
b/c*female					-0.020
					(0.72)
b/c*econ				0.032	
					(0.82)
Constant	0.141	0.190	0.139	0.140	0.129
	(3.25)***	(1.75)	(2.95)**	(1.95)*	(2.23)**
Observations	227	215	215	215	227
R-squared	0.10	0.11	0.10	0.11	0.10
Robust t statistics in parentheses					
* significant at 10%; ** significant at 5%; *** significant at 1%					

Appendix O-I – Robustness to alternate regression procedures

Here we replicate the main regressions related to PD cooperation using (i) logistic regression on each individual cooperation decision, clustered on subject and session, and (ii) Tobit regression on average cooperation (by subject), clustered on session. We find equivalent results to the OLS regressions reported in the main text.

Table O-I1. Cooperation and DG giving, using logistic regression clustered on subject and session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.469***	0.592***	0.484***	0.753***	0.609***	0.580***	0.346***	0.479***
	(0.138)	(0.154)	(0.162)	(0.228)	(0.202)	(0.214)	(0.0844)	(0.134)
DG giving	0.0919*	0.321**	0.0618	0.521**	0.112	0.0515	0.103	0.343**
	(0.0485)	(0.133)	(0.0762)	(0.254)	(0.0819)	(0.263)	(0.0808)	(0.168)
b/c*DG		-0.105*		-0.217*		0.0281		-0.108**
		(0.0568)		(0.119)		(0.132)		(0.0536)
Constant	-1.234***	-1.503***	-0.309	-0.866	-1.340**	-1.277**	-2.148***	-2.451***
	(0.388)	(0.379)	(0.474)	(0.531)	(0.563)	(0.583)	(0.313)	(0.402)
Observations	8,412	8,412	960	960	371	371	1,468	1,468
Standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table O-I2. Cooperation and motivations, using logistic regression clustered on subject and session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.307***	0.0336	0.304*	-0.439	0.430***	2.175***	0.254***	-0.312
	(0.113)	(0.120)	(0.178)	(0.387)	(0.147)	(0.591)	(0.0598)	(0.576)
Profit max	0.109***	0.0730***	0.145***	0.0445	0.0935***	0.257***	0.0746**	0.0292
	(0.0130)	(0.0238)	(0.0266)	(0.0566)	(0.0234)	(0.0628)	(0.0308)	(0.0576)
Help	-0.00264	-0.00254	-0.0403	-0.0413	-0.0135	-0.0137	-0.0290**	-0.0293**
	(0.0158)	(0.0154)	(0.0288)	(0.0295)	(0.0282)	(0.0277)	(0.0127)	(0.0131)
Moral	0.00668	0.00707	0.0350	0.0337	0.0139	0.0123	0.00381	0.00463
	(0.0156)	(0.0151)	(0.0327)	(0.0327)	(0.0189)	(0.0176)	(0.0213)	(0.0214)
Upset	0.0587***	0.0797*	0.0771**	0.131	0.0325	0.0433	0.0642***	0.0506
	(0.0145)	(0.0463)	(0.0327)	(0.0942)	(0.0300)	(0.0935)	(0.0234)	(0.0551)
b/c*ProfitMax		0.0155**		0.0457**		-0.0720***		0.0207
		(0.00735)		(0.0212)		(0.0263)		(0.0181)
b/c*Upset		-0.00876		-0.0241		-0.00300		0.00540
		(0.0174)		(0.0428)		(0.0331)		(0.0190)
Constant	-3.779***	-3.160***	-3.541***	-1.897**	-3.320***	-7.254***	-3.985***	-2.746
	(0.346)	(0.416)	(0.525)	(0.957)	(0.810)	(1.350)	(0.662)	(1.677)
Observations	8,204	8,204	936	936	360	360	1,405	1,405
Standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table O-I3. Cooperation and universalism, using logistic regression clustered on subject and session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.357***	0.429	0.306*	-0.150	0.455**	0.0802	0.360***	0.411
	(0.133)	(0.272)	(0.167)	(0.395)	(0.177)	(0.451)	(0.0950)	(0.397)
Universalism	0.00162	0.0141	-0.00520	-0.0816	5.31e-05	-0.0687	0.000849	0.0102
	(0.0147)	(0.0362)	(0.0225)	(0.0567)	(0.0293)	(0.0729)	(0.0225)	(0.0585)
b/c*Universalism		-0.00471		0.0299		0.0252		-0.00335
		(0.0175)		(0.0291)		(0.0226)		(0.0259)
Constant	-0.948**	-1.139**	0.167	1.330	-0.929	0.0904	-2.073***	-2.215**
	(0.438)	(0.569)	(0.571)	(0.829)	(0.645)	(1.362)	(0.414)	(0.871)
Observations	9,611	9,611	1,108	1,108	431	431	1,640	1,640
Standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table O-I4. Cooperation and benevolence, using logistic regression clustered on subject and session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.348***	0.340	0.295*	-0.468	0.454***	0.545	0.360***	0.730
	(0.133)	(0.255)	(0.165)	(0.506)	(0.175)	(0.650)	(0.0948)	(0.535)
Benevolence	-0.00362	-0.00437	-0.0218	-0.0902**	-0.0271	-0.0190	0.00307	0.0367
	(0.00854)	(0.0193)	(0.0165)	(0.0420)	(0.0224)	(0.0581)	(0.0131)	(0.0377)
b/c*Benevolence		0.000286		0.0271		-0.00327		-0.0133
		(0.00918)		(0.0208)		(0.0211)		(0.0175)
Constant	-0.805*	-0.784	0.718	2.651**	-0.174	-0.400	-2.146***	-3.083***
	(0.457)	(0.590)	(0.696)	(1.139)	(0.851)	(1.806)	(0.459)	(1.165)
Observations	9,574	9,574	1,104	1,104	430	430	1,640	1,640
Standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table O-I5. Cooperation and demographics, using logistic regression clustered on subject and session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.380***	0.470**	0.354**	0.369	0.462***	0.401*	0.330***	0.230*
	(0.133)	(0.190)	(0.161)	(0.256)	(0.168)	(0.232)	(0.116)	(0.139)
Female	-0.313***	0.0177	-0.691***	-0.972**	-0.0584	0.0131	-0.166	-0.543
	(0.106)	(0.254)	(0.147)	(0.403)	(0.220)	(0.754)	(0.184)	(0.403)
Econ major	-0.461**	-0.191	-0.432	0.653	-0.518*	-1.600***	-0.553**	-1.033*
	(0.206)	(0.485)	(0.319)	(0.768)	(0.283)	(0.621)	(0.248)	(0.586)
b/c*Female		-0.130		0.109		-0.0270		0.146
		(0.109)		(0.201)		(0.233)		(0.135)
b/c*Econ major		-0.105		-0.420		0.407**		0.187
		(0.230)		(0.302)		(0.205)		(0.177)
Constant	-0.748*	-0.969**	0.420	0.385	-0.828	-0.673	-1.848***	-1.601***
	(0.396)	(0.481)	(0.478)	(0.635)	(0.548)	(0.738)	(0.288)	(0.342)
Observations	9,272	9,272	1,068	1,068	415	415	1,579	1,579
Standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table O-I6. Cooperation and DG giving, using tobit regression clustered on session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.117***	0.149***	0.528***	0.716***	0.607***	0.582***	0.153***	0.179***
	(0.0324)	(0.0368)	(0.124)	(0.236)	(0.220)	(0.205)	(0.0334)	(0.0429)
DG giving	0.0256*	0.0867**	0.0534	0.396	0.0488	-0.00332	0.0483**	0.102*
	(0.0131)	(0.0338)	(0.0792)	(0.299)	(0.0652)	(0.169)	(0.0212)	(0.0533)
b/c*DG		-0.0276*		-0.162		0.0233		-0.0241
		(0.0148)		(0.140)		(0.0817)		(0.0170)
Constant	0.182**	0.111	0.165	-0.237	-0.873	-0.816	-0.154	-0.215*
	(0.0908)	(0.0894)	(0.380)	(0.499)	(0.617)	(0.593)	(0.105)	(0.124)
Observations	240	240	240	240	190	190	181	181
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table O-I7. Cooperation and motivations, using tobit regression clustered on session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.0611**	-0.0432	0.235*	-0.364	0.328*	1.599**	0.101***	-0.117
	(0.0252)	(0.0495)	(0.125)	(0.440)	(0.172)	(0.680)	(0.0288)	(0.325)
Profit max	0.0289***	0.0158**	0.145***	0.0542	0.0945***	0.206***	0.0278**	0.00847
	(0.00392)	(0.00636)	(0.0390)	(0.0499)	(0.0268)	(0.0699)	(0.0115)	(0.0223)
Help	0.000581	0.000765	-0.0268	-0.0270	-0.0272	-0.0312	-0.00196	-0.00153
	(0.00407)	(0.00390)	(0.0243)	(0.0243)	(0.0236)	(0.0233)	(0.00434)	(0.00439)
Moral	0.00259	0.00265	0.0342	0.0353	0.0254	0.0263	-0.00384	-0.00371
	(0.00363)	(0.00340)	(0.0323)	(0.0314)	(0.0213)	(0.0209)	(0.00639)	(0.00637)
Upset	0.0131***	0.0201**	0.0565**	0.136**	0.0335	0.0419	0.0238***	0.0233
	(0.00316)	(0.00984)	(0.0278)	(0.0672)	(0.0286)	(0.0811)	(0.00747)	(0.0179)
b/c*ProfitMax		0.00573***		0.0410***		-0.0511*		0.00874
		(0.00207)		(0.0144)		(0.0262)		(0.00986)
b/c*Upset		-0.00284		-0.0340		-0.00308		9.93e-05
		(0.00345)		(0.0268)		(0.0288)		(0.00683)
Constant	-0.463***	-0.236**	-3.037***	-1.771	-2.649***	-5.353***	-0.822***	-0.350
	(0.0649)	(0.110)	(0.809)	(1.218)	(0.853)	(1.405)	(0.282)	(0.722)
Observations	228	228	228	228	178	178	169	169
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table O-I8. Cooperation and Universalism, using tobit regression clustered on session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.0875**	0.113	0.349**	-0.159	0.462**	0.286	0.137***	0.194
	(0.0348)	(0.0739)	(0.162)	(0.412)	(0.200)	(0.414)	(0.0414)	(0.141)
Universalism	0.000526	0.00493	-0.00745	-0.0925	0.00597	-0.0259	-0.00124	0.00882
	(0.00417)	(0.0101)	(0.0243)	(0.0614)	(0.0228)	(0.0609)	(0.00739)	(0.0189)
b/c*Universalism		-0.00165		0.0333		0.0117		-0.00372
		(0.00490)		(0.0307)		(0.0199)		(0.00876)
Constant	0.256**	0.189	0.676	1.971**	-0.641	-0.163	-0.0554	-0.208
	(0.117)	(0.152)	(0.565)	(0.902)	(0.701)	(1.243)	(0.133)	(0.281)
Observations	277	277	277	277	217	217	210	210
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table O-I9. Cooperation and Benevolence, using tobit regression clustered on session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.0847**	0.103	0.337**	-0.486	0.456**	0.964*	0.136***	0.305**
	(0.0352)	(0.0852)	(0.161)	(0.447)	(0.198)	(0.536)	(0.0404)	(0.146)
Benevolence	-0.000679	0.00103	-0.0171	-0.0928**	-0.0457**	0.000903	-0.00180	0.0135
	(0.00288)	(0.00643)	(0.0146)	(0.0404)	(0.0230)	(0.0570)	(0.00490)	(0.0125)
b/c*Benevolence		-0.000650		0.0292		-0.0182		-0.00603
		(0.00310)		(0.0192)		(0.0185)		(0.00487)
Constant	0.288**	0.240	1.066	3.201***	0.726	-0.572	-0.0228	-0.452
	(0.139)	(0.196)	(0.654)	(1.134)	(0.934)	(1.683)	(0.145)	(0.345)
Observations	276	276	276	276	216	216	210	210
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								

Table O-I10. Cooperation and demographics, using tobit regression clustered on session.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Overall C last 4		First round C last 4		Leniency last 4		Forgiveness last 4	
b/c	0.0925***	0.120**	0.391**	0.420*	0.481**	0.490*	0.131***	0.165***
	(0.0341)	(0.0487)	(0.154)	(0.238)	(0.194)	(0.282)	(0.0451)	(0.0625)
Female	-0.0897***	0.00214	-0.668***	-0.973**	-0.0944	-0.0452	-0.114*	0.0664
	(0.0317)	(0.0720)	(0.204)	(0.405)	(0.244)	(0.722)	(0.0676)	(0.167)
Econ major	-0.128**	0.00127	-0.379	1.010	-0.468	-0.482	-0.193***	-0.202
	(0.0571)	(0.124)	(0.368)	(0.735)	(0.290)	(0.674)	(0.0737)	(0.165)
b/c*Female		-0.0359		0.115		-0.0189		-0.0681
		(0.0302)		(0.188)		(0.273)		(0.0705)
b/c*Econ major		-0.0502		-0.535*		0.00455		0.00187
		(0.0612)		(0.315)		(0.245)		(0.0712)
Constant	0.317***	0.248**	0.856*	0.780	-0.483	-0.505	0.0171	-0.0685
	(0.0996)	(0.122)	(0.449)	(0.557)	(0.607)	(0.798)	(0.112)	(0.135)
Observations	267	267	267	267	210	210	203	203
Robust standard errors in parentheses								
*** p<0.01, ** p<0.05, * p<0.1								