Effects of Endogenous Selection on Pro-social Behavior[1]

Malcolm Kass[2]

March 10, 2014

Abstract

There exists a small but growing strand of research on the pro-social effects of democracy. In these studies, subjects select an institution in which they interact using a collective choice mechanism such as voting. Typically subjects choose among formal or informal punishment, communication, or commitment institutions in a baseline social dilemma structure, and the results point to greater cooperation when these institutions are endogenously selected. This led to the idea that this social welfare-enhancing effect of democracy will only be effective when the subject's choice set includes institutions that serve to align personal and group incentives. However, most of the literature uses institutions that alter the equilibrium predictions, expand the sequential game decision tree by adding subgames, and/or alter the aggregate welfare for a given outcome for the interacting group/pair. This paper avoids these potential confounds and is a direct test of the social welfare-enhancing effect of democracy with institutions designed to lessen, but not completely alleviate, the friction between personal and group incentives.

I examine endogenous institutions in a "nested Prisoner's Dilemma" (NPD) setting, which nests two PD games and mimics the incentive structure inherent in counterterrorism policy coordination. One PD game captures the positive externalities associated with pre-emptive actions, and the other the negative externalities associated with defensive actions: the equilibrium of the combined game is for both players to select the Pareto-inefficient choice of defensive strategies. Previous work tests the impact of (exogenously-imposed) cost sharing of pre-emptive actions on the selection of the (non-equilibrium) socially optimal outcome, where both players choose pre-emptive actions. Cost sharing reduces the risk of selecting the pre-

[1] I thank Catherine Eckel, Enrique Fatas, Daniel G. Arce M., and Ernan Haruvy for their assistance and the conference participants at the 2013 North American Economic Science Association and the 2013 Southern Economic Association conferences.

[2] Department of Economics, School of Economic, Political and Policy Sciences, University of Texas at Dallas, Richardson, TX 75080-3021, USA; malcolmkass@utdallas.edu.

emptive strategy, but leaves the equilibrium , the sequential game structure, and the aggregate welfare of the outcome unchanged, unlike the previous literature on endogenous institutions. I test the effectiveness of a voting mechanism where subjects can select the level of cost sharing endogenously. In a finitely repeated NPD setting, there is weak evidence that the endogenous selection of the cost sharing level drives pro-social behavior. However, in a one-shot NPD setting, I find that subjects behave considerably less pro-socially when a given institution is endogenously chosen rather than exogenously imposed. In the one-shot NPD setting, 72.2% of subject pairs that mutually selected cost sharing institutions contained individuals that appeared to use the collective choice mechanism to encourage their counterparts to cooperate, but defected themselves. Only 42.6% of subject pairs in the imposed settings acted similarly. This supports the notion forwarded by the previous literature that the social welfare-enhancing effect of democracy is dependent on institutions that serve to align personal and group incentives. Additionally, this paper provides a key warning that the pro-social effect of democracy may not only be dependent on the available institutional options, but on the collective choice mechanism itself.

Key words: Prisoner's Dilemma, Democracy, Endogeneity Premium, Repeated Prisoner's Dilemma, Cooperation, Social Dilemma

JEL Classification Numbers: C91, C92, D02, D03

1. Introduction

Key to the implementation and success of social and economic institutions, such as the UN, is the cooperative behavior of the individuals interacting within the context of the institution. Many organizations are comprised of bodies of representatives that democratically select institutions designed to overcome economic social dilemmas. Since Olson's (1965) The Logic of Collective Action, social dilemmas have been a major research focus of the social sciences, often recommending economic institutions to overcome the social dilemma setting. However, only in the last 10 to 20 years have researchers begun to run controlled experiments investigating an effect of democracy on the cooperative behavior of people interacting in democratically selected economic institutions.

Empirical evidence is found in Frey (1998) and Pommerehne and Weck-Hannemann (1996). For instance, Frey (1998) found that Swiss cantons that allowed a democratic vote on specific tax structures had less tax evasion. Researchers coined this effect as "procedural utility" (Frey et al 2004), an idea that the selection process of the economic setting may also be a driver of individual utility. Previous experimental research has found similar results with regards to pro-social behavior. The current experimental research is roughly grouped in 2 main categories. In one category, subjects can vote to implement informal punishment and/or reward institutions. Much of this finitely repeated game research adds complexity by altering the aggregate welfare for a given outcome, usually by expanding the game decision tree by adding punishment or reward subgames.[3] A recent experiment on this topic is from Sutter et al (2010) where subjects, in a repeated voluntary contributions mechanism (VCM) setting, voted whether to implement a punishment or reward institution. Accounting for self-selection effects, the authors find higher allocations to the public good under both punishment and reward institutions.[4] In the second category, subjects are presented with institutions that alter the strategic nature of the social dilemma setting. While these institutions do not necessarily complicate the game by adding subgames, the strategic nature of these one-shot settings are changed. A key experiment in this regard is Dal Bo et al (2010). In that paper, subjects vote to interact in a 2x2 PD or a 2x2 coordination game where in the coordination game, a fine is automatically imposed on a unilaterally defecting player. Given that the other player cooperates, the defecting player's

[3] Outside of the added collective choice subgame.

[4] Self-Selection effects in this case are defined as cooperative subjects selecting institutions designed to promote cooperation in a social dilemma setting.

earnings are reduced to an amount slightly less than the mutual cooperative outcome. [5] The authors find considerably more cooperation if subjects democratically select to interact in the coordination game vs. interacting in the same game, albeit imposed.

This has led some to suggest that individual and collective incentives must be aligned for endogenous selection via democracy to generate cooperation. In the meta paper about this effect of democracy, Dal Bo (2012) proposes a necessary condition to this pro-social effect of democracy, termed "endogeneity premium" by Dal Bo et al (2010), stating "providing material incentives to align personal incentives with group goals is important for institutions to be effective. If the set of institutions available to citizens can not eliminate the difference between personal incentives and group goals, it is unlikely that democratic choice among the available institutions with have much impact on payoffs". I propose this statement is conjecture because the institutions in the choice set have either altered the one-shot equilibrium predictions, altered aggregate welfare for specific game outcomes, and/or have expanded the sequential game with punishment and reward subgames.[6] Therefore, the primary question examined in this paper is whether the endogeneity premium is robust to simple institutions that do not alter the equilibrium predictions, aggregate welfare for a given outcome, or add subgames.

For this paper, subjects were presented with 4 different PDs to select and interact in. What is different about each of these institutions is the difference between the row and column players' payoffs in the off-diagonal cells tied to the socially efficient action.[7] Starting from a baseline PD, the other 3 games were monotonic decreases of this difference. In the one-shot setting, regardless of the PDs selected by subjects, when compared to behavior of subjects in the same, albeit imposed, PD game, there was no increase in pro-social or cooperative behavior. In fact, subjects appear to use the collective choice mechanism to "trick" their counterparts in behaving pro-socially, only to defect themselves. Therefore, there is no evidence to reject Dal Bo's (2012) conjecture about a necessary condition for the endogeneity premium effectiveness. However, this may provide a glance into how different collective decision rules impact this pro-social effect of democracy.

[5] This is also called the "Temptation" or "Greed" payoff in the Prisoner's Dilemma literature.
[6] It should be noted that much of the current literature only find this Endogeneity Premium effect between people interacting in the social welfare enhancing institution. A possible exception is Sutter et al (2010), however this is unclear for they do not account for interaction effects between the selection treatment and the institution selected in the 3rd model in table 4 in that paper.
[7] This is also difference between the "Temptation" and the "Sucker" payoffs in the Prisoner's Dilemma literature.

In general, the findings of this paper contribute to the understanding of democratic institutions. The rest of the paper is organized as follow. Section 2 describes the social dilemma setting, expanding it to include the idea of institutions and the relevant literature. Section 3 is the experimental design and predictions. Section 4 contains the results, broadly categorized into institution selection choices (voting) and social dilemma interactions. Section 5 provides an interpretation and discussion. Section 6 concludes.

2. Theory on the Nested Prisoners Dilemma, Burden Sharing, and Endogenous Institution Selection

2.1 The Nested Prisoner's Dilemma Setting (NPD) and Burden Sharing

The social dilemma used in this paper is a 3x3 Prisoner's Dilemma from Arce and Sandler (2005), which is a model of counterterrorism actions of two nations looking to minimize the damage from a potential terrorist attack. The terrorist in this setup is a passive actor and provides the payoff structure for the Prisoner's Dilemma (PD). Contained in this PD are 3 actions, denoted as "policies". The first policy actively preempts terrorism and is labeled "Prevention". The Prevention policy has classic public good qualities, selecting the prevention policy benefits all. An example is destroying a sleeper cell, for the terrorist's capabilities are undermined which reduces the threat to all. The second policy actively deters terrorism and is labeled "Defense". The Defense policy can be interpreted as a public bad. If a nation spends resources in defending its borders, the terrorist updates its beliefs about the probability of a successful attack on this country and increases the likelihood of attack to other nations. A nation can also select a policy of inaction, labeled as "Take No Action".

This 3x3 one-shot PD game (the NPD) predicts that the Defense policy will be selected for the Defense policy strategically dominates Prevention and Take No Action for both players. Hence, mutual Defense is the unique Nash equilibrium. However, the Defense policy is Pareto dominated by mutual Take No Action and cooperation (mutual Prevention).[8] Below in table 1 is the NPD, labeled "Baseline", used for this paper where both row and column nations are symmetric. Note that the Defense policy strategically dominates all other possible policies but the Prevention policy is the Pareto efficient action.

(table 1)

[8] Along with the observation that public goods and public bads nested in the same Prisoner's Dilemma setting exasperate the welfare damaging effects of the social dilemma

Kass et al (2013) expanded the NPD by reducing the strategic risk of the Prevention policy. In this paper, strategic risk is defined as the difference between the lowest and highest payoff in action pairs where the socially optimal Prevention action is coupled with defection. Here, strategic risk can be interpreted as a "cost" or "burden" of cooperating. Therefore, by altering strategic risk, the individual payoffs for the outcomes in the NPD containing the Prevention policy are altered.[9] To reduce strategic risk but to keep the aggregate payoffs for each outcome unaltered, Kass et al (2013) transferred token(s) one-for-one from the highest payoff to the lowest payoff in the action pairs containing Prevention. These transfers were designated as "burden sharing" and they investigated cooperation differences among 3 different and monotonic increasing levels of burden sharing, labeled "Low Burden Sharing", "Moderate Burden Sharing", "High Burden Sharing" and between the baseline game.[10] The NPD games with burden sharing are in table 2 below.

(Table 2)

A visual representation may help elucidate this burden sharing effect. Figure 1 represents the convex hull of all possible combinations of interactions in the baseline NPD model. The 4 vertices in figure 1 indicate the 4 possible combinations of Prevention and Defense action pairs.[11] Implicit in this representation are assumptions for a von Neumann-Morgenstern Utility function. (von Neumann and Morgenstern (1947)) First, via the continuity assumption, subjects must have preferences over all possible convex combinations and that each point within this convex set can be explained as a convex combination of the highest possible and lowest possible payoffs. Within this convex hull, each point is a convex combination of the upper left-most point and the lower right-most point. These points represent the most severe misalignment of policies, {Prevention, Defense} and {Defense, Prevention}. Assuming the monotonicity condition holds, each subject wants to be closer to her most preferred point and to be further away from her least preferred point.

Burden sharing reduces the variability of payoffs. In figure 2, the upper left-most and lower right-most endpoints are drawn in, for the higher defection payoff is reduced by amount

[9] {Prevention, Prevention}, {Prevention, Take No Action}, {Prevention, Defense}, {Take No Action, Prevention}, {Defense, Prevention}

[10] Therefore, the burden sharing institutions are monotonically decreasing in strategic risk.

[11] {Prevention, Prevention}, {Prevention, Defense}, {Defense, Prevention}, and {Defense, Defense}

"s" and the lower cooperative payoff is increased by amount "s".[12] Since burden sharing applies only to the Prevention policy, the convex set is no longer a parallelogram as before, but now a 6-sided figure.[13]

(Figures 1 and 2)

No NPD with burden sharing alters the theoretical predictions from the baseline NPD; the friction between individual and group incentives still exists. The Defense policy is still the dominant strategy and Cooperation and mutual Take No Action Pareto dominate mutual Defense. In the jargon of this paper, the baseline NPD and the 3 NPDs with burden sharing will be referred to as Baseline and Burden Sharing "institutions".

2.2 Theory and Predictions for Endogenous institution selection

Endogenous institution selection can be thought of as the first stage in a multi-stage game (Tsebelis 1990). When the NPD is a one-shot game, the simultaneous institution selection is the first stage of a 2-stage sequential game. However, subgame perfection does not eliminate any Nash equilibria to give clear guidance on a prediction. Luckily, previous behavioral research provides a direction. Previous research indicates that the institution may need to alter the game to a point where subjects find it individually desirable to select the social welfare enhancing action. However, the only equilibrium prediction after the simultaneous institution selection stage (the collective choice component) is for subjects to defect given the institutions in this paper. Using the previous research as a guide, it may be doubtful that an endogenously selected baseline or burden sharing institution will generate more cooperative interactions as compared to subjects interacting in the same, albeit imposed, institution.

2.3 Previous Research

Much of the endogenous institution selection literature focuses on the social dilemma situations that arise from common pooled resource environments.[14] This paper is not concerned with overviewing this research. The next couple of sections delve into the previous research, primarily VCM settings.

2.3.1 Endogenous selection research on informal punishment (rewards) for defection (cooperation) and formal fines for defection

[12] Represented as the red line in Figure 2

[13] This convex set setup is similar to Carpenter (2000), however with 1 key difference. In that paper, increases in burden sharing also increased the aggregate welfare for off-diagonal payoffs.

[14] Environments such as water for irrigation, farming, fisheries, and forests where there is friction between individual incentives and collective welfare.

Previous work in this category focuses on endogenously selected reward and/or punishment institutions to drive cooperation compared to interactions under these same imposed institutions. While these institutions may not alter equilibrium predictions in the one-shot case, these institutions do alter the decision tree. As previously mentioned, Sutter et al (2010) tested a repeated VCM game with treatments that allowed subjects to implement a punishment institution and other treatments where subjects can implement a reward institution. Both endogenously selected punishment and reward institutions drive larger contributions to the VCM as compared to imposed punishment and reward institutions.[15] Kroll et al (2007) conduct a repeated VCM game with stable groups that compared a baseline to treatments where subjects voted on arrays of member contributions to the VCM. In this paper, if a contribution proposal gets a majority vote, then subjects can costly punish each other for defecting from the selected array. If the group does select a specific array of allocations, group contributions increase. This paper contained another treatment, whether the votes were binding or non-binding, akin to cheap talk. This treatment with non-binding votes does not drive pro-social play. Bischoff (2007) conducted an endogenous selection game where subjects can vote to implement a punishment institution in a dynamic common pooled resource game with matched partners. Bischoff finds that the endogenous selection of a punishment institution does not have an added effect on cooperation as compared to the same imposed common pooled resource game with punishment. Lastly, Tyran et al (2006) find, in a repeated VCM game, endogenously selected fines for defection promote cooperation as compared to the same fine when imposed.

What is unique in this paper is that the burden sharing institutions differ in the degree of strategic risk vs. unidirectional rewarding, punishing or fining. In this paper, the aggregate welfare for any given action set is unchanged with burden sharing, unlike the Tyran et al (2006) paper. The unidirectional nature of punishment (reward) typically reduces (increases) aggregate welfare as the cost for inducing cooperative behavior. In the case of punishment, subject distaste for these welfare reducing costs may explain why in some of the research , groups of subjects that selected a specific pro-social institution did cooperate more, but subjects overall did not find interacting in the pro-social institution necessarily agreeable. For instance, Sutter et al (2010)

[15] While punishment was considerably more effective, punishment institutions were also unpopular in that experiment.

find no groups of subjects willing to democratically select a high impact punishment institution.[16] [17]

2.3.2 Endogenous selection research on commitment and burden sharing institutions that alter one-shot equilibrium predictions.

In addition to the Dal Bo et al (2010) work mentioned previously, Carpenter (2000) performed a similar test of endogenously chosen institutions in a common pooled resource game, finding increased levels of cooperation over a baseline commons game. In this paper, the selection process is a proposer/acceptor system where the proposer can choose between many PD games (altered by decreasing levels of strategic risk for the cooperative action and slight monotonic increases in aggregate payoffs per off-diagonal action pair) and a coordination game where mutual cooperation is a supported equilibrium that Pareto dominates mutual defection. The proposer/acceptor system is theoretically tractable for the cooperative outcome is a subgame perfect refinement.

Additionally, one may notice that the setup in this paper is similar to a 2-stage game where subjects decide on transfer payments as inducements to cooperate.[18] Andreoni and Varian (1999) tested this setup where subjects decided on transfer amounts that altered the baseline PD game to a coordination game where mutual cooperation was the supported SPNE. Qin (2005) theoretically uncovered the general form of endogenous transfer situations with social dilemmas, finding conditions necessary for cooperation to be a subgame perfect refinement. For this 2 player setting, the transfer amount to an individual subject *i* must be larger than subject *i*'s gains from defection, but this transfer amount must be smaller than the difference between mutual cooperation and mutual defection for the other player *j*. Otherwise, player *j* wants player *i* to defect and the cooperative outcome can no longer be supported in equilibrium because the transfer for cooperating is too expensive. For the NPD settings tested here, the transfer amount is never above the gain from defection, so the cooperative outcome from the one-shot two stage game is never a supported SPNE. Experimentally, this idea has been tested by Charness et al (2007), finding that mutual cooperation instances increase by up to 30 to 50 percentage points

[16] Only 16.7% of subjects voted to implement the high impact punishment institution for this high impact treatment.
[17] Botelho et al (2005) find similar results that earnings efficiency matters for pro-social institution selection.
[18] Transfer payments can be viewed as each party agreeing to transfer a specific amount to the other player as a "reward" to cooperate.

when subjects can select transfer payments that alter the PD setting to a game that supports mutual cooperation as a SPE.

Lastly, there is a strand of literature on endogenous group formation, which can be interpreted as a commitment device. In a VCM setting, Kosfeld et al (2009) found that subjects who successfully voted to participate in a coalition that required each member to contribute her entire endowment to the public good were able to significantly increase aggregate earnings. In that paper, subjects first decide whether to participate in a coalition where each subject must allocate all of her endowment to the public good. Those who decide to not participate in this coalition will play the VCM as is. Then subjects must decide whether to implement the organization, which required unanimity. If the organization size is equal to or larger than the coalitional minimum, then staying in the coalition at the implementation stage is theoretically supported. The key finding from this paper is that subjects do form coalitions that meet the requirements of the organizational equilibrium. However, these coalitions do fall apart unless participation is unanimous, even though partial commitment is a theoretically supported SPNE.

3. Experimental Design and Predictions

3.1 Design and Procedures

This experiment involves the baseline and three different levels of burden sharing for the Prevention policy, comparing interactions when the institutions are imposed vs. when the institution was selected by a matched pair. The imposed (will have the prefix EXO for exogenous henceforth) baseline is a direct test of the theory presented in Arce and Sandler (2005) and has been tested previously in Arce et al (2011). Their findings generally support the theory in Arce et al (2005) that subjects would have trouble cooperating, defined as mutually selecting the Prevention policy. Kass et al (2013) examine differences in cooperation and social welfare when paired subjects interact in imposed burden sharing institutions. For the one-shot test, the authors find that the High Burden Sharing treatment increased cooperation instances by 44 percentage points as compared to a Baseline NPD game, but little evidence of an effect for the Low and Moderate Burden Sharing environments. This previous work is the data for the "imposed" institutions and are what the data from the endogenously selected institutions is compared to (henceforth, will have the prefix ENDO for endogenous).

In each session, including the EXO sessions ran previously randomly paired subjects play for 20 rounds with stable partners. Then subjects were randomly rematched in new pairs for a 21st round. Payoffs for round twenty-one were increased by a factor of ten. The 21st round is a one-shot test of the theory with randomly assigned, experienced subjects. Therefore, these sessions can be viewed as consisting of two sections, a finitely repeated game for rounds 1 to 20 and a one-shot game for round 21. This information was known to all subjects.

Treatment sessions were conducted at the Economic Research Laboratory at Texas A&M University. A total of 64 undergraduates and graduate students from various academic disciplines (including economics) and with no previous history of playing the NPD game were recruited via the ORSEE system (Greiner, 2004). There were three sessions for the ENDO treatment, 2 sessions with 20 subjects and 1 session with 24 subjects. From Arce et al (2011) and Kass et al (2013), there were 12 imposed institution sessions. (EXOBASE for Baseline, EXOLOW for Low Burden Sharing, EXOMOD for Moderate Burden sharing, and EXOHIGH for High Burden Sharing sessions) These were conducted at the Center for Behavioral and Economic Experimental Science at the University of Texas at Dallas in 2010 and 2011.

No subject participated in more than one session. Once subjects were present in the lab area, each was randomly assigned to a computer terminal. Before beginning the experiment instructions, the subjects were told not to verbally communicate with each other, but to feel free to ask questions. Subjects read the self-paced, computerized experimental instructions, which explained the different policies and the overall baseline game. Then they were shown the normal form version of the baseline NPD and were informed that earnings would be cumulative. The experiment was programmed using z-tree software (Fischbacher 2007).

The NPD was presented to subjects as an interaction between countries willing to reduce the possibility of a terrorist attack. Hence, this may be viewed as a source of framing effects. However, by using this naturalistic context vs. neutral language has one main benefit, to assist in conceptualizing the complexities of the asymmetric nature in the NPD. (Zelmer 2003) Framing effects are controlled for because instructions were identically framed between the imposed institution sessions and the endogenous treatment, therefore framing effects cannot explain an ENDO treatment effect.

Once subjects finished reading the instructions, they were given six examples and a quiz to insure comprehension. Unique to the ENDO treatment, pairs of subjects were then presented

with different Prevention policy burden sharing "options". Participants were told that they and their counterpart could coordinate to share zero tokens, share one token, share two tokens, or share three tokens of the Prevention policy cost for each Prevention policy selection per round. Next, subjects interacted in a repeated voting environment for 1 minute to potentially agree on the "option" they preferred. During this 1 minute timeframe, subjects repeatedly selected options until both subjects in a matched pair selected the same option. Once the pair mutually agreed on a specific option, the voting session ended. If the paired subjects could not agree on a specific option once time expired, subjects interacted in the zero-token baseline setting. Interactions under the ENDOBASE tag refer to if the pair played the Baseline institution, the ENDOLOW tag if the pair played the Low Burden Sharing institution, the ENDOMOD tag if the pair played the Moderate Burden Sharing institution, and ENDOHIGH tag if the pair played the High Burden Sharing institution. Subjects only interacted in ENDOLOW, ENDOMOD, and ENDOHIGH if both subjects mutually selected that particular option. Otherwise, subjects interacted in ENDOBASE.[19] The purpose of this repeated voting process is to help subjects coordinate on a burden sharing option. After the voting stage, subjects were informed of the selected institution and the experiment started where subjects were shown the results and earnings of their decisions in each round. Subjects were not shown a history of previous play, but were given a record sheet to record game play and earnings in each round, if the subject so desired. After the first twenty rounds, subjects read a short description of the 21st round, where they were reminded that they would be randomly re-matched and that payoffs were increased to ten times the amounts from the previous rounds. Unique to the ENDO treatment, subjects were presented with the Prevention policy burden sharing options for this last round. Since payoffs were increased by a factor of ten, the amount of Prevention cost to share was increased similarly.[20] Then the newly matched pair of subjects interacted in the same repeated voting session for 1 minute. After the repeated voting session, the 21st round started and players were shown the results and earnings of their decisions in this last round. Once the experiment was finished, the subjects completed a short survey asking personal characteristics including

[19] Note that subjects could also mutually select the Baseline game.
[20] Participants were told that they could coordinate to share 0 tokens, share 10 tokens, share 20 tokens, or share 30 tokens of the cost of Prevention.

socio/political views.[21] Finally, participants were paid in private the $5 show up fee and experimental earnings. Figure 3 illustrates the experimental design.

(Figure 3)

On average the experiment took approximately 40 minutes, with the survey and payouts taking an additional 35 minutes. Aggregate policy choices and average subject earnings for the EXOBASE, EXOLOW, EXOMOD, and EXOHIGH along with the experiment earnings for the endogenously selected ENDOBASE, ENDOLOW, ENDOMOD, and ENDOHIGH institutions are in table 3. There is a further breakdown of ENDOBASE policy choices and earnings for pairs who couldn't coordinate on a particular burden sharing option in table 4.

(Table 3 and Table 4)

3.2 Predictions

Given the myriad of theoretical possibilities in the finitely repeated game section of this experiment, I will only focus on the one-shot setting for predictions. The central question in this paper is if endogenous institution selection will increase the cooperative behavior of subjects as compared to the imposed institutions. As previously mentioned, Dal Bo (2012) conjectured that individual and collective incentives must be aligned for endogenous selection to generate cooperation. As mentioned previously, using previous research as a guide to examine this question is unclear. Hence, the effect of endogenous institution selection is relatively difficult to predict.

Nor is subgame perfection an adequate guide. Regardless of the selected institution, the only Nash prediction is for subjects to defect by selecting the Defense policy, but there is no guidance to determine which institutions subjects will select. Therefore, I am left with Dal Bo's (2012) conjecture that the endogenously selected Prisoner's Dilemmas will not generate more cooperative interactions as compared to subject interactions from the same imposed institution. Therefore, I propose the following hypothesis.

Subject pairs that are given the opportunity to only select among different Prisoner's Dilemma's will not behave more pro-socially (in mutual cooperation or pair economic efficiency measures) as compared to the same exogenously imposed Prisoner's Dilemma.

4. Results

[21] Table 1 in Appendix B contains comparison tests of the subject characteristics and beliefs between the treatments.

3 sessions (64 subjects) of the endogenous treatment were run at Texas A&M University. Subjects earned $24.80 on average (including the $5 show up fee) with a standard deviation of $4.25. Table 3 contains the aggregate policy choices and corresponding earnings for round 1, round 1 to 20, and round 21. Table 4 breaks down policy choices and earnings for ENDOBASE, separating out pairs that coordinated on ENDOBASE versus pairs who couldn't coordinate. One concern was whether a matched pair that coordinated on ENDOBASE would interact differently than a matched pair that miscoordinated on a specific institution. This is noteworthy for these pairs still play ENDOBASE. This turns out not to be the case, for the decisions of these two groups do not appear to be different for the first twenty rounds (p-value = 0.394) and for the 21st round (p-value=0.595 from the Fisher's exact test).[22] [23] Figure 4 shows four graphs plotting the fraction of Prevention selections per round. Each graph represents selections in the Baseline, Low Burden Sharing, Moderate Burden Sharing, and the High Burden Sharing games and contains two plots representing whether the setting was imposed or if the setting was selected. Evident in these time series are that Prevention selections are reduced under the Endogenous selection treatment for all games except the High Burden Sharing setting.

The rest of the results section is organized as follows. First is an analysis of institution selection votes, separating out the first and second voting decisions. Next we perform a non-parametric analysis of the aggregate policy choices, separating out the first 20 rounds from the 21st round. To eliminate cross-sectional confounds, differences in aggregate cooperation instances (the sum of mutual Prevention policy selections per matched pair from the first 20 rounds) and aggregate pair earnings for the first twenty rounds are tested. Data from the 21st round are in a similar format, but since policy data from this final round is free from the aforementioned confounds, I test differences in Prevention selections and earnings efficiency. Finally, to control for other potential confounds, the results section wraps up with an econometric analysis.

4.1 Voting choices

[22] Via multivariate analysis of variance comparing the aggregate instances of Prevention, Take No Action, and Defense selections

[23] Using cooperation instances from rounds 1-20, p-value = 0.1417 via two sample t-test

Figure 5 contains the first institution selections (labeled as Share Choices in the figure) for the first twenty rounds and for the final 21st round.[24] Note that because of the repeated voting mechanism, subjects have numerous institution selections. There is little evidence to suggest that subjects have a particular preference for the ENDOBASE game or any burden sharing institution. Looking at initial institution votes for the 21st round, selections were grouped towards ENDOBASE and ENDOHIGH, each accounting for about 1/3 of the first institution choices.

(Figure 5)

Table 5 contains various probit models on the predictive ability of specific personal characteristics and socio/political views. The binary dependent variable is whether the subject initially chose a burden sharing institution (either ENDOLOW, ENDOMOD, ENDOHIGH) or ENDOBASE for rounds the first twenty rounds. No personal characteristic or socio/political trait was found to drive the selection of a burden sharing institution. [25]

(Table 5)

Table 6 is similar to table 5, but the binary dependent variable is the subject's final institution selection for the first twenty rounds. Here, the counterpart's initial burden sharing choice may play a role, for if the counterpart chose a burden sharing institution, the subject could be more likely to select a burden sharing institution as well. No covariate appears to be robust.

(Table 6)

Next, we look at the 21st round voting decision. Table 7 contains a series of probit models where the binary dependent variable is whether subjects initially choose a burden sharing institution (either ENDOLOW, ENDOMOD, ENDOHIGH) or ENDOBASE in the voting session before this final round. Included in the personal characteristic covariates are the previous voting decision (whether voted for a burden sharing institution or ENDOBASE) and the fraction of mutual cooperation by the pair from the first twenty rounds.[26]

Of the game-related explanatory variables, only the previous vote in the first twenty rounds appears to drive burden sharing selections and is robust to other covariates.

(Table 7)

[24] Figure 1 in Appendix B contains a breakdown of the institutions mutually selected by matched pairs for both voting sessions.

[25] Due to power concerns, the less coarse ordered logit model was not employed. (Long 1997)

[26] This is from Dal Bo et al (2010), finding that previous cooperation in a repeated PD game promotes selection of a modified coordination game. (vs. the same Prisoner's Dilemma)

Similar to table 6, in table 8 the binary dependent variable is the subject's final institution selection for the 21st round voting session. Now the previous vote effect appears to have dissipated and there is only slight evidence of personal characteristics playing a role.

(Table 8)

4.2 Aggregate and Non-Parametric Pair Analysis of Performance

Table 9 contains the aggregate pairwise descriptive statistics across all EXO and ENDO sessions and a breakdown of behavior between pairs that coordinated on ENDOBASE vs. pairs that miscoordinated. Mentioned previously, there is no statistically discernible difference in policy selections between these two groups. Hence, the ENDOBASE data is aggregated for the rest of this paper. Table 10 contains p-values from the Wilcoxon rank-sum test that compares differences in the fraction of cooperation among different institutions for the first twenty rounds. Cooperation levels in ENDOHIGH appear to be unique as compared to the other endogenously chosen institutions. This is akin to the imposed institutions tested previously where EXOHIGH was the only institution that consistently generated differences in the repeated game section. Lastly, there is little nonparametric evidence that the voting mechanism drives cooperation in the first twenty rounds except for the ENDOMOD institution.

(Tables 9 and 10)

For the 21st round, table 11 contains p-values from the Fisher exact test comparing differences in the binomial distributions of individual Prevention selections. There is no evidence of selection differences between the imposed vs. the endogenously chosen institutions.

(Table 11)

Next is pair earnings efficiency. Table 12 contains p-values from the Wilcoxon rank-sum test comparing differences in pair efficiency[27] among different institutions for the first twenty rounds. There is evidence of differences between the imposed vs. the endogenously selected Low, Moderate, and High Burden Sharing institutions. The pairwise efficiency nonparametric results for the 21st round are in Table 13.[28] Here is some evidence of earnings differences

[27] Pair efficiency for the first 20 rounds is calculated as the aggregate earnings for a matched pair minus the mutual defection earnings. (200 tokens for 20 rounds of {Defense, Defense}) This resultant number is divided by 160, which is the maximum aggregate matched pair earnings minus the mutual defection earnings.

[28] Pair efficiency for round 21 is calculated as the aggregate earnings for a matched pair minus the defection earnings. (100 tokens for 21st round of {Defense, Defense}) This resultant number is divided by 80, which is the maximum aggregate matched pair earnings minus the defection earnings.

between EXOBASE and ENDOBASE, but no evidence of differences in earnings efficiency among the other institutions.

(Tables 12 and 13)

These non-parametric results provide mixed support for the alternative hypothesis that endogenous selection will drive pro-social behavior. However, this appears conditional on whether the setting is repeated or one-shot and on the specific institution.[29] Next is an econometric analysis to account for the past institutions, policy selection history, personal characteristics, potential interaction effects, and to account for endogenous covariates (self-selection) to determine if endogenous selection does indeed matter.

4.3 Econometric Analysis of Performance

4.3.1 Analysis of Rounds 1-20

Table 14 contains the results of a cross-sectional OLS model where fraction of cooperation is the dependent variable.[30] These are similar results as Kass et al (2013) where statistically only the repeated High Burden Sharing game drove cooperative play beyond the Baseline repeated game. This was alluded to by the non-parametric results presented earlier. As a measure of economic performance, table 15 contains cross-sectional OLS regression results on pairwise efficiency. The results in tables 14 and 15 find that endogenous institution selection appears to be robust negative driver pro-social behavior and outcomes. This negative effect is also robust to personal traits.

(Tables 14 and 15)

4.3.2 Analysis of Round 21

In this experiment, one can view the 21st round as a one shot Prisoner's Dilemma with experienced subjects who are experienced in the implications of policy choices and experienced in the implications of the different institutional effects. Hence history may play a role. Table 16 contains a series of probit models where the dependent variable is whether the subject selected the Prevention policy. (Prevention vs. Defense or Take No Action) Using the individual Prevention selections is still representative of the primary research question and there were no instances of mutual cooperation in the 21st round under ENDOBASE and ENDOLOW. Endogenous institution selection only appears to drive Prevention settings (at the 10% level)

[29] Nonparametric results are not meaningfully changed when incorporating only players from pairs that mutually selected the Baseline game.

[30] Fraction of Cooperation = Instances of Mutual Prevention / 20

when personal traits are controlled for. Previous levels of cooperative behavior are a strong predictor of Prevention selections, which supports previous findings found in Kass et al (2013).

(Table 16)

Table 17 is a collection of bivariate probit models (Greene (2012)). The bivariate model is useful here for it accounts for potential self-selection concerns since cooperative subjects may select institutions that most induce cooperation. The selected institution in the 21st round, treated as exogenous in previous tables, may be partially endogenous for the previous history in in the first twenty rounds may drive burden sharing institution selection. The bivariate model accounts for this. Of importance here are the p-values from the Wald test. This examines how much of the Prevention selection effect from a specific institution can be attributed to the predictors that determine institution selection. Since these p-values are larger than 0.22, there is little evidence of an underlying self-selection issue in the 21st round Prevention selections.

(Table 17)

To determine if endogenous selection drives economic performance, table 18 contains cross-sectional OLS regression models where the dependent variable is the 21st round earnings efficiency. Endogenous selection is a strong negative predictor for pair earnings efficiency. Pair earnings are estimated to drop by approximately 20% when the institution was selected in the 21st round vs. imposed.

(Table 18)

5. Discussion

From the proceeding results section, Dal Bo's conjecture appears to hold. There are 2 questions this section will delve into. First, why do we see weak positive support of endogenous choice for Prevention selections but a strong negative effect for earnings efficiency in the 21st round? Second, why is the endogeneity premium contingent on the availability of institutions with different equilibrium predictions in the choice set?

As an answer to the first question, from the 21st round raw data, 72.2% of subject pairs that mutually selected burden sharing institutions contained members that appeared to use the repeated voting mechanism to encourage their counterparts to cooperate, but defected themselves. Only 42.6% of subject pairs contained {Prevention, Defense} outcomes in the imposed settings. Therefore, the voting mechanism in this experiment may have been a tool leveraged by subjects to attain temptation payoff in the NPD.

Before tackling the second question, it would be helpful to discuss why endogenous selection promotes pro-social behavior at all. I propose that endogenous selection alters a subject's trustworthiness preferences, which in turn, increases the willingness of subjects to trust within the context of the institution. The democratic process meets a key criterion for legitimacy since it's viewed as procedurally fair. (see Tyler (2006) for a discussion on institution legitimacy) Specifically, the democratic process is "legitimate" because it is interpretable/ understandable and democratic mechanism is viewed as a "fair" method to create rules for society. Psychological research finds that when people are exposed to institutions that are procedurally fair, they behave in a manner more beneficial to the collective group. For instance, Tyler et al (2000) find that procedural fair workplaces "encourage more general actions on behalf of the group". In the field, Baldassarri et al (2011) find that Ugandan farmers playing a VCM game will view a democratically selected sanctioning monitor as more legitimate versus a sanctioning monitor chosen by random. These farmers act more pro-socially under the auspices of the democratically selected monitor.

The natural next question is why legitimacy drives pro-social play? Legitimacy drives cooperative behavior by altering the preferences for trustworthiness. Bohnet et al (2007) describes trustworthiness as a belief that the situation deserves to be trusted for the benefit for all in the future. Kramer (1999) expounds on trust itself by stating "trust needs to be conceptualized not only as a calculative orientation toward risk, but also a social orientation toward other people and toward society as a whole." Another explanation is from Rousseau et al (1998) that trust is "a psychological state comprising the intention to accept vulnerability based on positive expectations of the intentions or behavior or another." Given these descriptions of the impact of legitimacy on trust/trustworthiness, it is a minor step of logic to see that people may be willing to trust and be more trustworthy when interacting in settings/institutions viewed as "legitimate".

Back to the second questions, why is this effect absent in this paper? One reason could be that subjects view the repeated voting mechanism as cheap talk. Mentioned earlier, Kroll et al (2007) tested a voting mechanism that is nothing more than cheap talk in a VCM setting, finding no relationship of nonbinding votes to public good contributions. The vote may need to be viewed as consequential in order to drive this pro-social behavior in subjects. Given that each institutional setting tested is a PD, subjects may have viewed the vote as ultimately

inconsequential. Since subjects may have never felt the institution was legitimate, there was no adjustment of trustworthiness, leaving some subjects to view the institution only on its own terms and not as a product of interactions in a "fair" collective choice mechanism.

6. Conclusion

Previous literature has suggested that economic settings that are selected vs. imposed may promote efficient policy selection. In this paper, I test the effect of endogenous selection on the ability of subjects to coordinate on socially efficient policies. From previous research, I conjectured that institution selection would not drive pro-social behavior as compared to the imposed institution. This test fails to reject this hypothesis. Paired subjects who are experienced with the collective choice mechanism, the NPD, and burden sharing do not behave more pro-socially. In fact, by giving subjects the opportunity to select an institution, they appear to select policies that are individually self-serving and hurt aggregate social welfare as compared to subjects without the institution selection opportunity.

More generally, this paper indicates that the notion of an "endogeneity premium" (Dal Bo 2010) is fairly conditional. Cooperation may be heightened in democratically selected institutions, but multiple aspects may come into play. One necessary piece for this effect may be that institutions that align individual and social incentives must be present in the choice set. Another may be the design of the collective choice mechanism, especially a collective choice mechanism that cannot be viewed as cheap talk given the institutions in the choice set.

Reference

Andreoni J, Varian H (1999) Preplay contracting in the Prisoner's Dilemma. Proceedings of the National Academy of Sciences 96: 10933-10938.

Arce DG, Sandler T (2005) Counterterrorism: A Game-Theoretic Analysis. Journal of Conflict Resolution 49:183-200. doi: 10.1177/0022002704272863

Arce DG, Bakshi S, Croson RTA, Eckel C, Fatas E, Kass M (2011) Counterterror Strategies in a Lab. Public Choice 149: 465-478. doi: 10.1007/s11127-011-9884-x

Baldassarri D, Grossman G (2011) Centralized sanctioning and legitimate authority promote cooperation in humans. Proceedings of the National Academy of Sciences 27(108): 11023-11027

Bischoff, I (2007) Institutional choice versus communication in social dilemmas - An experimental approach. Journal of Economic Behavior & Organization 62, 20-36.

Bohnet I, Baytelman Y (2007) Institutions and Trust: Implications for Preferences, Beliefs and Behavior. Working paper 1-44

Botelho A, Harrison GW, Costa Pinto LM, Rutstrom EE (2005) Social Norms and Social Choice. Working paper.

Carpenter, JP (2000) Negotiation in the Commons: Incorporating Field and Experimental Evidence into a Theory of Local Collective Action, Journal of Institutional and Theoretical Economics 156: 661-683.

Charness G, Frechette G, Qin CZ (2007) Endogenous transfers in the Prisoner's Dilemma game: An experiment test of cooperation and coordination. Games and Economic Behavior 60: 287-306.

Dal Bo' P (2012) Experimental Evidence of the Workings of Democratic Institutions. Working paper: 1-35.

Dal Bo' P, Foster A, Putterman L (2010) Institutions and Behavior: Experimental Evidence on the Effects of Denocracy. American Economic Review 100: 2205-2229

Fischbacher U (2007) z-Tree: Zurich toolbox for ready-made economic experiments. Experimental Economics, 10, No. 2. 171-178, doi:10.1007/s10683-006-9159-4

Frey, BS (1998) Institutions and Morale: The Crowding-out Effect. Economics, Values, and Organization, ed. Avner Ben-Ner and Louis Putterman, 437–60. New York: Cambridge University Press.

Frey BS, Benz M, Stutzer A (2004) Introducing Procedural Utility: Not Only What, but Also How Matters. Journal of institutional and Theoretical Economics 160: 337-401.

Greene, W. H. (2012) Econometric Analysis. 7th ed. Upper Saddle River, NJ: Prentice Hall.

Greiner B (2004) An Online Recruitment System from Economic Experiments. Forschung und Wissenschaftliches Rechnen 63: 79-93.

Kass M, Fatas E, Eckel C, and Arce DG (2013) The UN in a Lab. Forthcoming in Social Choice and Welfare. http://ssrn.com/abstract=2248255

Kosfeld M, Okada A, Riedl A (2009) Institution Formation in Public Goods Games. American Economic Review 99(4) 1335-1355.

Kramer R, (1999) Trust and Distrust in Organizations: Emerging Perspectives, Enduring Questions," Annual Revew of Psychology, 50, 569-598.

Kroll A, Cherry T, Shogren J (2007) Voting, Punishment, and Public Goods. Economic Inquiry 45(3), 557-570.

Long, JS (1997) Regression Models for Categorical and Limited Dependent Variables. Sage Publications, London

Olson M (1965) The Logic of Collective Action: Public Goods and the Theory of Groups. Harvard University Press, Cambridge

Pommerehne WW, Weck-Hannemann H (1996) Tax rates, tax administration and income tax evasion in Switzerland. Public Choice 88, 161-170.

Qin, CZ (2005) Penalties and Rewards as Inducements to Cooperate. Working paper, UCSB.

Rousseau D, Sitkin S, Burt R, Camerer C (1998) Not so different after all : A cross-discipline view of trust. Academy of Management Review 23, 393-404.

Sutter M, Haigner S, Kocher MG (2010) Choosing the Carrot or the Stick? Endogenous Institutional Choice in Social Dilemma Situations. Review of Economic Studies, 1540-1566.

Tsebelis G (1990) Nested Games. Berkeley: University of California Press.

Tyler, T (2006) Psychological Perspectives on Legitimacy and Legitimation, Annual Review of Psychology 57: 375-400.

Tyler, T.R., and Blader, S. (2000). Cooperation in groups: Procedural justice, social identity, and behavioral engagement. Philadelphia, Pa.: Psychology Press

Tyran JR, Feld LP (2006) Achieving Compliance when Legal Sanctions are Non-deterrent. Scandinavian Journal of Economics 108(1), 135-156.

von Neumann J, Morgenstern O (1944) The Theory of Games and Economic Behavior, Princeton University Press: Princeton.

Zelmer, J. (2003) Linear public goods experiments: A meta-analysis. Experimental Economics, 6 (3), 299-310.

Table 1: Baseline

	Prevention	Take No Action	Defense
Prevention	9,9	5,11	1,13
Take No Action	11,5	7,7	3,9
Defense	13,1	9,3	5,5

Table 2: NPD Games with Burden Sharing

A. Low Burden Sharing

	Prevention	Take No Action	Defense
Prevention	9,9	6,10	2,12
Take No Action	10,6	7,7	3,9
Defense	12,2	9,3	5,5

B. Moderate Burden Sharing

	Prevention	Take No Action	Defense
Prevention	9,9	7,9	3,11
Take No Action	9,7	7,7	3,9
Defense	11,3	9,3	5,5

C. High Burden Sharing

	Prevention	Take No Action	Defense
Prevention	9,9	8,8	4,10
Take No Action	8,8	7,7	3,9
Defense	10,4	9,3	5,5

Figure 1: Convex Hull of the Baseline nested PD^2 game
{Player i's payoff, Player j's payoff}

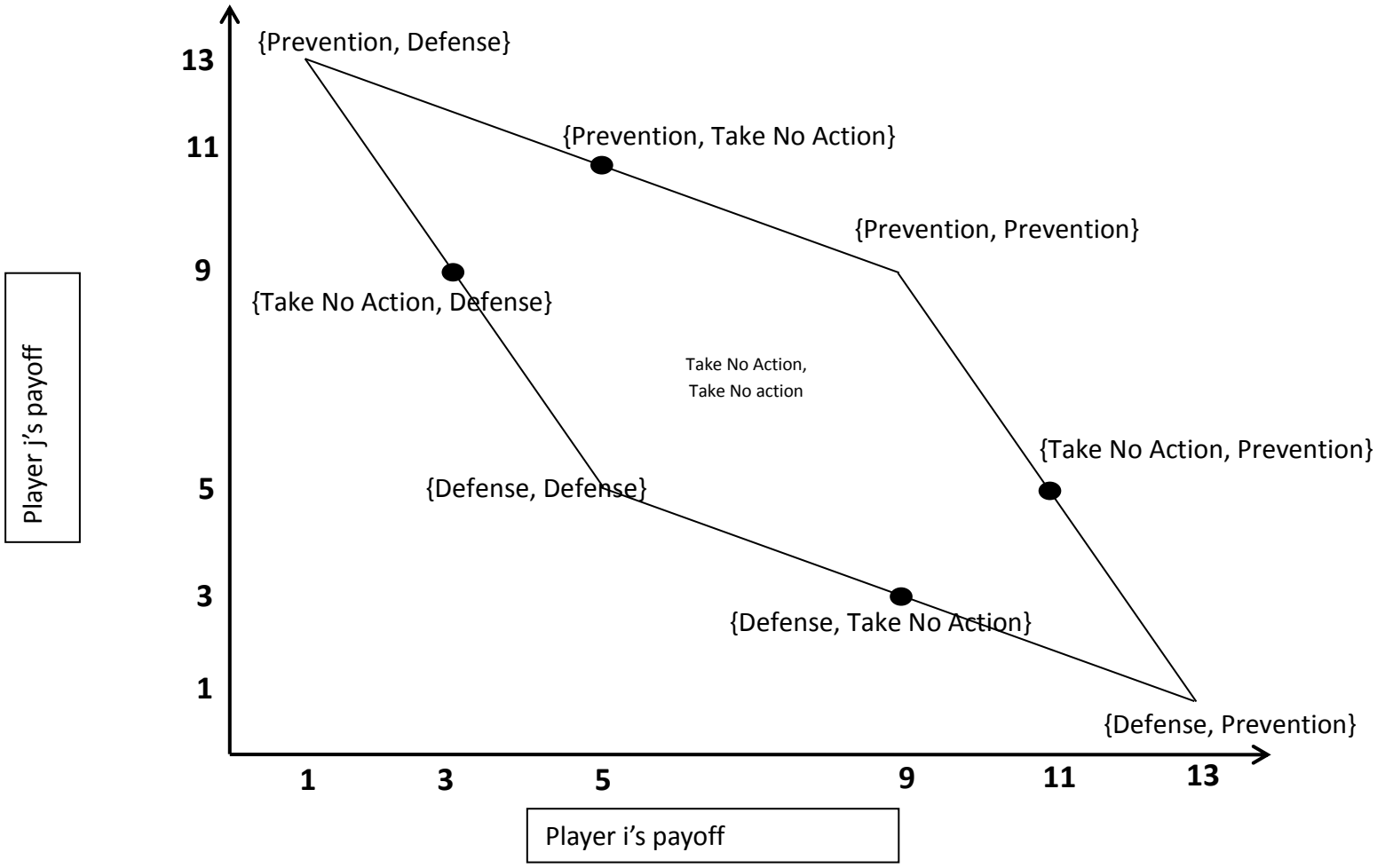

Figure 2: Convex Hull of the Nested PD^2 game with Symmetric Burden Sharing: {Player i's payoff, Player j's payoff}

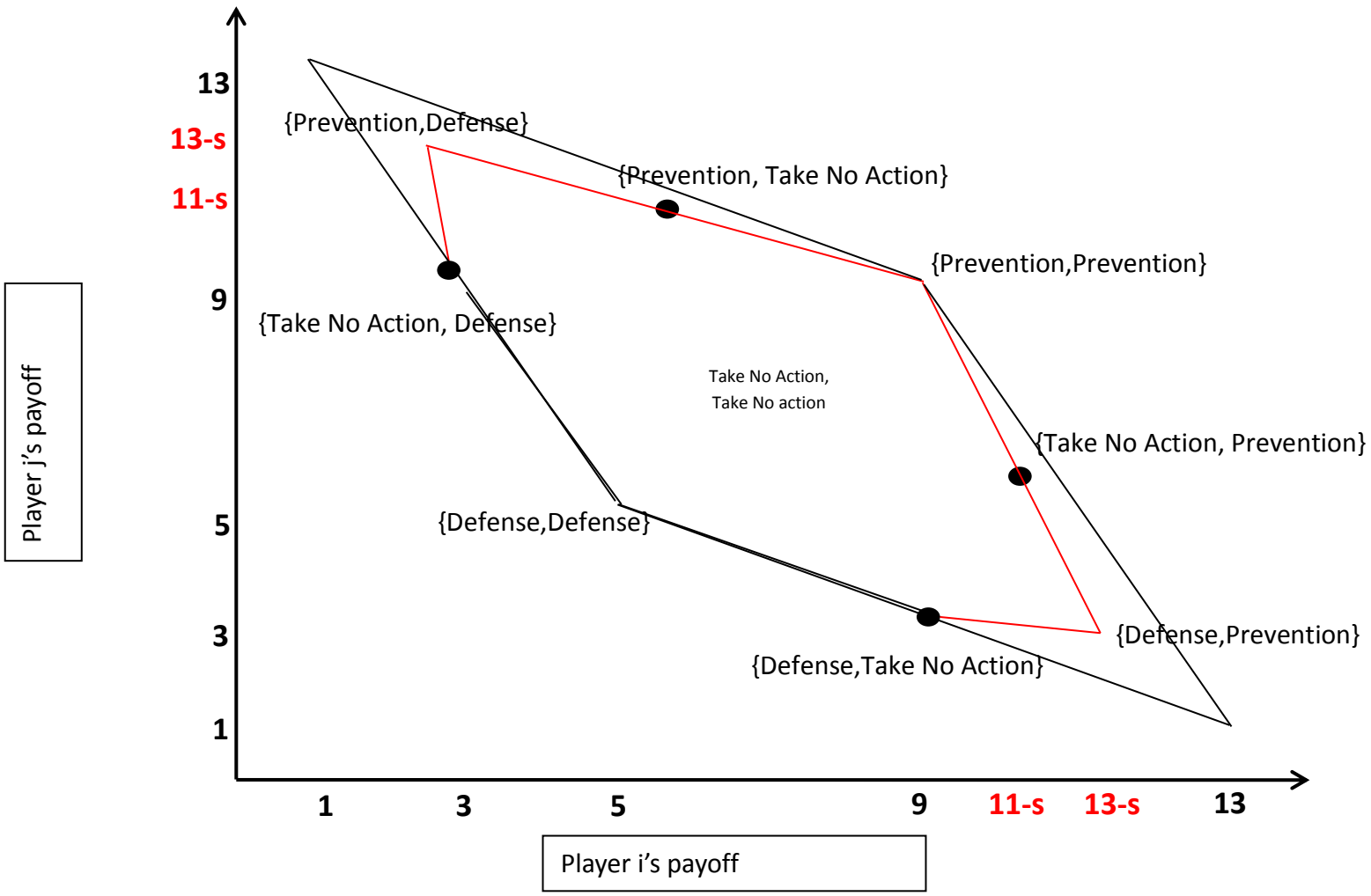

Figure 3: Experimental Design

	Burden Sharing Institution			
Exo or Endo	Baseline	Low Burden Sharing	Moderate Burden Sharing	High Burden Sharing
Exogenous[a]	EXOBASE	EXOLOW	EXOMOD	EXOHIGH
Endogenous	ENDOBASE[b]	ENDOLOW	ENDOMOD	ENDOHIGH

[a]Data from the imposed burden sharing treatments from Kass et al (2013)

[b]Data from ENDOBASE include pairs of subjects that were unable to coordinate on an specific institution and those pairs that mutually selected the Baseline game.

Table 3: Descriptive Statistics, Rounds 1, 1-20, and 21[a,b]

	EXO BASE	ENDO BASE	EXO LOW	ENDO LOW	EXO MOD	ENDO MOD	EXO HIGH	ENDO HIGH
Round 1								
Subjects	34	18	36	18	36	16	36	12
Pairs	17	9	18	9	18	8	18	6
Observations	34	18	36	18	36	16	36	12
Prevention	55.88%	38.9%	63.89%	33.3%	69.44%	50.0%	88.89%	75.0%
Take No Action	29.41%	16.7%	11.11%	16.7%	8.33%	18.8%	2.78%	8.3%
Defense	14.71%	44.4%	25.00%	50.0%	22.22%	31.2%	8.33%	16.7%
Average Profit	7.82	6.88	7.78	6.67	7.94	7.34	8.61	8.33
	(3.31)	(4.20)	(3.35)	(3.61)	(2.64)	(2.85)	(1.46)	(1.50)
Rounds 1-20								
Subjects	34	18	36	18	36	16	36	12
Pairs	17	9	18	9	18	8	18	6
Observations	680	360	720	360	720	320	720	240
Prevention	55.6%	31.1%	54.2%	27.8%	72.1%	42.2%	89.3%	84.6%
Take No Action	7.7%	10.0%	11.1%	13.6%	3.3%	9.4%	1.3%	7.5%
Defense	36.8%	58.9%	34.7%	58.6%	24.6%	48.4%	9.4%	7.9%
Average Total Profit	147.5	128.9	147.8	127.7	159.0	137.5	171.9	170.7
	(31.98)	(31.29)	(30.68)	(21.03)	(26.31)	(26.23)	(16.53)	(15.93)
Average Round Profit	7.38	6.44	7.39	6.38	7.95	6.88	8.60	8.53
	(2.78)	(2.85)	(2.52)	(2.69)	(2.14)	(2.61)	(1.33)	(1.43)
Round 21								
Subjects	34	28	36	10	36	8	36	18
Pairs	17	14	18	5	18	4	18	9
Observations	34	28	36	10	36	8	36	18
Prevention	26.47%	7.1%	11.11%	20%	38.89%	37.5%	69.44%	55.6%
Take No Action	5.88%	0%	11.11%	0%	0%	0%	0%	0%
Defense	67.65%	92.9%	77.78%	80%	61.11%	62.5%	30.56%	44.4%
Average Profit	61.76	52.9	56.67	54.0	65.56	65.0	77.78	72.2
	(46.48)	(24.2)	(29.08)	(20.7)	(32.82)	(38.2)	(24.62)	(29.8)

[a]Standard deviations are in parenthesis.

[b]Profit values are without the $5 show up fee and are in tokens, where in this experiment, subjects earning 10 tokens per USD

Figure 4: Fraction of Prevention Selections per Round: ENDO vs. EXO

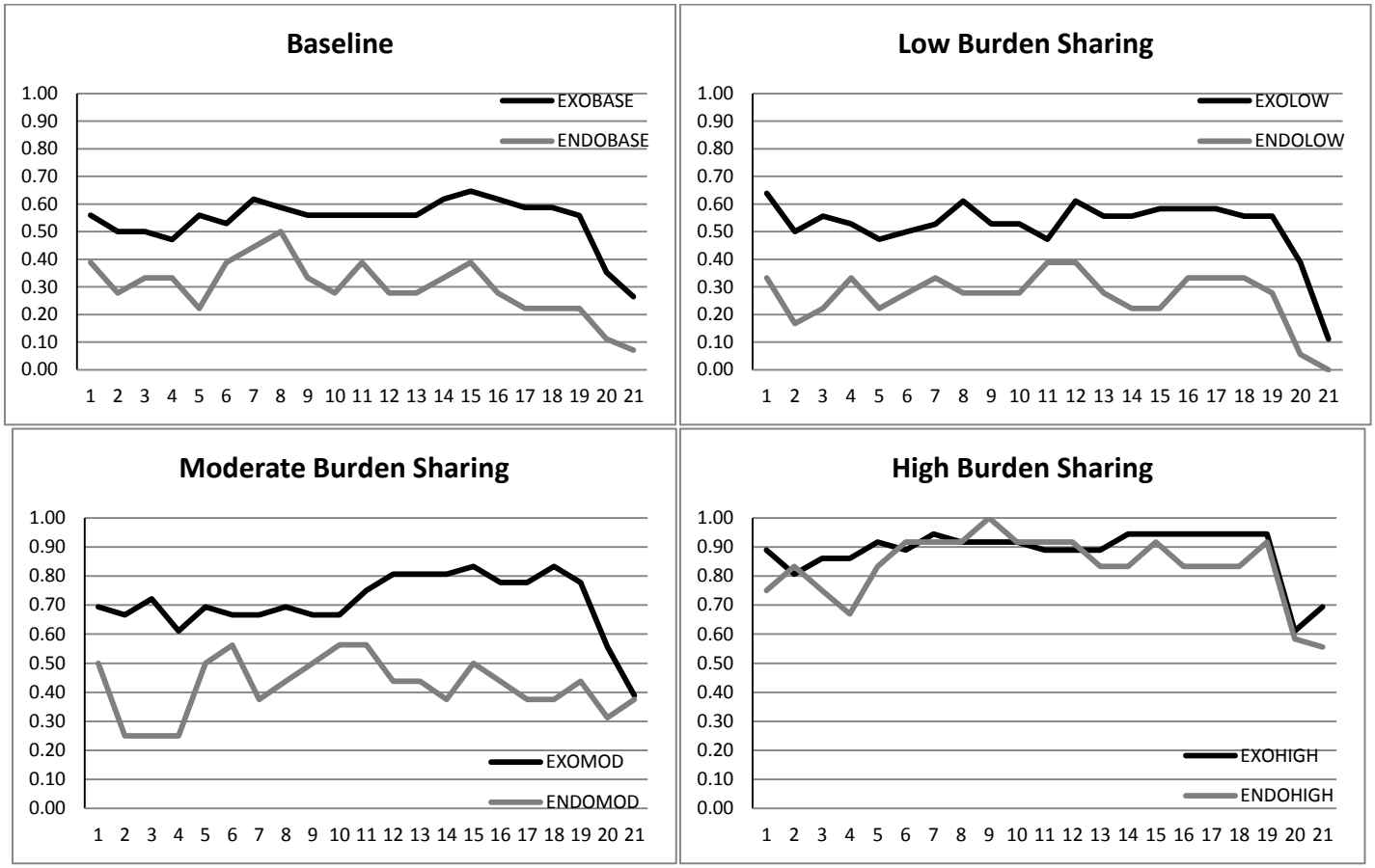

Table 4: Baseline Descriptive Statistics, Rounds 1, 1-20, and 21

	EXOBASE	ENDOBASE Total	ENDOBASE Coordinate	ENDOBASE Miscoordinate
Round 1				
Subjects	34	18	10	8
Pairs	17	9	5	4
Observations	34	18	10	8
Prevention	55.88%	38.9%	40%	37.5%
Take No Action	29.41%	16.7%	10%	25%
Defense	14.71%	44.4%	50%	37.5%
Average Profit	7.82 (3.31)	6.88 (4.20)	6.80 (4.67)	7.00 (2.14)
Rounds 1-20				
Subjects	34	18	10	8
Pairs	17	9	5	4
Observations	680	360	200	160
Prevention	55.59%	31.1%	18.5%	46.9%
Take No Action	7.65%	10.0%	7.5%	13.1%
Defense	36.76%	58.9%	74.0%	40.0%
Average Total Profit	147.53 (31.98)	128.9 (31.29)	117.8 (23.9)	142.8 (35.3)
Average Round Profit	7.38 (2.78)	6.44 (2.85)	5.89 (2.69)	7.14 (2.90)
Round 21				
Subjects	34	28	18	10
Pairs	17	14	9	5
Observations	34	28	18	10
Prevention	26.47%	7.1%	5.6%	10%
Take No Action	5.88%	0%	0%	0%
Defense	67.65%	92.9%	94.4%	90%
Average Profit	61.76 (46.48)	52.9 (24.2)	65.77 (43.1)	65.8 (42.9)

Standard deviations are in parenthesis.

Figure 5: Rd 1-20 First Share Choices vs. Rd 21 First Share Choices

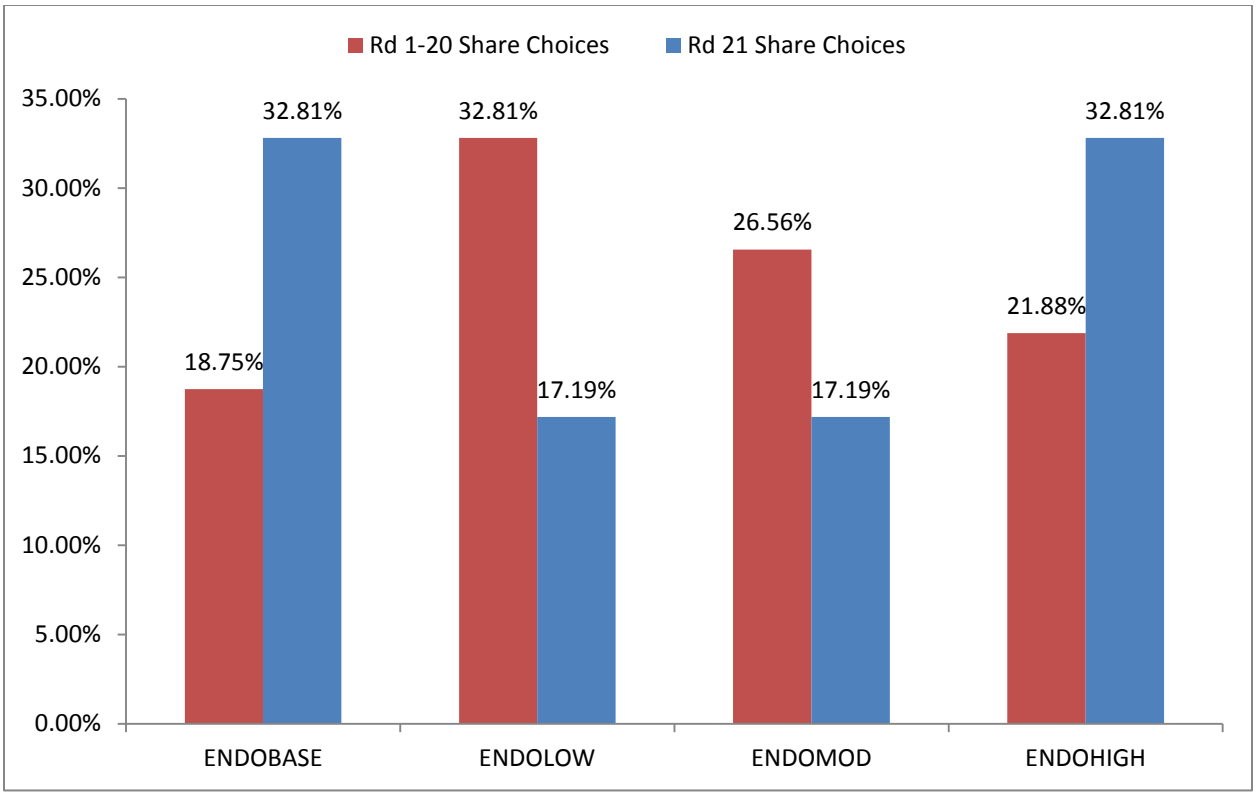

Table 5: Determinants of Initial Burden Sharing selection for Rounds 1-20, Dependent Variable: if burden sharing institution selected, Probit Model, Marginal Effect Shown[a]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
AGE	-0.0300								-0.0403
	(0.0185)								(0.0292)
FEMALE		0.0411							0.0279
		(0.103)							(0.0996)
WHITE			-0.0985						-0.0796
			(0.102)						(0.0991)
RELIGIOSITY				0.0665					0.0603
				(0.0647)					(0.0685)
ISOLATIONIST					-0.146				-0.138
					(0.104)				(0.0982)
RISKY						-0.0392			-0.0204
						(0.0260)			(0.0278)
FOCUS ON SELF							0.0284		0.0364
							(0.0211)		(0.0230)
US CITIZEN								0.0040	-0.146
								(0.148)	(0.223)
Log Likelihood	-32.28	-33.54	-33.17	-33.10	-32.71	-32.53	-32.75	-33.62	-28.60
AIC	68.56	71.08	70.33	70.19	69.2	69.06	69.49	71.24	75.20
McFadden Adj R^2	-0.020	-0.033	-0.057	-0.044	-0.032	-0.027	-0.033	-0.059	-0.118
Observations	64	64	64	64	64	64	64	64	64

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[a]AGE is the subject's age, FEMALE is a dummy if the subject is female. WHITE is a dummy whether the subject classifies him or herself as white or Caucasian, RELIGIOUSITY is a measure of the number of times a subject attends worship services. (Scale of 1 to 4) ISOLATIONIST world view is a dummy variable on whether the subject agreed with the following statement, "This country would be better off if we just stayed home and did not concern ourselves with problems in other parts of the world.", RISKY is a variable whose values come from a 10 point Likert scale from the following question, "How do you see yourself? Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?" Larger values are if the subject believes that herself is a risk taker. Similarly, FOCUS ON SELF is a variable from a 10 point Likert scale from the following question, "How do you see yourself? Do you generally donate a great deal of time or money to help others or do you focus primarily on taking care of yourself and your family?" Higher values indicated that the subject focuses on herself and her family more than others. US CITIZEN is a dummy indicating if the subject is a US citizen.

Table 6: Determinants of Burden Sharing selection for Rounds 1-20, Dependent Variable: if burden sharing institution selected. Probit Model, Marginal Effect Shown[a]

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1st Counterpart BS	0.159***									0.212
	(0.0436)									(0.417)
AGE		-0.0318								-0.00885
		(0.0208)								(0.0747)
FEMALE			0.0201							0.0515
			(0.148)							(0.173)
WHITE				-0.273*						-0.258
				(0.140)						(0.284)
RELIGIOSITY					0.0846					0.0348
					(0.0905)					(0.113)
ISOLATIONIST						-0.253**				-0.273
						(0.120)				(0.607)
RISKY							-0.0447			0.00414
							(0.0365)			(0.0895)
FOCUS ON SELF								0.0161		-0.0378
								(0.0309)		(0.163)
US CITIZEN									0.256	0.195
									(0.176)	(0.341)
Log Likelihood	-12.782	-15.589	-16.801	-15.060	-16.375	-15.055	-16.091	-16.677	-15.911	-4.851
AIC	29.564	35.177	37.602	34.119	36.750	34.110	36.182	37.35	35.82	29.70
McFadden Adj R^2	0.121	-0.046	-0.118	-0.015	-0.093	-0.015	-0.076	-0.111	-0.065	0.117
Observations	32	32	32	32	32	32	32	32	32	32

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[a]1st Counterpart BS is whether the counterpart first chose a Burden sharing institution for this voting stage. AGE is the subject's age, FEMALE is a dummy if the subject is female. WHITE is a dummy whether the subject classifies him or herself as white or Caucasian, RELIGIOUSITY is a measure of the number of times a subject attends worship services. (Scale of 1 to 4) ISOLATIONIST world view is a dummy variable on whether the subject agreed with the following statement, "This country would be better off if we just stayed home and did not concern ourselves with problems in other parts of the world.", RISKY is a variable whose values come from a 10 point Likert scale from the following question, "How do you see yourself? Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?" Larger values are if the subject believes that herself is a risk taker. Similarly, FOCUS ON SELF is a variable from a 10 point Likert scale from the following question, "How do you see yourself? Do you generally donate a great deal of time or money to help others or do you focus primarily on taking care of yourself and your family?" Higher values indicated that the subject focuses on herself and her family more than others. US CITIZEN is a dummy indicating if the subject is a US citizen.

Table 7: Determinants of Initial Burden sharing selection for Round 21[b], Dependent Variable: if burden sharing institution selected, Probit Model, Marginal Effect Shown[a]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
PAST VOTE	0.374***	0.380***									0.304**
	(0.101)	(0.106)									(0.130)
% PAST COOP		-0.0276									0.0128
		(0.145)									(0.146)
AGE			-0.0174								-0.0070
			(0.0213)								(0.0250)
FEMALE				0.0868							0.101
				(0.112)							(0.110)
WHITE					-0.057						-0.0283
					(0.114)						(0.114)
RELIGIOSITY						-0.0559					-0.0473
						(0.0699)					(0.0748)
ISOLATIONIST							-0.190*				-0.100
							(0.113)				(0.119)
RISKY								-0.019			-0.0064
								(0.0281)			(0.0282)
FOCUS ON SELF									0.0310		0.0195
									(0.0232)		(0.0241)
US CITIZEN										0.0415	0.0309
										(0.161)	(0.182)
Log Likelihood	-34.47	-34.45	-38.582	-38.63	-38.80	-38.61	-37.66	-38.69	-38.07	-38.89	-32.85
AIC	72.939	74.903	81.165	81.266	81.601	81.231	79.338	81.40	80.15	81.783	87.72
McFadden Adj R^2	0.063	0.038	-0.043	-0.044	-0.048	-0.043	-0.019	-0.046	-0.030	-0.051	-0.127
Observations	64	64	64	64	64	64	64	64	64	64	64

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[b]PAST VOTE is a dummy variable indicating if the subject voted for a burden sharing institution or not for rounds 1 to 20. % PAST COOP is the percentage of mutual Prevention decisions from the subject's matched pair from rounds 1 to 20.

Table 8: Determinants of Burden Sharing selection for Round 21[b], Dependent Variable: if burden sharing institution selected, Probit Model, Marginal Effects Shown[a]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
PAST VOTE	0.418**	0.408*										0.374
	(0.210)	(0.212)										(0.288)
% PAST COOP		0.0646										0.176
		(0.212)										(0.195)
1st Counterpart BS			0.0802									0.0476
			(0.0611)									(0.106)
AGE				-0.0405								-0.0466
				(0.0248)								(0.0360)
FEMALE					-0.148							-0.0369
					(0.160)							(0.178)
WHITE						0.191						0.300
						(0.161)						(0.221)
RELIGIOSITY							-0.0455					-0.229*
							(0.107)					(0.128)
ISOLATIONIST								-0.135				-0.387*
								(0.177)				(0.218)
RISKY									-0.0174			0.0117
									(0.0440)			(0.0490)
FOCUS ON SELF										-0.0338		-0.089***
										(0.0343)		(0.0345)
US CITIZEN											0.352**	-0.0578
											(0.167)	(0.239)
Log Likelihood	-19.001	-18.955	-19.830	-19.280	-20.196	-19.96	-20.503	-20.316	-20.514	-20.140	-18.964	-12.689
AIC	44.42.002	43.909	43.659	44.560	44.392	43.909	45.006	44.632	45.029	44.280	41.928	49.379
McFadden Adj R^2	-0.020	-0.066	-0.060	-0.033	-0.078	-0.066	-0.093	-0.084	-0.093	-0.075	-0.018	-0.199
Observations	32	32	32	32	32	32	32	32	32	32	32	32

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[b]PAST VOTE is a dummy variable indicating if the subject voted for a burden sharing institution or not for rounds 1 to 20. % PAST COOP is the percentage of mutual Prevention decisions from the subject's matched pair from rounds 1 to 20. 1st Counterpart BS is whether the counterpart first chose a Burden sharing institution for this voting stage.

Table 9: Pairwise Descriptive Statistics, Rounds 1-20, and 21[a]

	EXO BASE	ENDO BASE[c]	ENDO BASE[c,d] (Coord)	ENDO BASE[c] (MisCoord)	EXO LOW	ENDO LOW	EXO MOD	ENDO MOD	EXO HIGH	ENDO HIGH
Rounds 1-20										
Fraction Coop	0.488	0.228	0.110	0.375	0.467	0.189	0.65	0.306	0.861	0.767
	(0.455)	(0.347)	(0.246)	(0.435)	(0.444)	(0.234)	(0.382)	(0.389)	(0.268)	(0.354)
Efficiency	0.594	0.361	0.223	0.534	0.597	0.345	0.738	0.469	0.899	0.883
	(0.382)	(0.356)	(0.277)	(0.406)	(0.376)	(0.260)	(0.327)	(0.327)	(0.206)	(0.196)
Round 21										
Prevention	0.265	0.071	0.056	0.100	0.111	0	0.389	0.375	0.694	0.556
	(0.448)	(0.262)	(0.236)	(0.316)	(0.319)	(0)	(0.494)	(0.518)	(0.467)	(0.511)
Rd 21	0.294	0.071	0.056	0.100	0.167	0.100	0.389	0.375	0.694	0.556
Efficiency	(0.238)	(0.182)	(0.167)	(0.223)	(0.210)	(0.137)	(0.323)	(0.250)	(0.304)	(0.167)

Standard deviations are in parenthesis.

"Fraction Coop" is the mean number of instances of cooperation (mutual Prevention) between a pair of matched subjects for rounds 1-20. "Efficiency" is the fraction of total earnings of a pair (for rounds 1 to 20) of matched subjects by the maximum earnings possible for a pair, normalized by the defection payoff of 200 tokens. (160 tokens in this case) "Prevention" is the fraction of Prevention instances in Round 21. "Rd 21 efficiency" is the faction of round 21 earnings of the pair of matched subjects by the maximum earnings possible for a pair. (180 tokens in this case) "ENDO BASE Coord" indicates that the data from this column are from instances where paired subjects selected (hence, coordinated) and interacted in the Baseline game. "ENDO BASE MisCoord" indicates that the data from this column are from instances where paired subjects selected different institutions (hence, miscoordinated) and interacted in the Baseline game

Table 10: Nonparametric results using Wilcoxon Rank Sum test, Aggregate cooperation fraction comparison for rounds 1 to 20, p-values shown

Exogenously selected Burden Sharing Institutions

	EXOBASE	EXOLOW	EXOMOD
EXOLOW	0.9595	-	-
EXOMOD	0.2910	0.2068	-
EXOHIGH	0.0156	0.0058	0.0538

Endogenously selected Burden Sharing Institutions

	ENDOBASE	ENDOLOW	ENDOMOD
ENDOLOW	0.5709	-	-
ENDOMOD	0.3484	0.8439	-
ENDOHIGH	0.0033	0.0105	0.0223

Across the Exogenous vs. the Endogenous Institutions

EXOBASE vs. ENDOBASE	0.1124
EXOLOW vs. ENDOLOW	0.2102
EXOMOD vs. ENDOMOD	0.0289
ENDOHIGH vs. ENDOHIGH	0.1112

Table 11: Nonparametric results using the Fisher Exact test, prevention occurrences comparison for round 21, p-values shown

Exogenously selected Burden Sharing Institutions

	EXOBASE	EXOLOW	EXOMOD
EXOLOW	No obs.	-	-
EXOMOD	0.486	0.243	-
EXOHIGH	0.003	0.003	0.060

Endogenously selected Burden Sharing Institutions

	ENDOBASE	ENDOLOW	ENDOMOD
ENDOLOW	0.538	-	-
ENDOMOD	0.061	0.069	-
ENDOHIGH	<0.001	0.003	0.336

Across the Exogenous vs. the Endogenous Institutions

EXOBASE vs. ENDOBASE	0.622
EXOLOW vs. ENDOLOW	0.605
EXOMOD vs. ENDOMOD	0.378
ENDOHIGH vs. ENDOHIGH	0.550

Table 12: Nonparametric results using Wilcoxon Rank Sum test, Pair earnings Efficiency for rounds 1 to 20, p-values shown

Exogenously selected Burden Sharing Institutions

	EXOBASE	EXOLOW	EXOMOD
EXOLOW	0.9471	-	-
EXOMOD	0.3609	0.2326	-
EXOHIGH	0.0207	0.0118	0.1454

Endogenously selected Burden Sharing Institutions

	ENDOBASE	ENDOLOW	ENDOMOD
ENDOLOW	0.8597	-	-
ENDOMOD	0.2892	0.7358	-
ENDOHIGH	0.0046	0.0032	0.0096

Across the Exogenous vs. the Endogenous Institutions

EXOBASE vs. ENDOBASE	0.0664
EXOLOW vs. ENDOLOW	0.0942
EXOMOD vs. ENDOMOD	0.0388
ENDOHIGH vs. ENDOHIGH	0.4112

Table 13: Nonparametric results using the Wilcoxon rank-sum test, pairwise efficiency comparison for round 21, p-values shown

Exogenously selected Burden Sharing Institutions

	EXOBASE	EXOLOW	EXOMOD
EXOLOW	0.1070		
EXOMOD	0.3758	0.0283	
EXOHIGH	0.0003	<0.0001	0.0051

Endogenously selected Burden Sharing Institutions

	ENDOBASE	ENDOLOW	ENDOMOD
ENDOLOW	0.3627	-	-
ENDOMOD	0.0201	0.0887	-
ENDOHIGH	0.0001	0.0008	0.1410

Across the Exogenous vs. the Endogenous Institutions

EXOBASE vs. ENDOBASE	0.0083
EXOLOW vs. ENDOLOW	0.6166
EXOMOD vs. ENDOMOD	1.0000
ENDOHIGH vs. ENDOHIGH	0.1616

Table 14: Fraction of Mutual Prevention (Fraction of Cooperation)
Rounds 1 to 20, estimated via OLS

Dependent Variable: Cooperation fraction	(1)	(2)	(3)	(4)
Low Burden Sharing	-0.024	-0.027	-0.022	-0.018
	[0.107]	[0.102]	[0.127]	[0.131]
Moderate Burden Sharing	0.146	0.136	0.162	0.169
	[0.108]	[0.103]	[0.127]	[0.134]
High Burden Sharing	0.439***	0.415***	0.373***	0.353***
	[0.110]	[0.106]	[0.127]	[0.129]
Endogenous Choice		-0.252***	-0.260*	-0.280*
		[0.080]	[0.155]	[0.159]
Low BS * EC[a]			-0.017	-0.040
			[0.218]	[0.222]
Mod BS * EC[a]			-0.083	-0.037
			[0.223]	[0.229]
High BS * EC[a]			0.166	0.177
			[0.236]	[0.240]
Personal Characteristics[b]	N	N	N	Y
Constant	0.398***	0.485***	0.488***	0.432
	[0.076]	[0.078]	[0.091]	[0.379]
R-squared	0.184	0.260	0.268	0.314
Adjusted R-squared	0.159	0.229	0.215	0.205
Observations	103	103	103	103

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

[a] Interaction effects are the endogenous treatment (Endogenous Choice) interacted with the individual Burden Sharing institutions. Low BS * EC is the low burden sharing institution interacted with the Endogenous Choice treatments. Mod BS * EC and High BS * EC are the interaction effects for the Moderate Burden Sharing and High Burden Sharing institutions.

[b] Personal Characteristics include AGE, FEMALE,WHITE, RELIGIOUSITY, ISOLATIONIST, RISKY, FOCUS ON SELF, and US CITIZEN and previously described in table 5. None were significant at the 10% level.

Table 15: Pairwise earnings efficiency (Efficiency)
Rounds 1 to 20, estimated via OLS

Dependent Variable: Efficiency	(1)	(2)	(3)	(4)
Low Burden Sharing	-0.000	-0.003	0.003	0.022
	[0.091]	[0.088]	[0.108]	[0.112]
Moderate Burden Sharing	0.141	0.134	0.143	0.158
	[0.092]	[0.089]	[0.108]	[0.114]
High Burden Sharing	0.382***	0.362***	0.305***	0.290***
	[0.094]	[0.091]	[0.108]	[0.109]
Endogenous Choice		-0.203***	-0.233*	-0.255*
		[0.068]	[0.132]	[0.134]
Low BS * EC[a]			-0.018	-0.042
			[0.186]	[0.187]
Mod BS * EC[a]			-0.036	0.018
			[0.190]	[0.194]
High BS * EC[a]			0.217	0.220
			[0.201]	[0.203]
Personal Characteristics[b]	N	N	N	Y
Constant	0.513***	0.584***	0.594***	0.488
	[0.065]	[0.067]	[0.078]	[0.322]
R-squared	0.182	0.250	0.265	0.332
Adjusted R-squared	0.157	0.219	0.210	0.216
Observations	103	103	103	103

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

[a] Interaction effects are the endogenous treatment (Endogenous Choice) interacted with the individual Burden Sharing institutions. Low BS * EC is the low burden sharing institution interacted with the Endogenous Choice treatments. Mod BS * EC and High BS * EC are the interaction effects for the Moderate Burden Sharing and High Burden Sharing institutions.

[b] Personal Characteristics include AGE, FEMALE,WHITE, RELIGIOUSITY, ISOLATIONIST, RISKY, FOCUS ON SELF, and US CITIZEN and previously described in table 5. FEMALE is significant and negative at the 10% level.

Table 16: Prevention Policy selections
Round 21, estimated via Probit discrete choice models, Marginal effects shown

Dependent Variable: Prevention Policy	(1)	(2)	(3)	(4)	(5)
Low Burden Sharing	-0.042	-0.055	-0.006	-0.001	0.073
	[0.084]	[0.086]	[0.105]	[0.119]	[0.128]
Moderate Burden Sharing	0.326***	0.304**	0.376***	0.393***	0.378***
	[0.122]	[0.126]	[0.144]	[0.140]	[0.130]
High Burden Sharing	0.575***	0.568***	0.597***	0.462***	0.538***
	[0.107]	[0.108]	[0.130]	[0.150]	[0.129]
Endogenous Choice		-0.068	0.034	0.102	0.316*
		[0.088]	[0.162]	[0.156]	[0.164]
Mod BS * EC[a]			-0.224	-0.117	-0.337
			[0.262]	[0.243]	[0.233]
High BS * EC[a]			-0.079	-0.028	-0.309
			[0.221]	[0.208]	[0.212]
Lag Cooperation Fraction[b]				0.318***	0.315***
				[0.094]	[0.088]
Personal Characteristics[d]	N	N	N	N	N
Log Likelihood	-50.28	-49.989	-49.29	-44.379	-36.260
AIC	111.56	111.98	116.54	108.76	108.52
McFadden' Adj R^2	0.163	0.152	0.088	0.149	0.150
Observations[a]	103	103	98	98	98

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

[a] Interaction effects are the endogenous treatment (Endogenous Choice) interacted with the individual Burden Sharing institutions. Mod BS * EC and High BS * EC are the interaction effects for the Moderate Burden Sharing and High Burden Sharing institutions. Interaction effects between the Low Burden Sharing institution and the Endogenous Choice treatment was not possible for there was no Prevention selections in the ENDOLOW environment.

[b] Lag Cooperation Fraction is the ratio of instances in a subject's previous pair divided by the number of mutual prevention opportunities, which here is 20.

[d]RELIGIOUSITY is negative and significant at the 1% level. RISKY is negative significant at the 5% level.

Table 17: Prevention Policy selections for Endogenous Choice data, Round 21, estimated via Bivariate Probit discrete choice models to account for selection effects, Marginal effects shown

Dependent Variable: Prevention Policy selection	(1)	(2)	(3)
PAST VOTE	0.263	0.230	-0.072
	[0.176]	[0.182]	[0.162]
Lag Coop Fraction		0.096	0.307**
		[0.196]	[0.144]
Personal Characteristics	N	N	Y
rho	0.423	0.409	0.221
	[0.308]	[0.300]	[0.376]
Wald test p-value	0.229	0.227	0.538
AIC	80.06	83.79	101.12
Observations	32	32	32

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 18: Pairwise earning efficiency
Round 21, estimated via OLS

Dependent Variable: Round 21 Efficiency	(1)	(2)	(3)	(4)	(5)
Low Burden Sharing	-0.041	-0.073	-0.127	-0.125	-0.125
	[0.070]	[0.069]	[0.084]	[0.082]	[0.084]
Moderate Burden Sharing	0.193***	0.156**	0.095	0.086	0.045
	[0.071]	[0.071]	[0.084]	[0.082]	[0.083]
High Burden Sharing	0.455***	0.438***	0.400***	0.341***	0.337***
	[0.067]	[0.066]	[0.084]	[0.086]	[0.087]
Endogenous Choice		-0.137**	-0.223**	-0.206**	-0.205**
		[0.054]	[0.090]	[0.088]	[0.093]
Low BS * EC[a]			0.156	0.172	0.137
			[0.155]	[0.151]	[0.153]
Mod BS * EC[a]			0.209	0.266	0.216
			[0.165]	[0.162]	[0.168]
High BS * EC[a]			0.084	0.121	0.100
			[0.136]	[0.133]	[0.141]
Lag Cooperation Fraction[b]				0.153**	0.144**
				[0.063]	[0.063]
Personal Characteristics[d]	N	N	N	N	Y
R-squared	0.389	0.426	0.437	0.471	0.526
Adjusted R-squared	0.370	0.402	0.396	0.426	0.438
Observations	103	103	103	103	103

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

[a]Lag Cooperation Fraction is the ratio of instances in a subject's previous pair divided by the number of mutual prevention opportunities, which here is 20.

[b]Previous Institution are dummy variables for the institution that the subject interacted in from rounds 1 to 20. Not significant at the 10% level.

[b]RELIGIOUSITY is negative and significant at the 10% level. RISKY is negative significant at the 1% level.

[C]Interaction effects between the endogenous treatment and the burden sharing institutions cannot be performed due to no subject pairs selecting to interact in the Moderate Burden Sharing treatment and other colinearity issues.

Appendix B Endo Cost Share

Table 1': Rds 1-20, Subject pool personal characteristics[a,b]

	EXO BASE	EXO LOW	EXO MOD	EXO HIGH	ENDO BASE	ENDO LOW	ENDO MOD	ENDO HIGH	P-value	test
Number	34	36	36	36	18	18	16	12		
AGE	20.4	19.8	20.0	20.3	21.2	19.8	20.1	20.7	0.29	K
FEMALE	32%	44%	47%	33%	50%	50%	68.8%	50%	0.30	F
WHITE	44%	22%	33%	39%	66.7%	44.4%	50%	50%	0.09	F
RELIGIOSITY	1.26	1.06	1.00	1.17	1.44	1.5	1.25	1.42	0.48	K
ISOLATIONIST	15%	22%	25%	28%	50%	27.8%	12.5%	16.7%	0.23	F
RISKY	6.32	6.75	6.17	6.64	6.72	6.83	6.25	6.33	0.96	K
FOCUS ON SELF	5.59	6.22	6.17	5.78	5.06	4.89	6.44	6.33	0.32	K
US CITIZEN	82%	69%	83%	83%	83%	83%	88%	92%	0.77	F

Table 2': Rd 21, Subject pool personal characteristics[a,c]

	EXO BASE	EXO LOW	EXO MOD	EXO HIGH	ENDO BASE	ENDO LOW	ENDO MOD	ENDO HIGH	P-value	test
Number	34	36	36	36	28	10	8	18		
AGE	20.4	19.8	20.0	20.3	20.9	20.1	19.8	20.1	0.51	K
FEMALE	32%	44%	47%	33%	53.6%	60%	62.5%	50%	0.41	F
WHITE	44%	22%	33%	39%	35.7%	60%	62.5%	72.2%	0.02	F
RELIGIOSITY	1.26	1.06	1.00	1.17	1.64	1.7	1.0	1.1	0.07	K
ISOLATIONIST	15%	22%	25%	28%	35.7%	30%	25%	17%	0.68	F
RISKY	6.32	6.75	6.17	6.64	6.93	6.4	6.75	6.44	0.95	K
FOCUS ON SELF	5.59	6.22	6.17	5.78	5.39	4.90	5.125	6.50	0.47	K
US CITIZEN	82%	69%	83%	83%	86%	80%	83%	83%	0.65	F

* F for Fisher Exact test, K for Kruskal-Wallis test

[a] AGE is the subject's age, FEMALE is a dummy if the subject is female. WHITE is a dummy whether the subject classifies him or herself as white or Caucasian, RELIGIOUSITY is a measure of the number of times a subject attends worship services. (Scale of 1 to 4) ISOLATIONIST world view is a dummy variable on whether the subject agreed with the following statement, "This country would be better off if we just stayed home and did not concern ourselves with problems in other parts of the world.", RISKY is a variable whose values come from a 10 point Likert scale from the following question, "How do you see yourself? Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?" Larger values are if the subject believes that herself is a risk taker. Similarly, FOCUS ON SELF is a variable from a 10 point Likert scale from the following question, "How do you see yourself? Do you generally donate a great deal of time or money to help others or do you focus primarily on taking care of yourself and your family?" Higher values indicated that the subject focuses on herself and her family more than others. US CITIZEN is a dummy indicating if the subject is a US citizen.

[b] Subjects in the endo sessions where classified by the institutions played in the first 20 rounds.

[c] Subjects in the endo sessions where classified by the institutions played in the 21st round.

Figure 1': Voting Coordination for the 1st and 2nd voting decisions

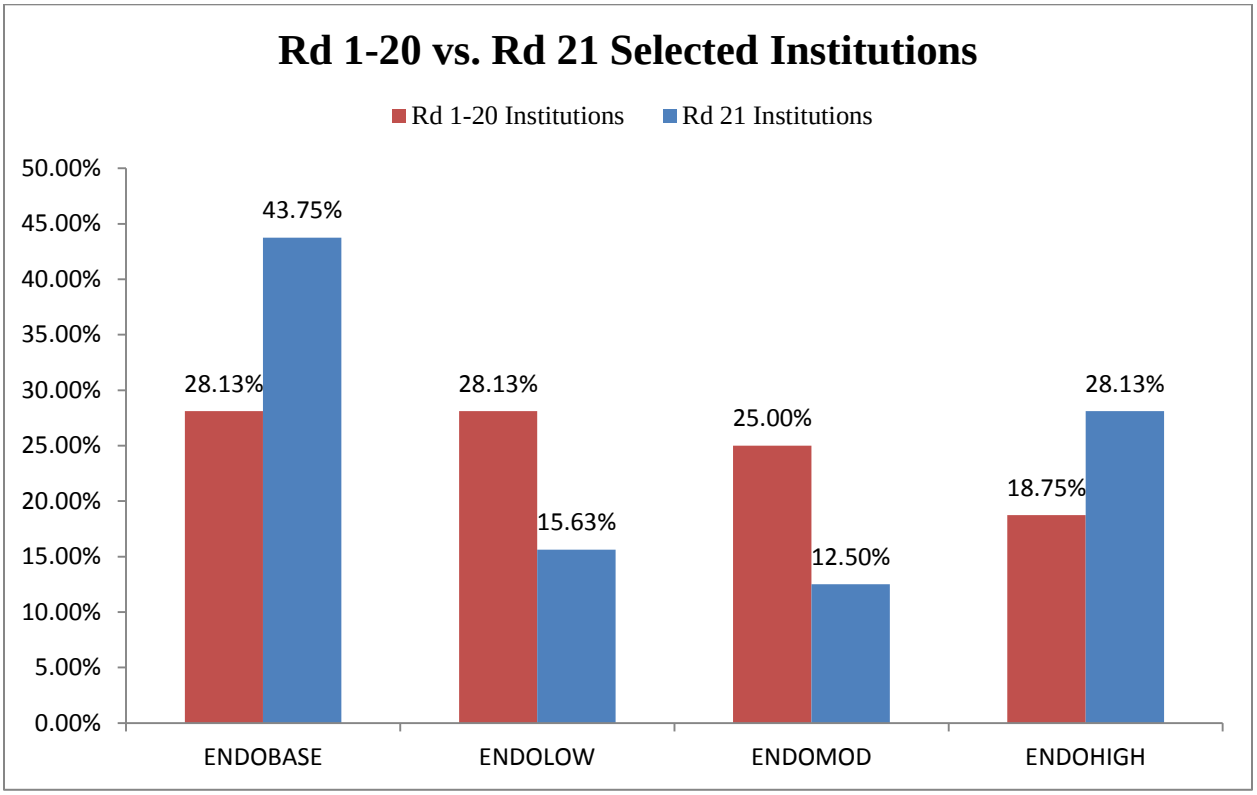

Figure 2': Institution coordination for each voting session

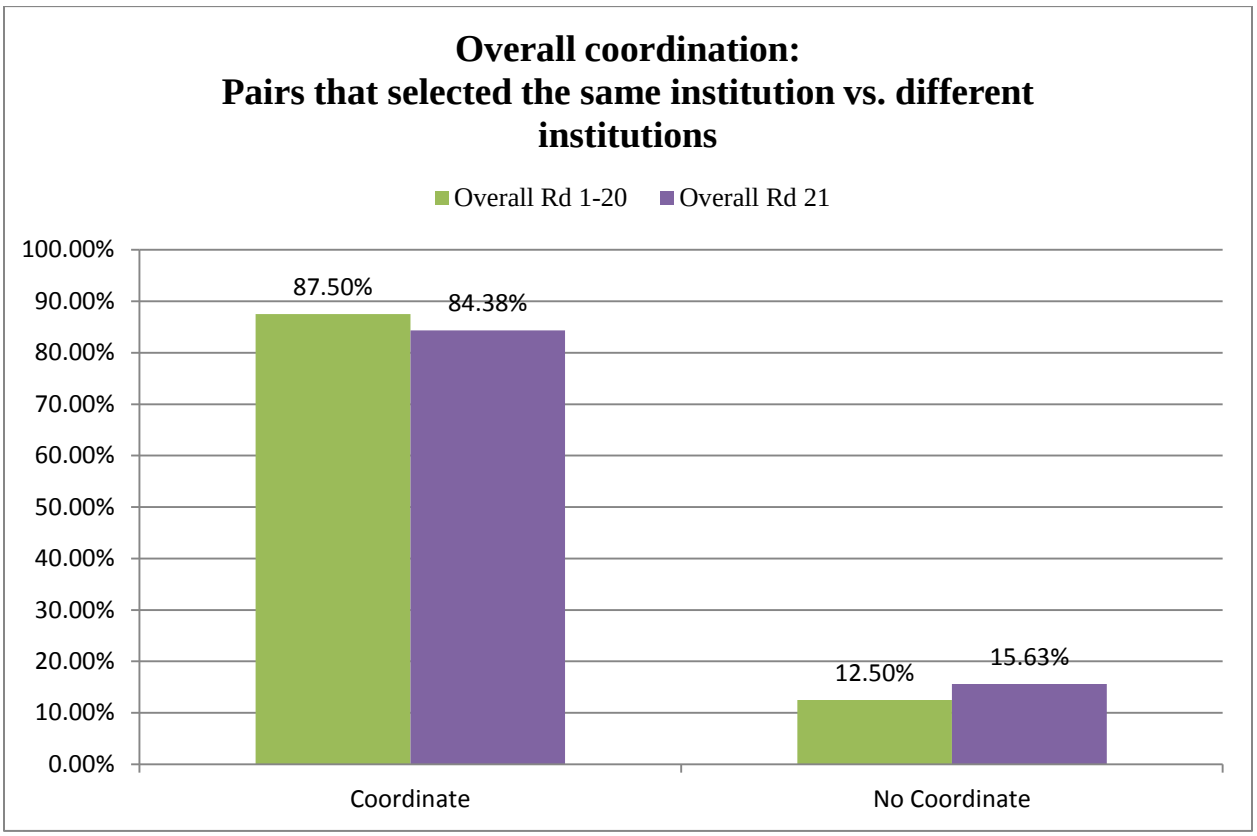

Figure 3': Institution coordination for ENDOBASE

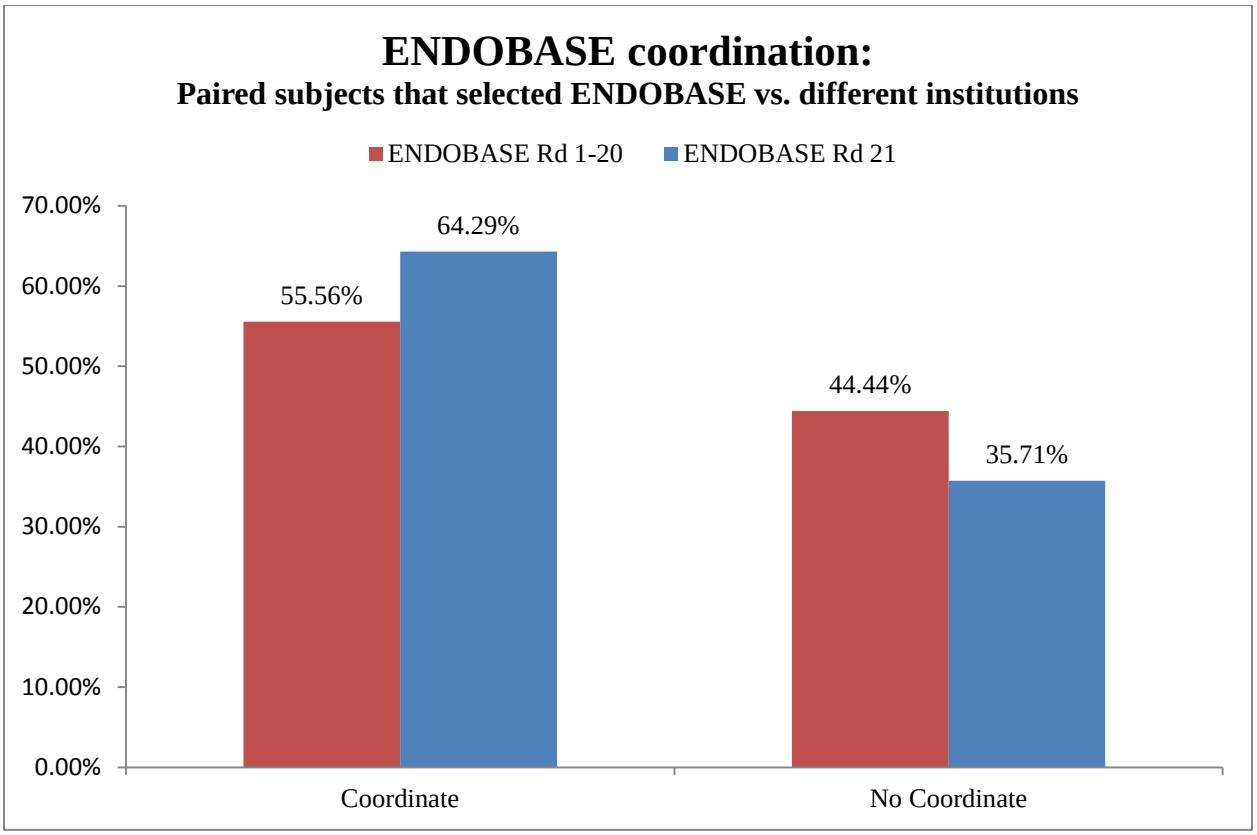

Table 3' Prevention Policy selections – Only using data with pair agreement
Round 21, estimated via Probit discrete choice models, Marginal effects shown

Dependent Variable: Prevention Policy	(1)	(2)	(3)	(4)	(5)
Low Burden Sharing	-0.028	-0.037	-0.006	-0.001	0.107
	[0.086]	[0.086]	[0.102]	[0.117]	[0.123]
Moderate Burden Sharing	0.339***	0.322***	0.371***	0.391***	0.387***
	[0.123]	[0.125]	[0.141]	[0.139]	[0.116]
High Burden Sharing	0.588***	0.589***	0.594***	0.460***	0.562***
	[0.108]	[0.108]	[0.130]	[0.150]	[0.112]
Endogenous Choice		-0.089	-0.010	0.126	0.389**
		[0.093]	[0.192]	[0.183]	[0.181]
Mod BS * EC[a]			-0.181	-0.141	-0.450**
			[0.282]	[0.256]	[0.227]
High BS * EC[a]			-0.035	-0.052	-0.402*
			[0.244]	[0.225]	[0.223]
Lag Cooperation Fraction[b]				0.319***	0.312***
				[0.098]	[0.096]
Personal Characteristics[d]	N	N	N	N	N
Log Likelihood	-50.28	-49.989	-49.29	-44.379	-36.260
AIC	111.56	111.98	116.54	108.76	108.52
McFadden' Adj R^2	0.163	0.152	0.088	0.149	0.150
Observations[a]	103	103	98	98	98

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

[a] Interaction effects are the endogenous treatment (Endogenous Choice) interacted with the individual Burden Sharing institutions. Mod BS * EC and High BS * EC are the interaction effects for the Moderate Burden Sharing and High Burden Sharing institutions. Interaction effects between the Low Burden Sharing institution and the Endogenous Choice treatment was not possible for there was no Prevention selections in the ENDOLOW environment.

[b] Lag Cooperation Fraction is the ratio of instances in a subject's previous pair divided by the number of mutual prevention opportunities, which here is 20.

[d]WHITE is positive and significant at the 5% level. RELIGIOUSITY is negative and significant at the 1% level. RISKY is negative and significant at the 1% level. INDIVIDUAL is negative and significant at the 10% level.