Optimal Contracts, Adverse Selection, and Social Preferences: An Experiment

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Abstract: It has long been standard in agency theory to search for incentive-compatible mechanisms on the assumption that people care only about their own material wealth. However, this assumption is clearly refuted by numerous experiments, and we feel that it may be useful to consider nonpecuniary utility in mechanism design and contract theory. Accordingly, we devise an experiment to explore optimal contracts in an adverse-selection context. A principal proposes one of three contract menus, each of which offers a choice of two incentive-compatible contracts, to two agents whose types are unknown to the principal. The agents know the set of possible menus, and choose to either accept one of the two contracts offered in the proposed menu or to reject the menu altogether; a rejection by either agent leads to lower (and equal) reservation payoffs for all parties. While all three possible menus favor the principal, they do so to varying degrees. We observe numerous rejections of the more lopsided menus, and approach an equilibrium where one of the more equitable contract menus (which one depends on the reservation payoffs) is proposed and agents accept a contract, selecting actions according to their types. Behavior is largely consistent with all recent models of social preferences, strongly suggesting there is value in considering nonpecuniary utility in agency theory.

Keywords: Adverse selection, contract theory, experiment, principal-agent problem

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The classic ‘lemons’ paper (Akerlof 1970) illustrated the point that asymmetric information led to economic inefficiency, and could even destroy an efficient market. Research on mechanism design has sought ways to minimize or eliminate this problem. Seminal research includes the auction results of Vickrey (1961) and the optimal taxation study by Mirrlees (1971). Applications include public and regulatory economics (Laffont and Tirole 1993), labor economics (Weiss 1991, Lazear 1997), financial economics (Freixas and Rochet 1997), business management (Milgrom and Roberts 1992), and development economics (Ray 1998).

It has long been standard in agency theory to search for incentive-compatible mechanisms on the assumption that people care only about their own material wealth. However, while this assumption is a useful point of departure for a theoretical examination, economic interactions frequently are associated with social approval or disapproval. In dozens of experiments, many people appear to be motivated by some form of social preferences, such as altruism, difference aversion, or reciprocity. Recently, contract theorists such as Casadesus-Masanell (1999) and Rob and Zemsky (1999) have expressed the view that contract theory could be made more descriptive and effective by incorporating some form of nonpecuniary utility into the analysis.

We consider the explanatory power of recent social preference models (e.g., Bolton and Ockenfels 2000, Fehr and Schmidt 1999, and Charness and Rabin 1999) in our contractual environment. Our aim is to investigate whether incorporating social preferences into contract theory could lead to a better understanding of how work motivation and performance are linked, and to thereby improve firms’ contract and employment choices, as well as productivity and efficiency.

Adverse selection refers to the situation where the agent knows more about her[1] "type" than the principal does at the time of contracting.[2] In the standard scenario on which we focus, a firm hires a worker but knows less than the worker does about her innate work disutility. Other typical applications include a monopolist who is trying to price discriminate between buyers with different (privately known) willingness to pay, or a regulator who wants to obtain the highest efficient output from a utility company with private information about its cost.[3]

In this context, we conduct an experimental test of optimal contracts with hidden information. To our knowledge, this is the first experimental study of the static principal-agent problem with hidden information. There are two types of agents and it is common information that these types are equally prevalent. A principal selects one of three menus, each having two possible contracts, to a pair of agents of unknown types. Each individual agent, who knows her own type and the menus available to the principal, then independently selects one of the two contracts offered on the menu or rejects both. Pecuniary incentive-compatibility separates the types' optimal choices for every menu and no rejections should ever be observed. The menus are ranked with respect to how much they favor the principal.

If both agents accept a contract, the contracts are implemented; if either agent rejects, both the agents and the principal receive symmetric reservation payoffs (a treatment variable). By introducing contracts that must be accepted by both workers, we contemplate the common situation where contracts must be negotiated with a union and then approved by

[1] Throughout this paper we assume that the principal is male and the agents are female.
[2] The original usage of the term "adverse selection" referred to a situation where someone purchasing an insurance policy knows more than the insurance company about the likelihood of an accident or loss.
[3] One-shot contracts are common in consumer transactions. In the public sector, government procurement is often conducted on a one-shot basis.

the workers.[4] Besides this feature, our environment (with 3-person groups and interactive preferences) leads to a more natural and realistic structure for the way in which subjects receive feedback, without (we will argue) otherwise distorting the contractual environment.

As people frequently do not act as pure money-maximizers in experiments, there is the immediate conjecture that the usual theoretical predictions will be rejected. However, the pattern of any such rejections should be informative. Interesting questions include the "equilibrium" contract menu (if any), whether there is a separation by type, and whether the level of the reservation payoffs affects behavior.[5]

One prediction of the standard theoretical model is that the high-type agents (the more productive type) will get "efficient" contracts and informational rents, whereas low-type agents get distorted contracts and no rents. In our data we observe that whether or not the different types of agents get substantial rents (as well as the size of these rents) depends crucially on the available reservation payoff. This should not be true under the standard theory. Another prediction of this model is that incomplete information will necessarily lead to allocations that are only second-best efficient.[6] In our experiment, we find that the allocations obtained in the lab are sometimes first-best efficient.

We observe that principals usually initially propose the theoretically-predicted contract, although it is intriguing that this is significantly more likely in the treatment with

[4] In essentially all of Europe, more than 75% of all workers are covered by some form of collective bargaining that involves trade unions (Layard, Nickell and Jackman 1994). Our design assumes that a contract structure that affects all workers needs to be approved by a supermajority rule.

[5] Previous experimental studies (e.g., Fehr, Gächter, and Kirchsteiger 1997 and Fehr and Schmidt 2000) argue that an implicit contract is often more beneficial than an explicit contract, despite the theoretical predictions under the standard self-interest assumption. We feel that their point is well taken, but note that they compare complete contracting to incomplete contracting. Our concern is the optimal complete contract, as influenced by social preferences, in an environment where complete contracts are simple.

[6] These are allocations that would be inefficient in the presence of complete information, but are the best a principal can obtain due to informational constraints. Efficiency is defined in this paragraph in the absence of social preferences.

higher reservation payoffs. When these early-period contracts are rejected sufficiently often (how often depends very much on the individuals and on the reservation payoffs), the principals who were offering them instead choose progressively less self-favorable alternatives, until rejections cease and an “equilibrium” menu is reached. This menu differs across the two treatments.

Our analysis indicates that all three nonpecuniary models mentioned can generally explain the observed behavior (with certain parameter restrictions) fairly readily. This suggests that contract theorists need not be overly concerned with the precise nature of social preferences, as the enhanced descriptiveness seems robust to the model specification.

I. BACKGROUND AND RELATED WORK

Private information leads to inefficiency because it is effectively a form of monopoly power (of information). Sometimes it is possible to introduce competition (such as auctions) as a method of reducing informational rents. If competition is not a possibility, mechanism design can still effectively minimize the rents of the privately informed, provided that there are more dimensions in preferences than in the informational problem. If a principal knows workers care both about wages and the number of hours worked, he can devise a contract menu of hours and wages that induces more truthful revelation and reduced inefficiency.

There is recent theoretical research about the impact of social preferences in optimal contract design. Casadesus-Masanell (1999) studies a principal-agent problem with moral hazard and assumes that an agent suffers disutility if her action differs from the social standard. Thus, the strength of extrinsic monetary incentives is lower than in standard theory, due to the trade-off between an agent’s intrinsic and extrinsic incentives. The analysis is performed (with qualitatively similar conclusions) when the motivating factor is an ethical standard, similar to a social norm.

Rob and Zemsky (1999) study a problem in which agents working in a group (firm) must undertake both an individual task and a cooperative task. Effort devoted to the cooperative task is more productive than that devoted to the individual task, but the (noisy) performance measure is such that a worker receives only partial credit for her cooperative effort. Employees receive disutility from not cooperating, depending on the past cooperation levels in the group. The (dynamic) problem of the principal is to manage the group so as to maximize profits. As the solution has different steady state levels of cooperation ("corporate cultures") depending on the initial levels of cooperation, the incentive schemes vary across groups. Thus, this paper provides a theory for the observed heterogeneity in actual incentive schemes, and an operative definition of corporate culture.

Dufwenberg and Lundholm (1999) study an unemployment insurance situation in which there is moral hazard (unobservable job search effort) and adverse selection (privately known productivity of effort). The job search effort, although unobservable to the regulator, is observable to other members of society. Social pressure mitigates the moral hazard problem, and effort is higher than under the absence of social concerns. However, individuals can pretend that the productivity of effort is lower than it really is; overall, the distribution of social respect is not clearly welfare improving. If one formulates an explicit utilitarian welfare function, the impact of social values on welfare is not monotonic, and welfare reaches a maximum for a positive but moderate social sensitivity.

Adverse selection has been studied extensively in private-auction experiments (see Kagel 1995 for a review), but not in relation to the static optimal contract with unknown types of agents. Closer to our focus, Chaudhuri (1998) and Cooper, Kagel, Lo, and Gu

(1999) study the *ratchet effect*, which can be a problem in dynamic contracting. Here the agent has an incentive to conceal his true type, as the principal may use this information to ratchet up the demands for performance in later periods. The main focus of these papers is whether the agents will pool their actions to conceal their types, as the theory would predict, and if they do not, whether the principals would exploit the information. The theoretical prediction without pre-commitment is that types will remain hidden, although the laboratory results suggest otherwise.

However, the ratchet effect is not a concern in many contracting situations. Principal-agent interactions in the field are frequently one-shot affairs. Furthermore, if the principal could commit to an *ex ante* contract, it would be optimal to implement the one-shot problem in the dynamic setting. Even though a relationship may actually involve repeated play, a firm could choose to pre-commit to a contract, and perhaps cultivate a reputation for integrity by doing so. In our experiment the issue is not so much whether agents will separate by contract type (by and large they do), but which particular way to separate them will be acceptable to the agents, and constitute an equilibrium. It is curious that this dynamic application has been studied earlier than the conceptually cleaner static problem.

In contracting under *moral hazard* (hidden action), the problem is how to induce the efficient action without being able to observe it. In principle, if outcomes are related to actions, we can induce efficiency by making the contract contingent on the outcome. Yet impediments such as risk preferences and limited liability may be present. For example, it may be necessary to have the agent incur some risk in order to induce the best action; however, this may conflict with other contractual objectives, such as providing insurance.

Papers such as Berg, Daley, Dickhaut, and O'Brien (1992), Keser and Willinger (2000), and Anderhub, Gächter, and Königstein (1999) consider the behavioral issues present with individual contracting in this context.[7] These studies provide evidence that social preferences are a consideration that affects the ability of the principal to reduce informational rents. One caveat when risk preferences are an issue is that they are difficult to control in the laboratory,[8] so that disentangling the motivations for behavior may be problematic. Anderhub, Gächter, and Königstein (1999) avoid this problem by severely constraining the principal's strategy space, but doing so may make the environment seem somewhat unnatural.

II. THE MODEL

In this section we describe the theoretical model which serves as the basis for the experimental design. Imagine that a firm needs two workers in order to be able to operate. The profits for the firm when it is operating are:

$$\Pi = e^1 - w^1 + e^2 - w^2$$

where e^i, w^i are, respectively, the effort levels and wages of worker $i \in \{1,2\}$. Each worker i has a utility function which depends on her type $j \in \{H,L\}$, which is her private information:

$$u^i_j(e^i, w^i) = w^i - \frac{k_j}{2}(e^i)^2$$

[7] Other studies involving moral hazard include Bull, Schotter, and Weigelt (1987), who examine the incentive effects of piece rate and tournament payment schemes, and Nalbantian and Schotter (1997), who investigate group incentive contracts. The latter study finds that "relative performance schemes outperform target-based schemes," suggesting the relevance of social preferences to this context. Plott, and Wilde (1982), DeJong, Forsythe, and Lundholm (1985), and DeJong, Forsythe, Lundholm, and Uecker (1985) consider moral hazard problems with multiple buyers and sellers. Güth, Klose, Königstein, and Schwalbach (1998), consider a dynamic moral hazard problem where trust and reciprocity issues impede obtaining the (theoretically possible) first-best outcome.

[8] While the Roth and Malouf (1979) binary lottery procedure theoretically controls for risk preferences, Selten, Sadrieh, and Abbink (1995) suggest that this procedure may actually exacerbate the problem behaviorally.

where $k_H = 1$ and $k_L = k > 1$. That is, the high type of agent has a lower cost of effort than the lower type. Thus, only the individual agent knows j, but e is observable and contractible.

From the utility functions of the principal and the agents we have that the first-best efforts levels are:

$$\hat{e}_j = \frac{1}{k_j}, j \in \{H, L\} \qquad (1)$$

We call $\hat{e}_j$ the efficient level of effort[9]. If we denote by $\underline{U}$ the outside option of the worker (which we assume for simplicity to be type-independent) we can induce optimal effort, with:

$$\hat{w}_j = \underline{U} + \frac{1}{2k_j}, j \in \{H, L\}$$

If the (independent) probability that an agent is a high or low type is denoted respectively by p^H or p^L, then the expected (optimal) profits for the principal are given by:

$$\Pi^E = 2\left(\frac{p_L}{2k_L} + \frac{p_H}{2k_H} - \underline{U}\right)$$

The second-best optimal contracts, when the types are private information of the agents result from the solution of the maximization program:

$$\max_{w_H, w_L, e_H, e_L,} 2(p_H(e_H - w_H) + p_L(e_L - w_L))$$

subject to

$$w_H - \frac{k_H}{2}(e_H)^2 \geq \underline{U} \quad (\text{IR}_H)$$

[9] This is an appropriate terminology because in all the Pareto-efficient allocations of this problem (with complete information) the level of effort is always $\hat{e}_j$. This is so because of the quasi-linearity of the utility function of the agents, a common assumption in this field. Thus, the Pareto-efficient allocations only differ in the wages and profits of the principal and agent.

$$w_L - \frac{k_L}{2}(e_L)^2 \geq \underline{U} \quad (\mathrm{IR}_L)$$

$$w_H - \frac{k_H}{2}(e_H)^2 \geq w_L - \frac{k_H}{2}(e_L)^2 \quad (\mathrm{IC}_H)$$

$$w_L - \frac{k_L}{2}(e_L)^2 \geq w_H - \frac{k_L}{2}(e_H)^2 \qquad (\mathrm{IC}_\mathrm{L})$$

where (IR_j) and (IC_j) are respectively the individual rationality and incentive compatibility constraints of an agent of type $j \in \{H,L\}$. As usual in these problems, it turns out that the active constraints in the optimal solution are (IR_L) and (IC_H), so that the solution is:

$$e_H^* = \frac{1}{k_H} = 1; \quad e_L^* = \frac{1-p_H}{k_L - p_H}; \quad w_L^* = \underline{U} + \frac{k_L}{2}\left(\frac{1-p_H}{k_L - p_H}\right)^2; \quad w_H^* = \frac{1}{2} + w_L^* - \frac{1}{2}(e_L^*)^2 \quad (2)$$

The high type of agent provides the "efficient" level of effort and obtains utility above $\underline{U}$. These informational rents (rents are defined here as the utility an agent gets above her reservation utility) are equal to:

$$w_H^* - \frac{1}{2} - \underline{U} = \frac{k_L - 1}{2}\left(\frac{1-p_H}{k_L - p_H}\right)^2$$

The effort of the low type of agent is "inefficiently" low and she obtains no rents. This is a sublime-perfect equilibrium.[10]

[10] There is one slightly non-standard feature of this model that should be mentioned. Since the agents' decisions are simultaneous, and a rejection implies that both agents receive the outside option, there exist subgame-perfect equilibria of the game, whose outcomes are different than the one we have just described. If one agent expects the other to reject her contract, it is a best-response to reject contracts that give her a higher utility than $\underline{U}$. This can be used to construct a variety of inefficient subgame-perfect equilibria. However, notice that any strategy that rejects a contract yielding a higher utility than $\underline{U}$ is *weakly dominated*. While such equilibria are subgame-perfect, they are not *trembling-hand* perfect (Selten 1965), and do not survive one round of deletion of weakly-dominated strategies (Dekel and Fudenberg 1990).

We implemented the theoretical model in our experiment by choosing values for the parameters in the three possible menus; each menu offered two possible contracts (effort choices). While we thus limit the possibilities available to the principal, a continuous strategy space would make the data analysis problematic (even ignoring the increased complexity of the decisions of the experimental participants), without adding much insight.

We chose $k_L = 2$ for all menus, in order to give relatively large rents to the H type (under her preferred contracts). Menu 1 is the "theoretically-predicted" menu; it is not first-best efficient and has the most unequal payoffs. Here the values for e_i, w_i, are obtained from equation (2).[11] An H agent could obtain moderate rents (if she chose the "right" menu and one of the contracts was accepted by the other agent) and an L agent could receive very small rents.[12] In Menu 2 the effort choices were the first-best efficient ones, computed from equation (1). The value for w_L is set so that the L agent could receive small rents, while the value for w_H provides the H agent with higher rents than in Menu 1. In Menu 3, both types of agents can receive substantial rents, and (as in Menu 1) the efforts of both types correspond to the optimal ones in the theoretical model. The parameters, efforts, and wages for the different menus in the experiment are summarized below:

TABLE 1 – PARAMETER VALUES

	k_L	p_L	e_H	e_L	w_H	w_L
Menu 1	2	1/2	1	0.33	0.69	0.24
Menu 2	2	1/2	1	0.50	0.88	0.63
Menu 3	2	1/2	1	0.33	0.94	0.49

[11] All payoffs were rounded to the nearest 25 units in our payoff table.
[12] In the theoretical model the rents for the L player are exactly zero. We chose to make the rents positive (but very small) to make acceptance strictly dominant while remaining very close to the "theoretical

One of the criticisms of models of optimal contract design in adverse selection contexts is that the theoretically-predicted contract menus are more "complex" than one observes in reality. In an environment like ours, these often employ a nonlinear structure and a very large number of possible choices of pairs of wages and efforts. This would be quite complicated to design for the principal, and even the choice of the agent would not be simple. While we have selected a very simple structure (only two types), we feel that a "simple" menu can serve as an approximation for the fully-optimal schedule. As Wilson (1993) points out (p. 146) in a representative example: "The firm's profits from the 5-part and two-part tariffs are 98.8% and 88.9% of the profits from the nonlinear tariff."

III. EXPERIMENTAL PROCEDURES

Six sessions were conducted at Universitat Pompeu Fabra in Barcelona in May and June of 1999. All participants knew that there were 12 people in each session, with 4 principals, 4 high-type agents, and 4 low-type agents. Groups of three (one principal and two agents) were matched randomly in each of the 15 periods, subject to the (stated) restriction that no group was ever repeated in consecutive periods. While there were few repeated 3-groups, each agent could expect to be matched with each principal several times during the experimental session. The average net pay was about 1600 pesetas (then around $11) per subject, including a 500 peseta show-up fee. Sessions lasted less than 2 hours.

At the beginning of a session, the instructions and a decision sheet were passed out to each subject. The decision sheet stated the subject number and the role (principal, high-type agent, or low-type agent). Instructions (presented in Appendix 1) covered all rules used to determine the payoffs to each player in the group; these were read aloud to the entire room. We included a table showing the monetary payoffs for every possible combination of actions.

We verbally reviewed every case, and then asked questions to ensure that the process was understood.

[Payoff table about here]

When the instructional phase was concluded, we proceeded with the session. In each period the principals first selected a menu on their decision sheets. Each matched agent could accept choice 1 or 2 from this menu, or reject both options. If both agents in the group accepted contracts, each obtained the corresponding payoff for an agent of her type. If either of the agents rejected both choices 1 and 2, then the payoffs for both the principal and the agents were the same (500 pesetas or 250 pesetas depending on the treatment).[13]

The experimenter went around the room collecting this information, with care taken to preserve the anonymity (with respect to experimental role) of the principals. Once the principals' menu selections were recorded, the experimenter again went around the room, this time providing the information about the menu to the agents (again preserving anonymity). The agents then made their choices and the experimenter collected this information; finally, the experimenter privately informed each participant about the choices and types (but not the identities) of both agents in the group.

Participants knew that there would be 15 periods in all. At the end of the session, participants were paid privately, based on the payoffs achieved in a randomly-selected round, as was indicated in the instructions.[14] As mentioned earlier, two types of sessions were conducted. The only difference between the sessions was on the reservation payoffs for

[13] In a sense, our game can be viewed as a multi-period 3-person version of the classic ultimatum bargaining game (Güth, Schmittberger and Schwarze 1982), where a rejection results in positive material payoffs.
[14] This was done in an effort to make payoffs more salient to the subjects, as this method makes the nominal payoffs 15 times as large as would be the case if payoffs were instead aggregated over 15 periods, and it also avoids possible wealth effects from accumulated earnings.

a rejection - 500 pesetas for each person in one case and 250 pesetas in the other. There were three sessions of each treatment.

IV. RESULTS

We find that the incentive-compatibility mechanism is predominantly successful in inducing a separation by contract selection among the agents who do not reject the contract menu proposed. However, there are many rejections of unfavorable contract menus by both types of agents. We also see a substantial degree of convergence on a "community consensus" by the end of 15 periods. If nonpecuniary utility is not a factor, one would expect principals to choose Menu 1 and agents to accept the appropriate contract. However, in each of Treatments 1 and 2 (reservation payoffs of 500 and 250, respectively), Menu 1 is selected only 35% of the time. In Treatment 1 (Treatment 2), when Menu 1 is proposed, it is rejected by at least one of the two agents 68% (40%) of the time.

A. Principal behavior

In Treatment 1, Menu 2 is chosen in 40 of 180 cases (22%) and Menu 3 was chosen in 78 cases (43%). In Treatment 2, Menu 2 is chosen in 88 of 180 cases (49%) and Menu 3 was chosen in 29 cases (16%).

By one measure, the difference across treatments in the distribution of proposals made is statistically significant at $p < .001$, using the Chi-square test ($\chi^2 = 40.45$, d.f. = 2). However, since there are 15 choices by each principal and these choices are unlikely to be independent, the degree of significance is overstated. As an alternative, we can apply a very conservative test: We rank menu proposal rates from each session, treating each session as only one independent observation, and then use the Wilcoxon rank-order test (see Siegel and Castellan 1988). Since the percentage of Menu 2 (Menu 3) contracts offered is lower (higher) in each and every Treatment 1 session than in each and every Treatment 2 session, even this test indicates significance at p = .05. The difference is accentuated in the later periods in the sessions. Figures 1 and 2 show the patterns of menu proposals over time (Appendix 3 offers a chart of the aggregated proposals for each period):

[Figures 1 and 2 about here]

The rate of Menu 1 proposals drops over time in each treatment. If we look at the last 5 periods only, this rate is about 20% in each treatment. In contrast, the rate for Menu 3 increases to 63% in the last 5 periods of Treatment 1, and the rate for Menu 2 increases to 67% in the last 5 periods of Treatment 2. The trend for menu proposals over time seems clear in each case.

B. Agent behavior

The principals do not change their behavior in a vacuum, but appear to respond to agents' rejections of contract menus. Although agents who are concerned only with maximizing their own material reward should never reject a contract menu, rejections are quite common.[15] When Menu 1 is proposed, it is rejected by at least one of the two agents 68% (40%) of the time in Treatment 1 (2). No agent of any type ever rejected Menu 3 and no H agent ever rejected Menu 2.

In Treatment 1, rejection rates of Menu 1 and Menu 2 are much higher for L types than for H types. (38/57 vs. 15/67 for Menu 1, and 36/44 vs. 0/36 for Menu 2). However, there is no such difference in Treatment 2. L types are also far more likely to reject either Menu 1 or Menu 2 in Treatment 1 than in Treatment 2 (38/57 vs. 11/62 for Menu 1 and 36/44 vs.

[15] This contrasts with the results of the Chaudhuri (1998) study, which found few "rejections" by the high productivity type firm in the 2nd (and final) period of his ratchet effect game.

3/91 for Menu 2). Overall, we also see nearly 3 times (89 to 30) as many rejections in Treatment 1 as in Treatment 2. All of these observations suggest that subjects behaved in a relatively "rational" manner, despite a willingness to sacrifice money to spurn a lopsided contract menu.

We can examine whether rejection rates are stable over time. A supergame explanation for rejections would imply that rejection rates drop over time. Figures 3 and 4 show the rates for the cases with observed rejections, aggregated over three periods for smoothing:

[Figures 3 and 4 about here]

Rejection rates of Menu 1 by H types are fairly stable in both treatments. Rates for L types increase where rejections seem to be effective - Menu 1 and Menu 2 in Treatment 1, as well as Menu 1 in Treatment 2. OLS regressions on (individual period) rejection rates over time gives significant (t-statistic > 1.96) positive coefficients in each of these cases.

C. Heterogeneity

While models of behavior often assume that all agents (of a given type) are identical, we find that there is considerable heterogeneity in the population, for both principals and agents. A detailed table of individual agent behavior is presented in Appendix 4.[16] Overall, 16/24 L agents and 11/24 H agents rejected at least one proposed menu. In addition, 3 H agents who never rejected a menu chose "low effort" at least once, sacrificing some money to reduce the principal's payoff. While most players rejected at some point, the distribution of the frequency of rejection is somewhat scattered, even within individual sessions.

Principal choices also vary considerably across individuals. Of course, these choices are affected by the variation in agent choices, so the best comparisons are within sessions (principals 1-4, 5-8, and 9-12). A chart showing each principal menu choice and the responses received is presented in Appendix 2.

TABLE 2 - INDIVIDUAL PRINCIPAL CHOICES

	Principal # - Treatment 1											
Menu	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1	5	8	3	3	6	6	9	4	3	5	4	6
2	6	4	1	3	5	1	5	3	1	1	5	5
3	4	3	11	9	4	8	1	8	11	9	6	4

	Principal # - Treatment 2											
Menu	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
1	0	4	15	0	9	2	2	12	6	3	3	7
2	15	10	0	0	6	8	12	3	5	9	12	8
3	0	1	0	15	0	5	1	0	4	3	0	0

Given the sizable degree of heterogeneity for agents and principals, it should not be surprising that behavior does not completely converge to an equilibrium in only 15 periods. Yet the trends suggest that this heterogeneity might be overcome over time.

D. Earnings

Given the observed agent behavior, which menu should a purely self-interested principal select? We can calculate the *ex post* earnings of principals for each menu:

TABLE 3 - AVERAGE PRINCIPAL PAYOFFS

Treatment 1	Treatment 2

[16] The average number of rejections and the standard deviation in Treatment 1 is 6.17 (2.62) for L types and 1.25 (2.01) for H types; in Treatment 2 these are 1.17 (1.90) and 1.41 (1.62) for L and H types, respectively.

Session	Menu 1	Menu 2	Menu 3	Session	Menu 1	Menu 2	Menu 3
1	1132	1193	1612	4	2505	2212	1669
2	1426	921	1611	5	1723	2397	1617
3	1592	992	1597	6	1579	2313	1604
Total	*1384*	*1038*	*1606*	*Total*	*1915*	*2312*	*1643*

Table 3 confirms that the most prevalent menu in each treatment is also the most remunerative for the principal. It is interesting to note that, although the available menus and payoffs are identical in the two treatments (except for the rejection payoffs), Menu 2 gives the lowest principal payoffs in Treatment 1, but the highest principal payoffs in Treatment 2. The rejection payoffs are clearly relevant to the issue of which menu is optimal for a self-interested principal. Note that standard theory predicts that behavior should be identical for these alternative reservation payoffs.

We can also examine first-best efficiency and distribution, in terms of the average payoff received by each participant. The expected average payoffs per person (assuming no rejections) is nearly the same for each contract menu (1452, 1467, and 1446 for Menu 1, 2, and 3, respectively). Actual average earnings increase in later periods in Treatment 1; a simple OLS regression of earnings against time indicates that earnings increase by 24 in each period (t-statistic = 3.80). The earnings pattern for Treatment 2 is more U-shaped, as there is more of a lag before rejections become frequent. An OLS earnings regression for Treatment 2 shows earnings increasing by an insignificant 8 per period; however, the same regression excluding periods 1-3 shows average earnings increase by 25 each period (t-statistic = 2.42).[17] It seems possible that the optimal social payoffs could be reached after more periods of play.

[17] Again, the t-statistics in these regressions are computed on the basis that each observation is independent. Since there is interaction, the level of statistical significance may be overstated.

How does the proportion of total earnings received by the principals vary over time in each treatment? A table showing the proportions for each period and treatment can be found in Appendix 2. The principal's share of earnings declines after the first 3 periods of Treatment 1 and settles into a range of 36%-46%. In Treatment 2, this share is fairly stable after the first period, ranging from 51%-58%. The agents' share of the social payoffs is higher in Treatment 1 in every round but the 1st. Overall, we see a trade-off between the size of the total payoff and its distribution - total earnings are higher in Treatment 2, but players' shares are more nearly equal in Treatment 1.

V. DISCUSSION

Standard principal-agent theory does not predict the behavior in either treatment, although we do eventually observe low rejection rates and effort separation by the two types of agent. We also find that the different reservation payoffs lead to very different patterns of menu selection. Rejection rates are much higher in Treatment 1, where the reservation payoffs are higher. This seems entirely driven by the dramatic differences across treatments in the rejection rates of L types (for Menu 1, 67% vs. 18%; for Menu 2, 82% vs. 3%).

A supergame notion might be suggested, since each agent expected to be matched with each principal several times in a session. Perhaps rejecters were hoping to face more favorable menus in later periods and thought that their rejections would make this more likely, even though all matches were anonymous. Although this might explain rejections in early rounds, we have seen that there is no evidence of decreases in rejection rates over time.[18] Strategic motivations alone do not provide an explanation for the observed behavior.

A. Social preference models and individual behavior

Social preference models offer explanations concerning why people might sacrifice money. The Bolton and Ockenfels (2000) and Fehr and Schmidt (1999) models presume that all monetary sacrifice is driven by experienced disutility from unequal payoffs. Charness and Rabin (1999) combine Rawlsian preferences with a desire to increase total payoffs, producing "quasi-maximin" preferences. These default social preferences are then modified by reciprocity considerations.

Since the principal selects the menu, and who also stands to earn the highest monetary payoff, all of these models make similar predictions. As in the ultimatum game, a monetary sacrifice can be read variously as a response to an unfriendly allocation decision or a simple dissatisfaction with lopsided payoffs. It is not our aim in this paper to differentiate between these models, but rather to demonstrate that all of them can potentially explain our data. As it is typical for a principal to receive the greater share in all contract menus, we feel that our setup is reasonably representative of the field in labor environments and where a monopolist is trying to price discriminate.

We examine the behavior of individuals under the light of these models; our analysis provides some idea about the distribution of parameters in the population. Overall, results are similar for all three models.

[18] A specific bit of evidence is that, in the very last round, seven principals tried Menu 1, perhaps thinking that rejections were only being made for strategic purposes; however, these were rejected by all L types (6/6) and 25% of H types (2/8).

A.1. Models

Let (π_1, π_2, π_P) be the vector of monetary payoffs for the agent 1, agent 2, and principal P in this experiment. The Bolton and Ockenfels (1999) model can be applied to our setup[19] to make the utility of an agent i:

$$v_i(\pi_1, \pi_2, \pi_P) = \pi_i - \frac{c_i}{2}\left|\frac{\pi_i}{\pi_1 + \pi_2 + \pi_P} - \frac{1}{3}\right|$$

The Fehr and Schmidt (1999) model has the following form in our setup:

$$v_i(\pi_1, \pi_2, \pi_P) = \pi_i - \alpha_i \frac{1}{2}\left(\sum_{j \neq i} max\{\pi_j - \pi_i, 0\}\right) - \beta_i \frac{1}{2}\left(\sum_{j \neq i} max\{\pi_i - \pi_j, 0\}\right)$$

Fehr and Schmidt note that there is very little evidence about aversion towards difference in favor of a player, so that β_i is a small number. For simplicity we will calibrate the parameter α_i and arbitrarily consider β_i to be $\alpha_i/2$.

The Charness and Rabin (1999) model, unlike the previous two, cannot be made a function simply of the monetary payoffs of all participants. Here, one must imbed in the utility function the actions (and perceived intentions) of people when making allocation choices.

[19] This model is actually presented with a more general specification. We have chosen a linear representation, although we also performed an analysis with a quadratic functional form for disparities in material payoffs. The results were very similar.

One of the key endogenous variables in the model is the “demerit coefficient” (ρ) which indicates the degree to which reciprocity considerations affect choices. While in principle ρ depends on the strategies chosen by the agents, we simplify by setting $\rho_1 = \rho_2 = 0$ and $\rho_P = 1$ ($\rho_P = .5$) when the principal chooses Menu 1 (Menu 2); these values are consistent with equilibrium. The agents’ utility in this model can then be parameterized as:

$$v_i(\boldsymbol{p}_1, \boldsymbol{p}_2, \boldsymbol{p}_P) = (1-g)\boldsymbol{p}_i + g\left[\boldsymbol{d} \cdot \underset{j\in\{1,2\}}{\mathrm{Min}}\{\boldsymbol{p}_j\} + (1-\boldsymbol{d})\left(\sum\nolimits_{j\in\{1,2\}} \boldsymbol{p}_j\right) - f \cdot \boldsymbol{r}_P \boldsymbol{p}_P\right]$$

For the calibration we will make γ = 0.2 and δ = 0.5, so that the only parameter to be calibrated will be *f*.[20] The parameter values chosen are arbitrary, although plausible; a better choice could improve the fit.

A.2. Observational Fit

If preferences were as described in the models, all the rejection rates should be either zero or one, but many of them are between zero and one; we will argue that the agents seem to be learning about rejection norms. While this makes classification a bit problematic, we will label an agent as a “rejector” of a given menu if she rejects it at least 50% of the time. Table 4 shows the minimum parameter values that would induce a rejection of the menu:

[20] In the full model, one’s demerit coefficient is multiplied by a parameter to determine the extent to which one’s “right” to fair treatment has been forfeited by bad actions. As the principal’s payoff is never the minimum, we can simply consider the minimum of the agents’ payoffs. We assume that the parameter diminishing the weight of the principal’s payoff in the social surplus is high enough so that a principal not choosing Menu 2 gets a weight of 0.

TABLE 4: PROPORTIONS OF REJECTORS AND CUTOFF PARAMETERS[21]

Menu-type-treatment	**Observed Rejection rate**	**BO cutoff** (absolute value)	**FS cutoff** (â=0.5*á)	**CR cutoff** (ρ_P=0.5 in M2)
M2 – L – 500	11/12	260	0.04	0.33
M1 – L – 500	9/12	130	0.02	0.17
M1 – L – 250	4/12	1410	0.24	0.64
M1 – H – 500	3/12	1600	0.20	0.47
M1 – H – 250	3/12	3050	0.38	0.83
M2 – L – 250	0/12	1580	0.26	0.86
M2 – H – 500	0/12	31700	1.52	2.03
M2 – H – 250	0/12	40100	1.92	2.54

The behavior over time and between menus is the only consistency check that can be applied individual by individual. The remaining tests must be more population-oriented.[22] Let us assume that the parameters of the individuals are chosen by Nature at the beginning of time in a random manner. Notice that the parameters are ordered for the different menus and treatments (and that they are ordered in similar ways for the three models). Given this, one would expect that the numbers of "rejectors" would be ordered so that when the cutoff rate is larger, the number of rejectors would be smaller.

In fact, this is definitely the general pattern. While there are some minor reversals and anomalies (discussed in detail in Appendix 6), these could easily be the result of slightly different draws from the heterogeneous participant population. The agents' behavior is mainly compatible with the social preference models.

[21] We also performed calculations on the assumption that ρ_P=1 in CR for both Menu 1 and Menu 2, that â$_i$ = á$_i$/4 or â$_i$ = 0 in FS, and using a quadratic specification for BO. Results were very similar and we feel that the assumptions made in Table 4 may be more realistic.

[22] An additional test for behavioral consistency with the models is that an agent who rejects Menu 2 should also reject Menu 1. This is true because (as can be seen in Table 4) the parameter for rejection of Menu 1 is always lower than the parameter for rejection of Menu 2 in all models. There are only two cases when agents who reject Menu 2 do not reject Menu 1: L types 1 and 8 in Treatment 1. However, once these individuals start rejecting never revert to accepting a menu. It is simply the case that they receive proposals of Menu 1 in the early rounds, when they are actively learning the community rejection norms.

We can also explore principal behavior in light of these models. Measuring these preferences is more complicated, as a principal is strategically concerned with the reaction of the agents. Nevertheless, some behavior must be explained, such as the fact that it is common for principals to select Menu 1 in the initial periods. At first glance, this seems to be in conflict with a presumption of a significant degree of social preferences. However, notice that a principal would offer Menu 1 with certain parameter values: â < 0.66 in the FS model, or $c < 4600$ in the BO model, or for any $\delta \leq 1$ and $\gamma < 0.72$ in the CR model. Under the assumption that principals and agents are drawn from the same population, it seems that principal behavior does not contradict the social preference models, as we did not identify any agents with parameters above these cutoff values.[23]

A final test of the calibrated parameters is a comparison between our results and those of other experiments. We present an analysis in Appendix 6, referring to data presented in Fehr and Schmidt (1999) and evidence from "similar" games in Charness and Rabin (1999) and Charness and Rabin (2000). On the whole, our imputed parameter values are largely consistent with these data.

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A.3 Further considerations

The predictions of the three social preference models we have discussed would not change much (if at all) if each individual agent could only veto her own contract menu. First, if one agent believes the other agent will be (or should be) rejecting the contract as well, she will not be inflicting any damage on the other agent by rejecting the contract menu. The Charness and Rabin (1999) model might predict a slightly greater tendency to reject lopsided

[23] Recall that â □ á in the FS model (we assumed a 1:2 relationship for our calibration). We observed very

contract menus, since a unilateral rejection avoids reducing the payoffs of the blameless other agent, as is preferred under the quasi-maximin formulation. On the other hand, both the Bolton and Ockenfels (2000) and Fehr and Schmidt (1999) models might predict a slightly reduced rejection rate, since one cannot be as effective in "leveling" the payoffs by making a monetary sacrifice. In any event, 3-person ultimatum game studies such as Güth and van Damme (1998) and Kagel and Wolfe (1999) find that responders do not seem to be much concerned with the welfare of an inactive third party, so we suspect behavior would be robust to this design choice.

Another issue to consider in the light of social preferences is which contract is efficient, in the sense of being socially desirable. In our design, with a limited set of contracts, efficiency is not an issue, as all the contracts are Pareto-efficient. But if we consider the (utilitarian) sum of payoffs as a welfare criterion, it turns out that Menu 2 is the socially desirable, when social preferences are not considered, but Menu 3 maximizes the (expected) sum of utilities when social preferences are taken into account[24]. This suggests that the welfare implications of optimal contract theory may be modified once the model is generalized to account for these issues.

Since our experiment is fairly typical of the mechanism design literature, one can be reasonably confident that the conclusions obtained (once the models are modified to account for social preferences) are not very sensitive to the particular way in which these social preferences are modeled. We believe that this is a positive aspect of our study.

B. Learning

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few (if any) individuals for whom á was greater than 0.65.

[24] For the most common combination of parameters consistent with our data

Fifteen periods is certainly too short for a serious learning analysis. Nevertheless, we have seen that choices change over time; perhaps participants are learning something along the way. First, the principals observe the responses to proposed contract menus and update their beliefs about the norms of the population of agents. Table 5 presents the data concerning whether or not a principal changed the contract menu after observing either joint acceptance or a rejection by at least one agent (14 observations for each principal):

TABLE 5 – MENU CHANGES BY PRINCIPALS

	No rejection in prior period		Rejection in prior period	
	Change	No change	Change	No change
Treatment 1 (500)	34 (33%)	69 (67%)	49 (75%)	16 (25%)
Treatment 2 (250)	42 (30%)	99 (70%)	14 (52%)	13 (48%)

It is apparent that principals are substantially more likely to select a different menu after a rejection than after no rejection – 75% vs. 33% in Treatment 1 ($p < .0001$), and 52% vs. 30% in Treatment 2 ($p = .01$, one-tailed test). These sequential dependencies suggest that rejections drive the change in principal behavior over time.

A rather interesting and puzzling result is that a significant number of agents do not respond in a consistent manner to the contract menus (See Appendix 5). It may be the case that some agents are uncertain about the appropriate response, and update with the revealed actions of others. Some agents appear to learn to reject contract menus.

If we define "internal consistency" as no more than one deviation from consistent play, we have that 13 of 47 agents (27%) make at least two choices inconsistent with their other ones. If we define consistency such that even one "tremble" is a violation, 30 of 48 agents (62%) are inconsistent. One test of whether inconsistent choices are merely arbitrary is whether agents behave differently when they observe that the other agent in the triad has rejected a contract menu. Appendix 4 presents the likelihood of rejection for both types of agent, contingent on a rejection by another agent in the previous period. We can perform some simple statistical tests for sequential dependencies on these data.

Consider Menu 1: In Treatment 1, L types reject Menu 1 12/15 times (80%) after a menu was rejected by another agent, compared to 26/42 times (62%) otherwise. Similarly, H types reject Menu 1 6/18 times (33%) after another agent rejects a menu, compared to 9/49 times (18%) otherwise. Each of these differences is only marginally significant statistically ($Z \cong 1.30$, $p \cong .10$, one-tailed test). If we aggregate these proportions to increase the number of observations, we see that agents reject Menu 1 18/33 times (55%) after observing a rejection, but only 35/91 times (38%) otherwise; the test of proportions gives $Z = 1.60$, $p \cong .05$, one-tailed test.[25]

Since there are far fewer rejections in Treatment 2, it should not be surprising that differences are not statistically significant - agents reject Menu 1 3/9 times (33%) after observing a rejection, compared to 24/117 times (20%) otherwise. While the difference goes in the expected direction, the test of proportions only gives $Z = 0.93$, $p = .18$. In response to Menu 2, L types show little difference in rejection rates across treatments– 13/16 (81%) vs. 23/28 (82%) in Treatment 1, and 0/15 (0%) vs. 3/76 (4%) in Treatment 2.[26] While agents may be uncertain about whether is it “reasonable” to reject the most lopsided contract menu, the choice of rejecting Menu 2 seems idiosyncratic and unaffected by the choices of other agents.

[25] Note that these tests assume independence for possible multiple observations of an agent’s behavior, and so the significance may be overstated.

[26] Since H types never reject Menu 2, there is obviously no difference in behavior induced by observing a rejection (0/12 vs. 0/24 in Treatment 1; 0/7 vs. 0/78 in Treatment 2).

It is clear that further evidence is needed. We feel that the issue of learning experimental social norms may be a fruitful area for future research.

VI. CONCLUSION

Our evidence suggests that, while there are many lopsided contract menus proposed and rejected in early periods, the principals quickly learn the group standard for menu acceptability and the production team functions thereafter in a relatively efficient manner. It is interesting that changing the reservation payoffs leads to a different menu becoming a quasi-equilibrium after a number of periods, even though standard contract theory would predict no differential effect.

We observe a substantial degree of heterogeneity in the behavior of both principals and agents. This may be due to differing perceptions about what is the "fair" menu that should be offered. There is also evidence that agents are unsure about whether to reject contract menus and are influenced by the observed choices of other agents. Perhaps these agents update their views about the social norms and adjust their values accordingly. The socially-appropriate action is not always obvious and so it seems reasonable that some people look to their peers for guidance. More research on this issue is needed.

Overall, we can say that the behavior of agents seems mostly consistent with the three models of "social preferences" described in the previous section. We think that this is important, because it shows that principal-agent models would give more realistic predictions if they incorporated this social dimension in the models. For example, it is possible that this is the reason why observed incentive schemes are much less "powerful" than would be expected given standard theory (see Jensen and Murphy 1990). The documented absence of relative performance pay within firms (Garen 1994) might also be the result from these considerations. To the extent that these data generalize, it appears there is considerable scope for integrating social preferences into contract theory.

We have emphasized that, in our design, different models of social preferences have similar degrees of success in explaining our data. It is obvious from earlier research (e.g., Charness and Rabin 1999) that this is not a general result in all contexts, so it could be interesting to examine contracting problems where the models make different predictions. For example, the predictions of the various models would differ more strongly if the high-type agent, instead of the principal, was eligible to receive the largest share.

For reasons of simplicity, and to focus on the interactive nature of preferences, we have limited the contract space. One could relax that constraint to explore the extent to which complexity issues are important in this interaction. This would also allow us to check if the "social optimality" of contracts that we observe in Treatment 1 extends when the contract choice is richer.

Since more effective contracts are likely to lead to better economic outcomes, we feel that further research on contracts and social preferences is warranted.

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APPENDIX 1 - INSTRUCTIONS

Thank you for participating in this experiment. The experiment will consist of a series of 15 decision periods. In each period you will be randomly and anonymously matched with two other persons; the action you choose and the action chosen by the persons with whom you are matched will jointly determine your payoffs in each period.

You have been assigned a subject number. Please retain this number, as we will need it to pay you at the end of the experiment.

Process: There are two classes of players: *proposers* and *responders*. The responders can be one of two types: HIGH or LOW. The class to which the player is assigned (proposer or responder) and the type of the players (in the case the player is a responder) are chosen randomly at the beginning of the game. Each responder has an equal initial probability to be of either type HIGH or type LOW. Half of all responders will be of each type. Each responder knows his type, but no other participant does. Your role (class and type) *will not change during the experiment*. Your subject number, class and type (if you are a responder) are printed on the decision sheet we have given you.

In each period you will be randomly-matched in groups of three players, according to subject numbers. All groups will be composed of a proposer and two responders of any combination of types; *ex ante*, there is a 25% chance that both responders are HIGH, a 50% chance that one is HIGH and the other is LOW, and a 25% chance that both are LOW.[27] The identity of the other players in the group is unknown to you and the composition of the groups will change randomly every period. While you will not know the matching process, we would be happy to show you (at the end of the experiment) how the matches were created.

Once the period begins each proposer must make a selection from one of 3 possible choices {1,2,3} and will do so by checking a box for that period on the decision sheet provided. We will come around the room and record each proposer selection. Next we will go around the room and mark the proposer selections on the decision sheets of the responders in the appropriate groups. At this point, the two responders in each group must each choose one of the three available options {1,2,VETO} by checking the corresponding box on the decision sheet. (For both proposers and responders, we ask that you do not fill in the spaces clearly marked as EXPERIMENTER.) We will then record these choices. Finally, we will once again go around the room and mark the responder decisions (and the type of responders) for each group on the decision sheets for all members of that group. At this point, you can calculate your payoff from the period from the table provided.

How choices depend on points: The payoffs will be a function of the proposer's choice and the responders' responses. Please refer to the table provided and we will offer some examples of how this process works. [This Table is at the end of Appendix 1.]

First, you should understand that, unless one of the responders chooses to VETO the proposer's choice, the payoff for any responder depends **only** on the proposer's choice and the responder's choice. No person will ever receive a negative payoff *unless she chooses it herself*.

[27] In fact, these were the actual probabilities, given our matching scheme (see Appendix 2). The *ex ante* probabilities are 3/14, 4/7, and 3/14.

If **either** responder chooses to VETO the proposal, then the VETO payoffs (shown in the columns shaded in gray on the payoff table in your packet) would result.

If you are a Responder, you may be wondering how you can tell if you are Responder 1 or Responder 2. There is an algorithm you can use which will make your task easier: if you are a Responder of the HIGH type, simply consider yourself to be Responder 1; if you are a Responder of the LOW type, simply consider yourself to be Responder 2. In all cases, this will ensure that your payoffs correspond to your choices.

Suppose the proposer chooses option 1 and faces responders who are both type HIGH. Suppose further that both responders choose option 1. First, find the rows corresponding to Proposer Choice 1. Next, find the 5 columns corresponding to the case where both responders are HIGH. The column that is relevant in this case is headed by “11”. As you can see, the Proposer would receive 3950 pesetas, Responder 1 would receive 775 pesetas and Responder 2 would receive 775 pesetas. Suppose instead that Responder 1 chooses option 1 and Responder 2 chooses option 2. The column that is now relevant is headed by “12”. In this case the Proposer would receive 3075 pesetas, Responder 1 (who chose option 1) would receive 775 pesetas, and Responder 2 (who chose option 2) would receive 725 pesetas. If instead Responder 1 chooses option 2 and Responder 2 chooses option 1, the column that is now relevant is headed by “21”. In this case the Proposer would receive 3075 pesetas, Responder 1 (who chose option 2) would receive 725 pesetas, and Responder 2 (who chose option 1) would receive 775 pesetas. If instead Responder 1 chooses option 2 and Responder 2 chooses option 2, the column that is now relevant is headed by “22”. In this case the Proposer would receive 2175 pesetas, Responder 1 would receive 725 pesetas, and Responder 2 would receive 725 pesetas. Suppose instead that **either** Responder chooses to VETO the proposer's choice. In this case, the Proposer would receive 500 pesetas and each Responder would receive 500 pesetas.

Suppose the Proposer chooses option 2 and faces two LOW Responders. First, find the rows corresponding to Proposer Choice 2. Next, find the 5 columns corresponding to the case in which both responders are LOW. Suppose further that both responders choose option 1. The column that is relevant in this case is headed by “11”. As you can see, the Proposer would receive 2500 pesetas, Responder 1 would receive -550 pesetas and Responder 2 would receive -550 pesetas. Suppose instead that Responder 1 chooses option 1 and Responder 2 chooses option 2. The column that is now relevant is headed by “12”. Then the Proposer would receive 2400 pesetas, Responder 1 (who chose option 1) would receive -550 pesetas, and Responder 2 (who chose option 2) would receive 550 pesetas. If instead Responder 1 chooses option 2 and Responder 2 chooses option 1, the column that is now relevant is headed by “21”. Then the Proposer would receive 2400 pesetas, Responder 1 (who chose option 2) would receive 550 pesetas, and Responder 2 (who chose option 1) would receive -550 pesetas. If instead Responder 1 chooses option 2 and Responder 2 chooses option 2, the column that is now relevant is headed by “22”. Then the Proposer would receive 2300 pesetas, Responder 1 would receive 550 pesetas, and Responder 2 would receive 550 pesetas. Suppose instead that **either** Responder chooses to VETO the proposer's choice. In this case, the Proposer would receive 500 pesetas and each Responder would receive 500 pesetas.

Suppose the Proposer chooses option 3 and faces one HIGH responder and one LOW responder (by the way the table is written, the type HIGH is necessarily Responder 1 and the type LOW is necessarily Responder 2). First, find the rows corresponding to Proposer Choice 3. Next, find the 5 columns corresponding to the case where one responder is HIGH and the other is LOW. Suppose further that both responders choose option 1. The column that is relevant in this case is headed by “11”. As you can see, the Proposer would receive 2050 pesetas, Responder 1 would receive 1725 pesetas and Responder 2 would receive -325 pesetas. Suppose instead that Responder 1 chooses option 1 and Responder 2 chooses option 2. The column that is now relevant is headed by “12”. Then the Proposer would receive 1625 pesetas, Responder 1 (who chose option 1) would receive 1725 pesetas, and Responder 2 (who chose option 2) would receive 1000 pesetas. If instead Responder 1 chooses option 2 and Responder 2 chooses option 1, the column that is now relevant is headed by “'21”. Then the Proposer would receive 1625 pesetas, Responder 1 (who chose option 2) would receive 1225 pesetas, and Responder 2 (who chose option 1) would receive -325 pesetas. If instead Responder 1 chooses option 2 and Responder 2 chooses option 2, the column that is now relevant is headed by “22”. Then the Proposer would receive 1175 pesetas, Responder 1 would receive 1225 pesetas, and Responder 2 would receive 1000 pesetas. Suppose instead that **either** Responder chooses to VETO the proposer's choice. In this case, the Proposer would receive 500 pesetas and each Responder would receive 500 pesetas.

Payment: Each person will be paid individually and privately. Only one of the 15 periods will be chosen at random for actual payment, using a die with multiple sides. In addition, you will receive 500 pesetas for participating in the experiment. If, in the period selected your payoff is negative, it will be deducted from the 500 peseta show-up fee; however, no one will receive a net payoff less than 0.

If you have questions raise your hand and one of us will come and answer your question. Direct communication between participants is strictly forbidden. Please ask questions if you do not fully understand the instructions. Are there any questions?

PAYOFF TABLE

	2 HIGH responders						1 HIGH, 1 LOW responder						2 LOW responders				
	11	**12**	**21**	**22**	**VETO**		**11**	**12**	**21**	**22**	**VETO**		**11**	**12**	**21**	**22**	**VETO**
Proposer	3950	3075	3075	2175	500		3950	3075	3075	2175	500		3950	3075	3075	2175	500
Responder 1	775	775	725	725	500		775	775	725	725	500		-1275	-1275	525	525	500
Responder 2	775	725	775	725	500		-1275	525	-1275	525	500		-1275	525	-1275	525	500
Proposer	2500	2400	2400	2300	500		2500	2400	2400	2300	500		2500	2400	2400	2300	500
Responder 1	1450	1450	1050	1050	500		1450	1450	1050	1050	500		-550	-550	550	550	500
Responder 2	1450	1050	1450	1050	500		-550	550	-550	550	500		-550	550	-550	550	500
Proposer	2050	1625	1625	1175	500		2050	1625	1625	1175	500		2050	1625	1625	1175	500
Responder 1	1725	1725	1225	1225	500		1725	1725	1225	1225	500		-325	-325	1000	1000	500
Responder 2	1725	1225	1700	1225	500		-325	1000	-325	1000	500		-325	1000	-325	1000	500

APPENDIX 2 - INDIVIDUAL PRINCIPAL CHOICES AND RESPONSES

A matching scheme was randomly-determined (subject to no group repeating in two consecutive periods) and was used in all sessions. One can track the entire history of the sessions, given the matching scheme below and the results presented in previous Tables. Principals were # 1, 2, 11, and 12; H types were # 3, 4, 9, and 10; L types were # 5, 6, 7, and 8:

Period	Group 1			Group 2			Group 3			Group 4		
1	1	10	6	2	4	3	11	9	5	12	7	8
2	1	4	3	2	5	6	11	9	7	12	10	8
3	1	9	7	2	4	5	11	3	10	12	8	6
4	1	3	6	2	9	5	11	10	7	12	4	8
5	1	6	5	2	4	8	11	3	7	12	10	9
6	1	9	4	2	3	7	11	8	5	12	10	6
7	1	10	7	2	6	8	11	3	4	12	9	5
8	1	6	7	2	10	3	11	5	8	12	4	9
9	1	3	7	2	9	6	11	10	5	12	4	8
10	1	4	5	2	7	6	11	10	9	12	3	8
11	1	10	5	2	9	7	11	8	6	12	3	4
12	1	6	8	2	5	7	11	3	9	12	10	4
13	1	7	5	2	4	10	11	3	6	12	9	8
14	1	6	8	2	4	9	11	3	5	12	10	7
15	1	10	4	2	8	5	11	3	6	12	9	7

TREATMENT 1

Prop.	Period														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1*/	2	2	1*	2**	2	3	2**	1*	2*	1*	3	3	3	1*
2	1	2	1	1*/	1*	2*	1**	1*	3	2*	3	3	1	2	1**
3	1	1*	1*	2*	3	3	3	3	3	3	3	3	3	3	3
4	1*	1**	1*	2*	3	2*	2*	3	3	3	3	3	3	3	3
5	1*	1	1**	2*	1**	3	2	2**	1*	3	1*	3	2**	3	2
6	1	1*	1	1**	2*/	1*	3	1	3	3	3	3	3	3	3
7	1/	1**	1	1*	2*	1**	1	2**	2*	1*	2**	1*	2*	3	1*
8	1	1*	1*	3	2	2*	2*	3	3	3	3	3	3	3	1**
9	1	1/	1**	3	2*	3	3	3	3	3	3	3	3	3	3
10	1/	1*	1*/	2*	1*/	3	3	3	3	3	3	3	1/	3	3
11	1*	1*	2	3	2*	3	3	2**	3	3	1*	2	2	1*	3
12	1*	1*	2	3	3	1	2*	1	3	2*	3	1/	2*	2*	1*

TREATMENT 2

Prop.	Period 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	2	2	2	2	2*	2	2	2	2	2	2	2	2	2	2
2	1	2	3	2*	1	2	2	1	2	2	2	1**	2	2	2
3	1/	1	1	1	1	1*	1	1*	1	1	1*	1	1	1	1*
4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
5	1	1	1	1	1	1*	1*	1	1/	2	2	2	2	2	2
6	2	1	3	2	2	3	2	1*	2	2	3	2	3	2	3
7	3	2	2	2	2	1	1*/	2	2	2	2	2	2	2	2
8	1	1*	1	1*	1	1	1*	1*	1/	1*	1//	2	1*	2	2
9	1	3	2	1*	1	3	2	3	2	1*	2	1*	3	2*	1
10	2	2	2	1	1**	3	3	3	2	2	1	2	2	2	2
11	1	2	1*	2	2	2	2	1*	2	2	2	2	2	2	2
12	1*	1	1	1*	2	2	1	1*	2	1*	2	2	2	2	2

* means a rejection, ** means both agents rejected.
/ means a low play by an H type. // means two low plays by H types.

Principals 1-4 were in the first session in the treatment, 5-8 were in the second session, and 9-12 were in the third session.

AGGREGATED MENU PROPOSALS BY PERIOD

	Period 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Treatment 1															
Menu 1	12	10	9	4	3	3	2	3	2	1	3	2	2	1	5
Menu 2	0	2	3	4	6	4	4	4	1	3	1	1	4	2	1
Menu 3	0	0	0	4	3	5	6	5	9	8	8	9	6	9	6
Treatment 2															
Menu 1	7	5	5	6	6	4	5	7	3	4	3	3	2	1	2
Menu 2	3	5	4	5	5	4	5	2	8	7	7	8	7	10	8
Menu 3	2	2	3	1	1	4	2	3	1	1	2	1	3	1	2

PRINCIPAL % OF TOTAL EARNINGS

	Period 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Treatment 1	66	51	53	36	37	41	43	46	37	37	37	41	46	38	38
Treatment 2	63	57	54	55	58	53	55	52	55	55	53	54	51	53	53

APPENDIX 3 – INDIVIDUAL AGENT CHOICES BY PERIOD

TREATMENT 1 (500)

	Period														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L1	1/2	2/2	1/2	1/2	2/3	3/2	2/3	3/2	3/2	2/3	1/3	3/2	3/2	3/2	1/3
L2	1/3	2/2	1/2	1/3	2/3	2/3	1/3	2/3	3/2	2/3	3/2	3/2	3/2	3/2	3/2
L3	1/2	1/3	2/2	2/3	3/2	2/3	3/2	2/3	1/3	2/2	3/2	3/2	3/2	3/2	3/2
L4	1/3	1/3	1/3	2/3	1/3	3/2	1/3	3/2	3/2	3/2	3/2	3/2	3/2	3/2	1/3
L5	1/2	1/2	1/2	1/3	1/3	1/3	2/3	2/3	2/3	3/2	1/3	3/2	2/3	3/2	3/2
L6	1/3	1/3	1/3	2/3	1/3	2/3	3/2	2/3	3/2	3/2	2/3	3/2	2/3	3/2	1/3
L7	1/2	1/3	1/3	1/3	2/3	1/3	2/2	2/3	1/3	3/2	3/2	3/2	2/3	3/2	1/3
L8	1/2	1/2	1/2	3/2	2/3	1/3	3/2	2/3	3/2	3/2	2/3	3/2	3/2	3/2	3/2
L9	1/2	1/3	1/3	2/3	2/3	3/2	2/3	2/3	3/2	3/2	3/2	3/2	3/2	1/3	3/2
L10	1/1	1/2	2/2	3/2	2/2	1/2	3/2	3/2	3/2	3/2	1/2	3/2	2/2	3/2	3/2
L11	1/3	1/2	1/3	3/2	2/3	3/2	3/2	3/2	3/2	3/2	3/2	3/2	3/2	2/3	1/3
L12	1/2	1/3	2/3	3/2	1/3	3/2	3/2	2/3	3/2	2/3	1/3	3/2	2/3	3/2	3/2
H1	1/2	2/1	1/1	1/1	3/1	2/1	3/1	1/1	1/1	3/1	3/1	3/1	3/1	3/1	3/1
H2	1/1	2/1	1/1	2/2	1/1	2/1	3/1	3/1	3/1	2/1	3/1	3/1	1/1	2/1	1/1
H3	1/1	1/1	2/1	1/3	3/1	2/1	2/1	3/1	3/1	3/1	3/1	3/1	3/1	2/1	3/1
H4	1/2	1/3	1/3	2/1	3/1	2/1	3/1	1/3	3/1	3/1	1/1	3/1	1/1	3/1	1/3
H5	1/1	1/1	1/1	2/1	2/2	1/1	1/1	1/1	1/1	3/1	3/1	1/1	2/2	3/1	1/1
H6	1/1	1/1	1/1	3/1	2/2	3/1	1/1	3/1	3/1	3/1	3/1	3/1	3/1	3/1	3/1
H7	1/2	1/3	1/3	1/3	2/1	3/1	2/1	3/1	3/1	1/3	3/1	1/3	3/1	3/1	1/3
H8	1/1	1/3	1/1	1/1	2/1	2/1	2/1	1/1	2/1	1/1	1/1	3/1	3/1	3/1	2/1
H9	1/1	1/1	2/1	3/1	2/1	3/1	3/1	3/1	3/1	2/1	3/2	2/1	2/1	1/1	3/1
H10	1/2	1/2	1/2	3/1	1/2	3/1	3/1	1/1	3/1	3/1	3/1	1/2	1/2	3/1	3/1
H11	1/3	1/3	1/3	2/1	3/1	3/1	2/1	1/1	3/1	3/1	3/1	2/1	2/1	3/1	1/1
H12	1/1	1/1	2/1	3/1	3/1	1/1	3/1	3/1	3/1	3/1	3/1	1/1	1/1	2/1	3/1

In this table, “x/y” indicates Menu x and response y, where 1 means “high effort”, 2 means “low

TREATMENT 2 (250)

	Period														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L1	1/2	2/2	3/2	2/3	2/3	1/3	3/2	1/3	1/2	2/2	2/2	1/3	2/2	1/2	2/2
L2	2/2	2/2	3/2	2/2	2/2	3/2	2/2	2/2	2/2	2/2	1/3	2/2	1/2	2/2	1/3
L3	3/2	1/2	2/2	1/2	1/2	2/2	2/2	2/2	2/2	2/2	2/2	1/3	2/2	3/2	3/2
L4	3/2	3/2	3/2	3/2	1/2	1/2	2/2	1/2	3/2	3/2	1/2	2/2	3/2	2/2	2/2
L5	3/2	1/2	3/2	2/2	1/2	1/2	1/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	3/2
L6	1/1	1/2	1/2	1/2	1/2	1/2	2/2	1/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2
L7	1/2	2/2	1/2	2/2	2/2	3/2	1/2	1/2	1/2	2/2	3/2	2/2	2/2	3/2	2/2
L8	1/2	1/2	1/2	1/2	2/2	1/2	2/2	2/2	1/2	1/2	2/2	2/2	1/2	2/2	3/2
L9	1/2	2/2	2/2	1/2	1/2	2/2	1/2	1/2	2/2	1/2	2/2	2/2	3/2	2/2	2/2
L10	1/1	2/2	1/2	1/2	1/2	2/2	3/2	3/2	2/2	2/2	2/2	1/2	2/2	2/2	2/2
L11	1/3	2/2	2/2	2/2	2/2	3/2	2/2	3/2	2/2	2/2	1/2	2/2	3/2	2/2	2/2
L12	1/2	1/2	1/2	1/2	1/3	2/2	3/2	1/3	2/2	1/3	2/2	1/3	2/2	2/3	2/2
H1	1/1	2/1	1/1	2/1	1/1	2/1	1/1	1/1	2/1	3/1	3/1	1/1	1/1	1/1	1/1
H2	1/1	2/1	3/1	3/1	1/1	2/1	1/1	3/1	3/1	2/1	3/1	3/1	2/1	2/1	2/1
H3	1/2	1/1	2/1	2/1	3/1	2/1	3/1	3/1	2/1	1/1	2/1	1/1	3/1	2/1	3/1
H4	2/1	3/1	1/1	1/2	3/1	3/1	2/1	1/1	1/1	1/1	2/1	3/1	2/1	3/1	2/1
H5	2/1	1/1	2/1	1/1	2/1	3/1	1/2	1/1	1/2	1/3	1/2	2/1	2/1	2/1	2/1
H6	2/1	1/1	3/1	1/3	2/1	1/3	1/3	1/3	1/2	2/1	1/2	2/1	3/1	2/1	2/1
H7	3/1	2/1	1/1	2/1	1/1	1/1	1/3	1/1	2/1	2/1	3/1	2/1	1/3	2/1	2/1
H8	1/1	1/3	2/1	2/1	1/1	1/1	1/3	1/1	2/1	2/1	2/1	2/1	3/1	2/1	2/1
H9	2/1	3/1	1/3	1/3	2/1	3/1	2/1	3/1	2/1	1/3	2/1	2/1	2/1	2/1	2/1
H10	2/1	3/1	2/1	1/3	1/3	3/1	2/1	1/3	2/1	1/3	2/1	2/1	2/1	2/1	1/1
H11	1/1	2/1	2/1	1/1	2/1	3/1	1/1	1/1	2/1	2/1	1/1	2/1	2/1	2/1	2/1
H12	1/1	1/1	1/1	2/1	2/1	2/1	2/1	3/1	2/1	2/1	2/1	2/1	2/1	2/1	1/1

In this table, “x/y” indicates Menu x and response y, where 1 means “high effort”, 2 means “low

APPENDIX 4 - REJECTIONS BY AGENTS[28]

Treatment 1 (500)

L types
6/7 reject M1 in the period after a high type rejects menu 1
2/2 reject M2 in the period after a high type rejects menu 1
4/5 reject M1 in the period after a low type rejects menu 1
5/7 reject M2 in the period after a low type rejects menu 1
2/3 reject M1 in the period after a low type rejects menu 2
6/7 reject M2 in the period after a low type rejects menu 2

H types
0/3 reject M1 in the period after a high type rejects menu 1
0/2 reject M2 in the period after a high type rejects menu 1
5/6 reject M1 in the period after a low type rejects menu 1
0/7 reject M2 in the period after a low type rejects menu 1
1/9 reject M1 in the period after a low type rejects menu 2
0/4 reject M2 in the period after a low type rejects menu 2

Treatment 2 (250)

L types
1/4 reject M1 in the period after a high type rejects menu 1
0/7 reject M2 in the period after a high type rejects menu 1
0/3 reject M1 in the period after a low type rejects menu 1
0/4 reject M2 in the period after a low type rejects menu 1
0/0 reject M1 in the period after a low type rejects menu 2
0/2 reject M2 in the period after a low type rejects menu 2

H types
2/2 reject M1 in the period after a high type rejects menu 1
0/3 reject M2 in the period after a high type rejects menu 1
0/3 reject M2 in the period after a low type rejects menu 1
0/1 reject M2 in the period after a low type rejects menu 2

[28] We also include responses with a one-period lag if the menu offered in the next period after the rejection was menu 3.

INDIVIDUAL AGENT BEHAVIOR

L types

	L1		**L2**		**L3**		**L4**	
Session	M1	M2	M1	M2	M1	M2	M1	M2
1	2/5	3/4	3/4	4/5	2/3	3/5	6/6	1/1
2	4/7	4/4	5/5	5/5	6/7	3/4	1/4	3/3
3	3/4	4/4	0/4	0/3	3/4	2/2	3/4	4/4
4	3/6	2/7	2/3	0/10	1/4	0/8	0/4	0/4
5	0/4	0/8	0/7	0/8	0/5	0/8	0/8	0/6
6	0/6	0/8	0/5	0/8	1/2	0/10	4.8	1/6

H types

	H1		**H2**		**H3**		**H4**	
Session	M1	M2	M1	M2	M1	M2	M1	M2
1	0/5	0/2	0/5	0/5	1/3	0/4	4/7	0/2
2	0/9	0/3	0/4	0/1	6/7	0/2	1/7	0/5
3	0/3	0/5	0/7	0/0	3/5	0/4	0/5	0/2
4	0/9	0/4	0/3	0/6	0/4	0/6	0/5	0/5
5	1/7	0/7	4/7	0/6	2/6	0/7	2/6	0/8
6	3/3	0/9	4/5	0/8	0/5	0/9	0/4	0/10

X/Y in each cell refers to: Times the agent chose rejection/Times menu was offered

APPENDIX 5 – CONSISTENCY OF AGENT CHOICES

Agent	Treatment 1 (500)				Treatment 2 (250)			
	Response to Menu 1		Response to Menu 2		Response to Menu 1		Response to Menu 2	
	2	**R**	**2**	**R**	**2**	**R**	**2**	**R**
L1	3	2	1	3	3	3	5	2
L2	1	3	1	4	1	2	10	0
L3	1	2	2	3	3	1	8	0
L4	0	6	0	1	4	0	4	0
L5	3	4	0	4	4	0	8	0
L6	0	5	0	5	5	0	8	0
L7	1	6	1	3	5	0	7	0
L8	3	1	0	3	8	0	6	0
L9	1	3	0	4	6	0	8	0
L10	4	0	3	0	4	0	8	0
L11	1	3	0	2	1	1	10	0
L12	1	3	0	3	4	4	5	1

Agent	Treatment 1 (500)						Treatment 2 (250)					
	Response to Menu 1			Response to Menu 2			Response to Menu 1			Response to Menu 2		
	1	**2**	**R**	**1**	**2**	**R**	**1**	**2**	**R**	**1**	**2**	**R**
H1	9	0	0	4	0	0	9	0	0	4	0	0
H2	3	0	0	6	0	0	3	0	0	6	0	0
H3	3	1	0	6	0	0	3	1	0	6	0	0
H4	4	1	0	5	0	0	4	1	0	5	0	0
H5	3	3	1	2	0	0	3	3	1	2	0	0
H6	1	2	4	7	0	0	1	2	4	7	0	0
H7	4	0	2	7	0	0	4	0	2	7	0	0
H8	4	0	2	7	0	0	4	0	2	7	0	0
H9	0	0	3	9	0	0	0	0	3	9	0	0
H10	1	0	4	9	0	0	1	0	4	9	0	0
H11	5	0	0	9	0	0	5	0	0	9	0	0
H12	3	0	0	10	0	0	3	0	0	10	0	0

Choices 1, 2, and Reject are denoted “1”, “2”, and “R”, respectively

APPENDIX 6 –ANOMALIES AND CONSISTENCY WITH OTHER DATA

Menu-type-treatment	Observed Rejection rate	BO cutoff (absolute value)	FS cutoff (â=0.5*á)	CR cutoff (ρ_P=0.5 in M2)
M2 – L – 500	11/12	260	0.04	0.33
M1 – L – 500	9/12	130	0.02	0.17
M1 – L – 250	4/12	1410	0.24	0.64
M1 – H – 500	3/12	1600	0.20	0.47
M1 – H – 250	3/12	3050	0.38	0.83
M2 – L – 250	0/12	1580	0.26	0.86
M2 – H – 500	0/12	31700	1.52	2.03
M2 – H – 250	0/12	40100	1.92	2.54

Anomalies

None of the social preference models have a complete alignment with parameter cut-off values and the observed rejection behavior. Let us examine the anomalies model by model

For CR the only problem is that the proportion of low type "rejectors" of menu 1 in treatment 2 should be lower than the high type "rejectors" of menu 1 and in the data it is higher (4 versus 3). However the difference is small and statistically insignificant. The other two models have somewhat bigger problems.

The FS model predicts that Menu 1 rejections for the high types in treatment 1 should be larger than Menu 1 rejections for low types in treatment 2, whereas we have the opposite (3 versus 4). This model also predicts that Menu 1 rejections for high types in treatment 2 should be lower than Menu 2 rejections for low types in treatment 2, whereas we have higher (3 versus 0).

Similarly, the BO model has the problem that Menu 2 rejections for low types in treatment 2 should be higher than the Menu 1 rejection rates for high types in both treatments, whereas it is actually lower (0 versus 3). These differences are a bit worrisome, although not statistically significant (the Fisher exact test gives a one-tailed p = .11; see Siegel and Castellan 1988).

Comparison with other experimental data

With respect to FS, we can infer from Table A that about 1/12 of the players have an a_i parameter between 0 and 0.02, 8/12 have parameters between 0.02 and 0.2 or 0.3, and 3/12 have a parameter larger than 0.3 but smaller than 2. Table III in Fehr and Schmidt (1999) offers data suggesting that 30% of subjects have a value of 0, 30% have a value of 0.5, 30% have a value of 1 and 10% have a value of 4. Our estimated values shift the distribution a bit towards the left (it gives more weight to smaller values) but, given the relatively small numbers, it does not look like an important difference.

We can also compare our results with evidence from "similar" games in Charness and Rabin (1999) and Charness and Rabin (2000).[29] When B has a choice between (A,B) payoffs of (800,200) or (0,0), 11% of the population (13/114) have an implied á$_i$ parameter larger than 0.33, and when B has a choice between (750,400) and (375,375), 29% of the population (15/52) have an implied á$_i$ parameter larger than 0.07. In our data, we have 11/12 larger than 0.02 and 3/12 larger than about 0.25; these proportions seem roughly consistent. Checking BO with these data, the (800,200) vs. (0,0) choices suggest that 11% have an implied c_i parameter larger than 2222 and the (375,375) vs. (750,400) suggest that 29% have a value of c_i larger than 1080. Again comparing with our data, we have 11/12 larger than 75 and 3/12 larger than about 1000; once again, these proportions seem roughly consistent.

[29] We use the data from 5 games: 1) A can choose (500,500) or enter. If A enters, B chooses (800,200) or (0,0); 2) A can choose (750,750) or enter. If A enters, B chooses (800,200) or (0,0); 3) A can choose (700,300) or enter. If A enters, B chooses (800,200) or (0,0); 4) A can choose (550,550) or enter. If A enters, B chooses (75,400) or (375,375); 5) A can choose (750,750) or enter. If A enters, B chooses (750,400) or (375,375).

FIGURE 1
Proposals over Time (Treatment 1)

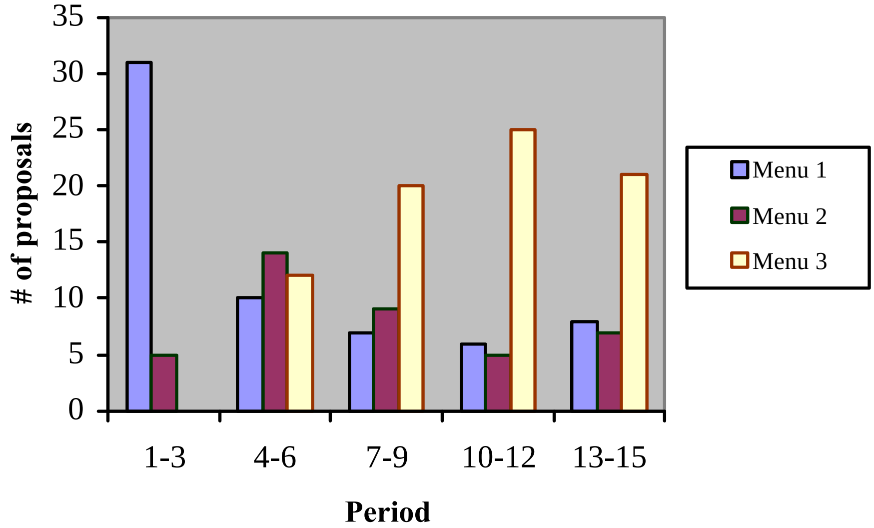

FIGURE 2
Proposals over Time (Treatment 2)

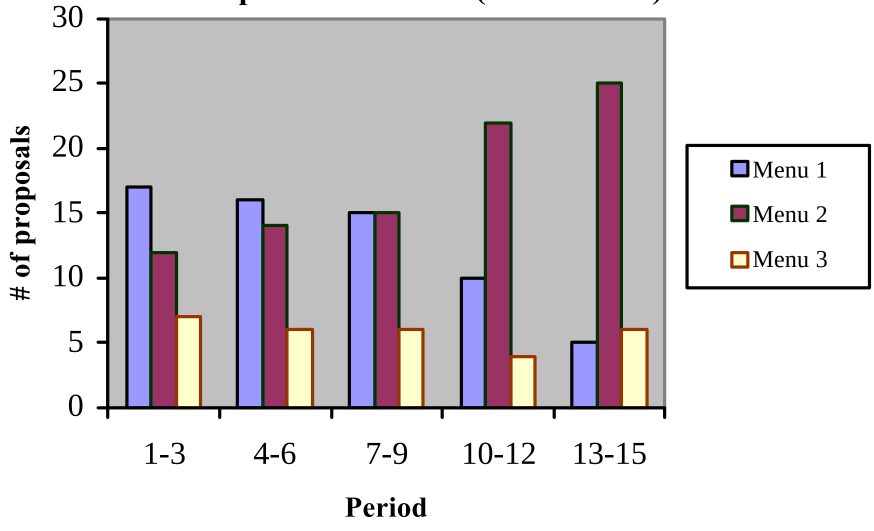

FIGURE 3

Rejection Rates over Time (Treatment 1)

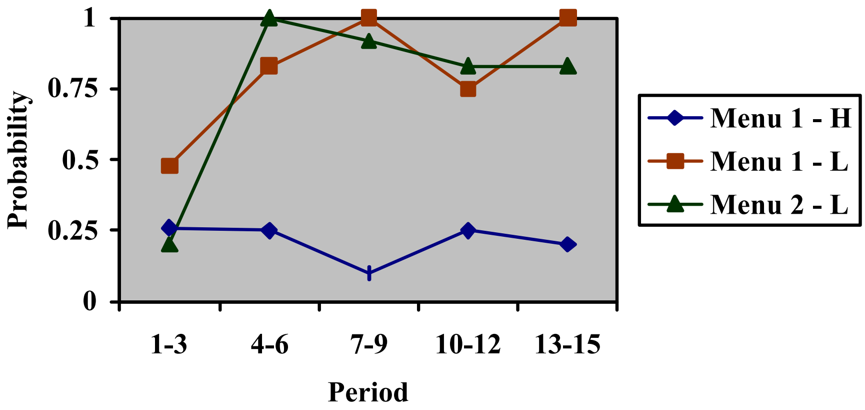

FIGURE 4

Rejection Rates over Time (Treatment 2)