

Fairness and Entitlement in Majoritarian Decision-Making*

Daniel Diermeier

IBM Professor of Regulation and Competitive Practice
Department of Managerial Economics and Decision Sciences (MEDS) and
Center for Business, Government, and Society
Kellogg School of Management
Northwestern University
d-diermeier@kellogg.northwestern.edu

Sean Gailmard

Assistant Professor
Harris School of Public Policy Studies
University of Chicago
gailmard@uchicago.edu

This Version: February 5, 2004

* Financial support from the Dispute Research and Resolution Center and the Dean of the Kellogg School of Management of Northwestern University is gratefully acknowledged. Thanks to seminar participants at Princeton, NYU, and Northwestern, and panelists at the 2003 APSA annual meeting in Philadelphia, for helpful comments.

Fairness and Entitlement in Majoritarian Decision-Making

Abstract

We experimentally test competing theories of three-player majoritarian bargaining models with fixed, known disagreement values. Subjects are randomly assigned to three roles: a proposer and two types of voters. Each role is randomly assigned a disagreement value, i.e. a given amount of money he/she will receive if the proposal is rejected. These values are known to all players before any decision is made. Proposers then make a take-it-or-leave-it offer on how to split a fixed, known amount of money among the players. If a majority of players accepts the proposal, the players' payoffs are determined by the proposal; if the proposal is rejected, each player receives his or her reservation value. We assess the ability of three behavioral hypotheses – selfish, egalitarian, and inequality-averse– to account for our results. Our primary design variable is the proposer's reservation value, which allows us to obtain different implications from each hypothesis. We find that each hypothesis is inconsistent with our data in important respects. In particular, subjects strongly respond to changes in reservation values as if they were interpreted as a basic form of property rights.

1. Introduction

Since its publication in 1978, the Romer-Rosenthal model has been recognized as a powerful tool to study political decision-making - from its original application, to school board referenda, to legislative politics. As in the median voter model, voters are assumed to have single-peaked preferences over a single dimensional policy space. However, in contrast to the median voter model, one legislator has the power to propose an alternative to the status quo policy. If the median voter's ideal policy is located in the interval defined by a status quo policy and the proposer's ideal policy, then the proposer can exploit his proposal power by proposing a policy that makes the median (or "pivotal voter") indifferent between accepting and rejecting this policy. It follows that the proposal will be accepted, using a simple subgame-perfection argument. Thus, agents with proposal power may be able to bias the policy outcome away from the median voter's ideal point.

The Romer-Rosenthal model can easily be generalized to a large class of legislative decision rules (e.g. voting rules with super-majority requirements or veto players) and to other choice spaces.¹ For example, for any given proposal we can derive for each voter a reservation value, the utility difference between the proposal and the status quo, provided voters have additively separable preferences over policy and divisible benefits ("money").² Equivalently, the proposer could distribute a fixed amount of money subject to approval by a decisive coalition among the voters who have a commonly known reservation value. In equilibrium the proposer would assemble a coalition of the cheapest voters, pay each voter her reservation value, and keep the rest.³

This idea is at the heart of the Baron-Ferejohn model of legislative bargaining (Baron and Ferejohn 1989a) over a fixed amount of money. However, in contrast to the simple model outline above, Baron and Ferejohn derive each voter's reservation value endogenously.⁴ Formally, the

¹ See Krehbiel (1998) for a detailed application to U.S. legislative decision-making.

² See Snyder (1991) for this approach to legislative decision-making.

³ One unimportant difference to the spatial model is that the voters outside of the winning coalition will receive a payoff of zero in the "divide-the-dollar" environment, but may have a negative payoff in the spatial model. Obviously, the latter could be implemented in a "redistribute-the-dollar" experiment where an existing allocation would be redistributed by a vote.

⁴ The Baron-Ferejohn model is among the most widely used formal frameworks in the study of legislative politics. Variants of the model have been used in the study of legislative voting rules (Baron and Ferejohn 1989a), committee power (Baron and Ferejohn 1989b), pork-barrel programs (Baron 1991a), government formation (Baron 1989, Baron and Ferejohn 1989a), multi-party elections (Austen-Smith and Banks 1988), and inter-chamber bargaining (Diermeier and Myerson 1999).

Baron-Ferejohn model is an n -player multi-period bargaining game under a given voting and amendment rule. In all variants of the model, a proposer is selected according to a known recognition rule. He then proposes a policy or an allocation of benefits to a group of voters.⁵ According to the given voting rule, the proposal is either accepted or rejected. Under the closed amendment rule, if the proposal is accepted, the game ends and all actors receive payoffs as specified by the accepted proposal. Otherwise, another proposer is selected, etc. The process continues until a proposal is accepted or the game ends. In many applications the game is potentially of infinite duration, and ends only if a proposal is accepted.

Under the closed rule, the Baron-Ferejohn model predicts that the proposer will propose a minimal winning coalition, leaving the other players with a payoff of zero. The proposing party will give the proposed coalition partner just the amount necessary to secure acceptance. This amount equals the coalition partner's expected payoff in case the proposal is rejected and the bargaining continues (her "continuation value"). Continuation values depend on the recognition rule and the discount factor. Proposals under the closed rule are thus always accepted in the first round. Note that the proposing party will always choose as a coalition partner the party with the lowest continuation value. The division of spoils will, in general, be highly unequal, especially if the players' discount factors are low.

We refer to this class of games, with the Baron-Ferejohn and Romer-Rosenthal models as special cases, as "proposer-pivot" models. One of the main reasons proposer-pivot models have been so popular in applications is that they explicitly formalize the bargaining processes and provide both point and comparative statics predictions about the effects of different institutions on bargaining behavior and outcomes. This allows researchers to analyze how different procedures and rules may affect bargaining behavior and outcomes.

Eventually, the usefulness of the proposer-pivot model depends on how well it explains behavior in actual multi-person bargaining environments. Recent experimental work on simpler two-person bargaining games has shown that such bargaining models' predictions may fail to be supported in the laboratory. For example, a number of experimental studies have examined ultimatum games (Güth, Schmittberger, and Schwartz 1982) in which one player proposes a division of a fixed amount of money; the other player must either accept or reject, with rejection

⁵ We denote proposers by male, voters by female pronouns.

implying a zero payoff for both. In experiments on ultimatum games, proposers should take (almost) all of the money, yet the divisions are far more equal than predicted. Moreover, if proposers offer less than a threshold amount⁶ the other player frequently rejects the offer (even if a significant amount of money is offered) and receives a payoff of zero. Experiments on bilateral bargaining games with alternating offers result in similar outcomes. Proposers offer more money than suggested by their subgame-perfect strategy, and bargaining partners consistently reject offers and forego higher payoffs (e.g., Camerer 2003, Forsythe et al. 1994, Güth et al. 1982, Roth 1995).⁷

Many explanations have been proposed for this finding.⁸ One of the most fruitful ones suggested that players are not trying to maximize their individual monetary payoff, but are influenced by moral motivations such as the desire to follow norms of fairness, even under experimental conditions that guarantee anonymity between players. Forsythe, Horowitz, Savin, and Sefton (1994) investigated this hypothesis by comparing ultimatum and dictator games. The dictator game differs from the ultimatum game in that the proposing player proposes a division between the two players, yet the other player (the “passive voter”) cannot reject the proposal. In the original dictator game experiments, proposers gave significant shares to passive voters. However, subsequent experiments have shown that variations in the experiment may sharply reduce or even eliminate giving to passive actors.⁹ The so-called “dummy-player game” (Güth and Van Damme 1998; Kagel and Wolfe 2001) combines the ultimatum and the dictator game in single, three-player game. That is, one of the recipients has veto power over the allocation (as in the ultimatum game), while the other player is passive. As Güth and Van Damme show, dummy players received very low payoffs.

Proposer-Pivot models (whether in the Romer-Rosenthal version with exogenously given reservation values or in the Baron-Ferejohn version with endogenously derived continuation values) are similar to these bargaining games in that proposers are expected to offer their coalition partners just enough to make them indifferent between accepting and rejecting. The

⁶ This threshold amount may vary slightly by subject pool, but in many experiments is about 40% of the total pie (e.g. Camerer 2003).

⁷ These findings are quite robust to large financial stakes, of anywhere from \$100 to a month’s wages in experiments conducted in some developing countries.

⁸ See Camerer (2003) for a detailed review of the literature.

⁹ In a double-blind condition, for example, Hoffmann et al. (1994) demonstrated a sharp increase in proposer allocations in the dictator game, but no change in the ultimatum game.

relationship between the proposer and non-coalition members in the last period, however, is also similar to the dictator game or dummy-player game, since the votes of the non-coalition members are not necessary to pass a proposal and thus should receive a payoff of zero.

Note, however, that the presence of multiple responders also introduces an element of competition. In contrast to the dummy-player game, the proposer in a proposer-pivot game can choose whom to include in his or her coalition. This potentially introduces an element of competition among (non-proposing) voters. The effect of a similar form of competition has been studied in so-called “market games” where two or more responders submit the smallest offer they would accept before being matched with a given proposer (Güth, Marchand, and Rulliere 1997; Grosskopf 2003; Fischbacher, Fong, and Fehr 2003).¹⁰ One of the most striking findings of this literature is that, in contrast to fixed bilateral interactions, behavior in multilateral pie-splitting situations closely approximates selfish behavior (Fischbacher, Fong, and Fehr 2003). Fischbacher et al. (2003) propose the following explanation for these striking behavioral differences compared to the ultimatum game. Even if subjects were motivated by fairness concerns, such as inequality aversion (e.g. Fehr and Schmidt 1999), competition among responders makes it impossible for any one agent to unilaterally enforce an equal but low-payoff split of the pie; they only have the choice between an unequal split that favors another responder willing to accept a lower offer, or (a chance at) an unequal split that favors themselves. (There are, however, potentially important institutional differences between the market game and the proposer-pivot model. For example, coalitions in proposer-pivot games can be any subset of the group, rather than being constrained to just the proposer and one responder as in the market game.)

Unfortunately, there has been little experimental research on the proposer-pivot model. McKelvey (1991) studied a three-voter, three-alternative stochastic version of the Baron-Ferejohn model under the closed rule (i.e., where no amendments to proposals are permitted). This game has many subgame-perfect equilibria, and in this case it is customary to focus on the (usually) unique stationary equilibrium. Stationarity rules out any dependence of the agents’ strategies on the history of play and thus avoids the multiple equilibrium problem generated by a Folk Theorem argument. McKelvey concludes that the stationary solution to his game at best

¹⁰ There is also a version of market games with proposer competition; see Roth, Prasnikar, Okuno-Fujiwara, and Zamir (1991).

modestly explains the data. Proposers usually offer too much and these proposals are accepted with too high a probability.

Diermeier and Morton (2004) use a finite game under weighted majority rule where a fixed payoff is divided among three actors.¹¹ In their game, there exists a unique subgame perfect equilibrium without randomization along the equilibrium path. This allows for sharp point predictions without assuming the stronger stationarity requirement.¹² Further, it permits Diermeier and Morton to test a richer set of (qualitative) comparative statics predictions. However, Diermeier and Morton find little support for either point or comparative static predictions. First, in 30-40% of the cases, proposers allocate money to all players, not just to the members of the minimal winning coalition. Further, proposers do not seem to select the “cheapest” coalition partner (i.e., the one with the lowest continuation value). Rather, if players propose minimal winning coalitions, they appear to select their coalition partners randomly. Second, proposers do not seem to exploit their proposal power as predicted by the Baron-Ferejohn model. The observed mean allocations are never within one standard deviation of the predicted allocation and rarely within two standard deviations. Third, the Baron-Ferejohn model predicts that proposals will be accepted in the first proposal period if and only if the proposal is at least as high as a player’s continuation value. Yet, a significant percentage of first-period proposals above the continuation value are rejected (between 1/5 and 1/4 depending on treatment). In some cases, groups go through a number of proposal periods.

Diermeier and Morton’s data do reveal some consistent behavioral patterns. Proposers first select a subset of players with which to negotiate (a “proto-coalition”). Once they have decided, the money is split equally among the members of the proto-coalition. About 10%-15% of the time, the proto-coalition contains all members. Consequently, in this case the money is split equally among all players. In the remaining cases (85%-90%), the proposer picks one other member to form a two-member proto-coalition. Each of the members of the two-player coalition then receives half the money. Note that there is no evidence of a proposer effect in either case. Indeed, players take extreme measures to guarantee equal payoffs within their proto-coalition.¹³

¹¹ Baron and Ferejohn (1989a) discuss this case in their paper.

¹² McKelvey (1991) suggests that subjects may try to coordinate on a non-stationary equilibrium that might explain the data.

¹³ A particularly striking finding are so-called “pittance coalitions” (about 25% of all coalitions). These are allocations where two players each receive \$22 (out of a total payoff of \$45) while the third player receives \$1.

These findings may suggest some concern for fairness or altruistic preferences. Yet, as is typical in multilateral pie splitting games, splits of the pie are often very unequal and are less equal than in ultimatum or dictator games. This suggests that what could be considered “fair” in proposer-pivot models is less obvious than in two-person bargaining games. It may apply to coalition composition, to the allocation of payoffs within a coalition, or both.

In a recent paper Frechette, Kagel, and Lehrer (2003) investigate the institutional predictions of the Baron-Ferejohn model. They compare open versus closed rule versions of the Baron-Ferejohn model with five players. As in McKelvey (1991), play continues until agreement is reached. Like McKelvey, but in contrast to Diermeier and Morton, Frechette et al. thus focus on stationary equilibria. Frechette et al. find some qualitative support for the Baron-Ferejohn model. In particular, there are longer delays and more egalitarian distributions under the open rule. However, some less obvious (but critical) aspects of the Baron-Ferejohn model are not well-supported in the data. For example, in their design proposers should propose minimal winning coalitions in both the open and closed rule case. However, only 4% of proposals correspond to this prediction. Even more troubling, under the open rule subjects accept proposals that offer them *less* than their continuation value!

Frechette et al. point out that their “fair share” interpretation is consistent with Bolton and Ockenfels’s (2000) ERC (“equity, reciprocity, and competition”) theory. Bolton and Ockenfels (cf. Fehr and Schmidt 1999) argue that fairness norms are defined in terms of one’s own share relative to the income to be divided, with no concern for shares that others may receive. While the ERC approach has been successful in explaining two-player bargaining behavior in ultimatum games and related games, its precise application to the Baron-Ferejohn game is not clear. In particular, a critical question is whether fair shares are calculated with respect to all players or with respect to the coalition members. Moreover, recent experimental results with three-person ultimatum games (Kagel and Wolfe 2001; Bereby-Meyer and Niederle 2003) are inconsistent with both Bolton and Ockenfels (2000) as well as Fehr and Schmidt (1999).

A common problem with all experimental investigations of the Baron-Ferejohn model is that the specific games under consideration are cognitively highly demanding. This is a key

Diermeier and Morton restrict players to full-dollar offers. Thus, players cannot split the \$45 exactly into equal halves, but have to either propose either \$22 or \$23 to the coalition partner. It thus appears that proposers prefer to “throw away” one dollar rather than allocating unequal payoffs among the proto-coalition members.

difference between the easy-to-understand bargaining tasks in the tradition of the ultimatum game and experiments that investigate the Baron-Ferejohn model. Thus, one important reason why experimental results do not match theoretical predictions in the Baron-Ferejohn experiments may be that subjects do not fully understand the game's complex incentives. In this case subjects may simply revert to a default allocation rule.¹⁴

To investigate a variant of the cognitive hypothesis (the so-called “slow learning” hypothesis), Frechette et al. design a second experiment that differs from the closed rule case by considering more rounds and by adding a graduate student to the subject pool that used an algorithm to implement the stationary subgame-perfect equilibrium strategy. In this experiment proposal behavior more closely resembles the Baron-Ferejohn predictions: allocations are less egalitarian, and equal split proposals (among all players) completely vanish. Nevertheless, play does not converge to the allocation predicted by the Baron-Ferejohn model. Rather, proposers and voters seem to rely on a “fair” reference point of $1/n$ share of the benefits. Offers below that share are consistently rejected while shares above $1/n$ are usually accepted. This focal point interpretation may also account for the odd finding in the open rule case where subjects accepted an amount less than their continuation value, which happened to be significantly higher than the fair reference point.¹⁵

Our goal in this paper is to design an experiment that captures the key features of the proposer-pivot model, yet is as simple as the ultimatum game. This will allow us to separate cognitive from motivational issues and directly focus on the question of whether and how agents in majoritarian bargaining situations are driven by ethical motivations such as fairness, inequality aversion, etc. Specifically, we use a much simpler proposer-pivot game. Recall that in the Baron-Ferejohn model, subjects at each stage must calculate the continuation values induced by the specified proposer recognition rules.¹⁶ In our design, each player is directly assigned an *ex ante* known *disagreement value*, i.e. a given amount of money he or she will receive if the proposal is rejected. Proposers then make a take-it-or-leave-it offer on how to split a fixed, known amount of

¹⁴ The Diermeier and Morton results, random choice of coalition partner(s) and even splits within the coalition, are particularly suggestive in this respect.

¹⁵ While the Frechette et al. procedure does suggest some support for the slow learning hypothesis, it also raises some new methodological concerns. For example, the fact that the presence of a “selfish” player was announced (and thus became public knowledge) may change the nature of the game.

¹⁶ Giving players hints or information about how to calculate continuation values appears to have little effect in game experiments (Camerer 2003).

money among the players. Thus, the game can either be interpreted as a three-player, divide-the-dollar version of Romer and Rosenthal's proposer model where the voters have different reservation values, or as a "reduced form" version of the Baron-Ferejohn model with given continuation values. By varying the disagreement values as our treatment variables in a very simple extensive form, we can test competing theories of sequential bargaining behavior that have been suggested in the literature.

Our second key design feature concerns the use of disagreement values. Recall that in a model with self-interested agents, any proposer will select the "cheaper" of the other voters and offer that player her disagreement value (perhaps with a little security margin), while the other (more expensive) voter receives zero. Similarly, voters will accept only offers at or above their respective disagreement values. Note that this optimal behavior (by proposers and voters) *does not* depend on the *proposer's* disagreement value, unless the value is so high that the proposer prefers his or her disagreement value to any possible proposal. Thus, varying the proposer's reservation value should not have any influence on proposing or voting behavior. That is, the tested theory not only makes certain point and comparative statics predictions, it also mandates that certain aspects of the game *should not matter*. If they do, the theory is falsified.

As we will show below, the use of disagreement values can not only be used to test the original proposer-pivot model (where all agents are only interested in maximizing their own payoffs), but also to test alternative views that incorporate other-oriented motivations such as fairness concerns. As above, these alternative theories, properly specified, predict that certain variations of the proposer's reservation values should not matter; if they do, the theory does not work in this context.

Specifically, we will consider the following approaches:

A. Selfish Players

In this approach both proposers' and voters' utility function only includes their own (expected) monetary payoff. Voters will accept any offer that is at least as high as their reservation value. The behavior of proposers also depends on the equilibrium concept. If we assume subgame-perfect equilibrium, proposers select the $(N-1)/2$ cheapest of the non-proposers and pay those players their continuation values (perhaps with a little security margin). This behavior was neither observed in McKelvey (1991) nor in Diermeier and Morton (2004). It was partially

observed (as a comparative static, between open and closed rules) in Frechette et al. (2003). If we were to find that this approach was consistent with the data, we could conclude that the evidence of apparently “fair” outcomes found in McKelvey (1991), Diermeier and Morton (2004) as well as Frechette et al. (2003) – like the use of simple equal-split rules or the importance of the $1/n$ reference point – are not based on genuine fairness concerns, but are default rules of thumb that subjects fall back on due to cognitive limitations.

B. Egalitarian Players

In this approach the proposer will allocate money equally among all group members (strong version) or among the coalition members (weak version), while voters will reject non-egalitarian allocations *even if their own payoff is substantial*. Of course, egalitarian proposals may be motivated by non-egalitarian concerns. That is, a selfish player who believes that the voters are egalitarians would be well-advised to make an equal-split proposal, provided his continuation value is less than the equal split payoff. Thus, one of the challenges in designing the experiment will be to distinguish egalitarian players from selfish players who propose equal distributions for strategic reasons.

C. “Fair” Players

This approach (pioneered by Bolton and Ockenfels 2000, Fehr and Schmidt 1999) retains subgame-perfect equilibrium as the solution concept, but changes the utility function to include fairness or equity concerns. All else constant, players still prefer more money to less, but also prefer to have neither too little nor too much relative to others – they are “inequality-averse.”

Each of these three benchmark cases has been supported by some previous experimental evidence. As emphasized by Fischbacher, Fong, and Fehr (2003), play can look markedly more selfish and strategic with two or more responders than with only one. But as demonstrated by Frechette, Kagel, and Lehrer (2003), some results may be best explained by models of fair or at least inequality-averse players. Finally, evidence of egalitarian behavior has been observed or suggested in Diermeier and Morton (2004) as well as Frechette, Kagel, and Lehrer (2003).

2. Procedures, Design, and Hypotheses

The experiments involved groups of three subjects that had to split 1250 points among themselves by majority rule. One subject in each group, designated the proposer, proposed a split

of the 1250 points for all three group members. Then all three group members saw the proposal (for all group members) and voted on it. If a majority voted in favor, it passed and all subjects were paid according to the proposal; if a majority voted against, it failed and all subjects were paid according to pre-specified and known disagreement values (DV's).

The major innovation in our design is to use the proposer's disagreement value as our treatment variable, which allows for a clean assessment of several versions of the behavioral hypotheses above. With selfish players using backward induction, changes in the proposer's DV should never affect the results, which are driven entirely by the DV of the pivotal voter as long as the proposer's equilibrium payoff is not strictly lower than his reservation value. In particular, results should *stay constant if the proposer's continuation value is varied*. Also, manipulating DV's allows us to change the inequality players face if the offer is rejected, and therefore for a fixed offer gives clear implications for voter behavior under a hypothesis of fair or inequality-averse players.

We also introduced slight variation in responder disagreement values, to prevent voters from simply assuming that since voter DV's were the same, voter behavior is supposed to be the same. DV's for the proposer, voter 1, and voter 2, respectively, were from one of the three sets (60,60,40), (1125,60,40), and (65,60,30),¹⁷ which we refer to by the proposer's disagreement value (DVp). Each subject participated in every treatment (but not in every role in every treatment), which helps us to use them as their own controls. The order in which these treatments were run varied across sessions to help control for sequence effects. The design is summarized in the following table.

Table 1. Design

Session	No. Subjects	Treatment Order (DVp)
1	15	60, 1125, 1125, 65
2	12	1125, 60, 65, 1125
3	12	60, 1125, 1125, 65
4	12	1125, 60, 65, 1125
5	12	60, 1125, 1125, 65
6	12	1125, 60, 65, 1125
7	12	60, 1125, 1125, 65
8	12	1125, 60, 65, 1125

¹⁷ DV's to voter 1 and voter 2 were permuted in different sessions.

There were 40 rounds in each session, and the DV's and roles in the groups (proposer or voter) changed every 10 rounds. Group membership, on the other hand, was randomly re-drawn after every round. Payments in the experiment were the sum total of points from all 40 rounds, times .001. Thus, in each round the pie to split was \$1.25. Subjects kept track of their results on personal history sheets. All of these procedures were clearly explained to subjects before the experiment began.

Eight sessions of the majority rule experiment were run in a PC classroom in the Northwestern University Library. Participants were Northwestern undergraduates and were recruited from the Northwestern student center, from dormitory listservs, and from introductory classes in economics and political science. The sessions had 12 participants each, except session 1, which had 15 participants, so that a total of 99 subjects participated in 1320 group-rounds¹⁸ across all eight sessions. Each subject spent at least 10 rounds as a proposer and as a voter; the average number of rounds spent as a voter was 26.6. Sessions lasted about 90-100 minutes, and subjects earned about \$19 on average, plus a \$5 participation fee. The experiment was computerized using the z-Tree software developed at the University of Zurich (Fischbacher 1999).

This design allows us to test the following hypotheses.

Hypothesis 1 (“Selfishness”)

- (a) Every proposer will be more likely to select a coalition that includes himself/herself and the one other team member with lowest disagreement value.
- (b) The payoff to the cheapest coalition partner is likely to be close to that player's disagreement value. The third player will receive a payoff of zero.
- (c) Proposals above an agent's reservation value are always accepted; below the reservation value they are always rejected.
- (d) Variations in the proposer's reservation value should have no consequence for which allocations are proposed; i.e. there should be no significant variation across different treatments.

If this hypothesis is confirmed, we have strong evidence that the “anomalous” results in McKelvey (1991), Diermeier and Morton (2004), and Frechette, Kagel, and Lehrer (2003) were

¹⁸ $1320 = (7 \text{ sessions with } 12 \text{ subjects})(40 \text{ rounds/session})(4 \text{ groups/round}) + (1 \text{ session with } 15 \text{ subjects})(40 \text{ rounds})(5 \text{ groups/round})$

largely due to subjects' cognitive limitations in complex games, and that the selfish, strategic behavior known from other multilateral experiments such as "market" games (e.g., Fischbacher, Fong, and Fehr 2003) are also found in the proposer-pivot model. That is, if subjects understand the incentives of the game properly, they will act as if they maximized only their own expected payoffs. Observed behavior will be consistent with subgame-perfect equilibrium with selfish players. In particular, subjects are not motivated by any fairness considerations.

If we find no empirical support for the hypothesis, we have evidence that agents are not motivated strictly by selfish concerns. However, there are many ways in which subjects may conceptualize fairness in this situation. By varying the proposer's disagreement value, our design allows us to separate different accounts of fairness in this decision context.

Hypothesis 2 ("egalitarianism")

- (a) Proposer will allocate money equally among all three group members (strong version) or at least all members of the coalition (weak version).
- (b) Responders will reject non-egalitarian allocations even if their own proposed payoff is substantial.
- (c) Variations in the proposer's reservation value should have no consequence for which allocations are proposed. In particular, proposers should allocate *less* to themselves than their reservation values in treatment (1125,60,40).

Bolton and Ockenfels (2000) as well as Fehr and Schmidt (1999) recently proposed a different theory of fairness or other-orientedness: players still prefer more money to less, but they prefer to have neither too little nor too much relative to others (they are "inequality-averse"). This leads to the following hypothesis.

Hypothesis 3 ("inequality aversion")

- (a) A vector of payoffs should appear better to a voter when the selfish payoff is higher, all else constant, but should appear worse when inequality in that vector increases, all else constant.
- (b) Voters should evaluate the payoffs when the proposal is rejected the same way they evaluate the payoffs when the proposal is accepted.

3. Results

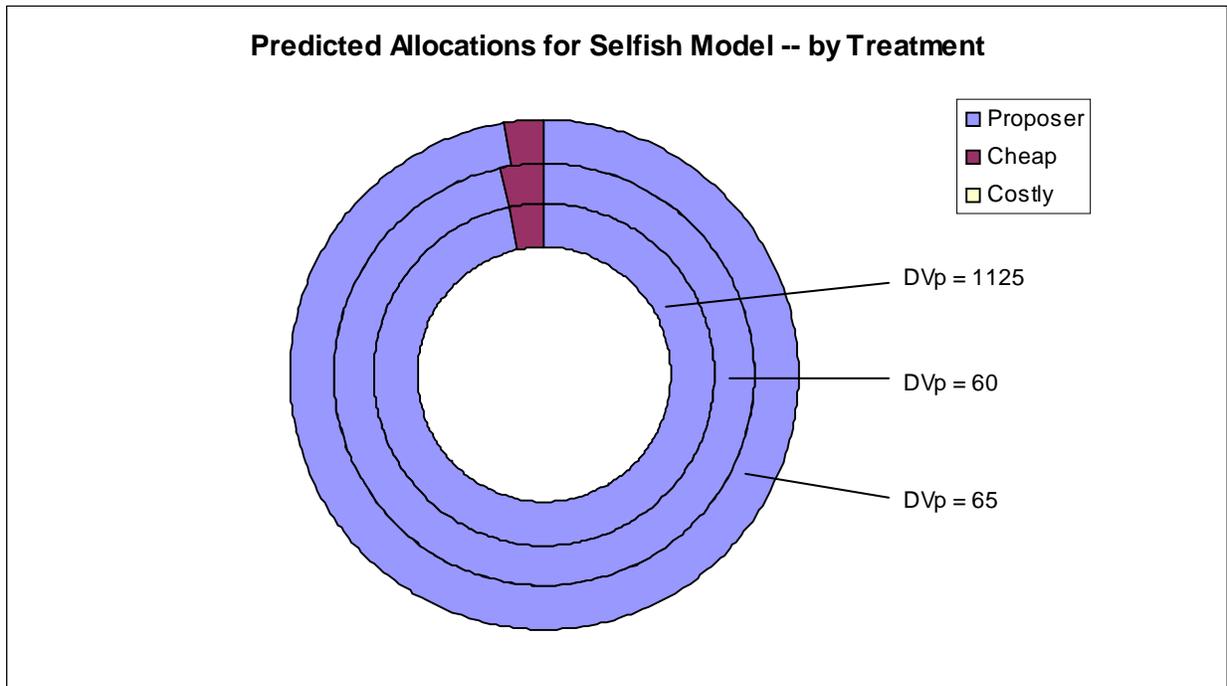
According to our experimental results, *none* of the three hypotheses is confirmed by the data. One of the most striking findings is that there is a large effect of changes in the proposer's rejection value. That is, proposers allocate a significantly higher share to themselves in the case of $DV_p = 1125$ and responders are more likely to approve such proposals.

3.1. Cognitive Heuristics and Selfish Players

There are several ways to test the explanatory power of this theory in our design.¹⁹ We first turn to non-parametric tests for the difference in proposer and voter behavior across treatments. First consider proposer behavior. The following figure shows the predicted offers by treatment. Each ring of the figure represents the same information as a pie chart; the segments of each ring depict the share of the pie predicted to go to each group member.

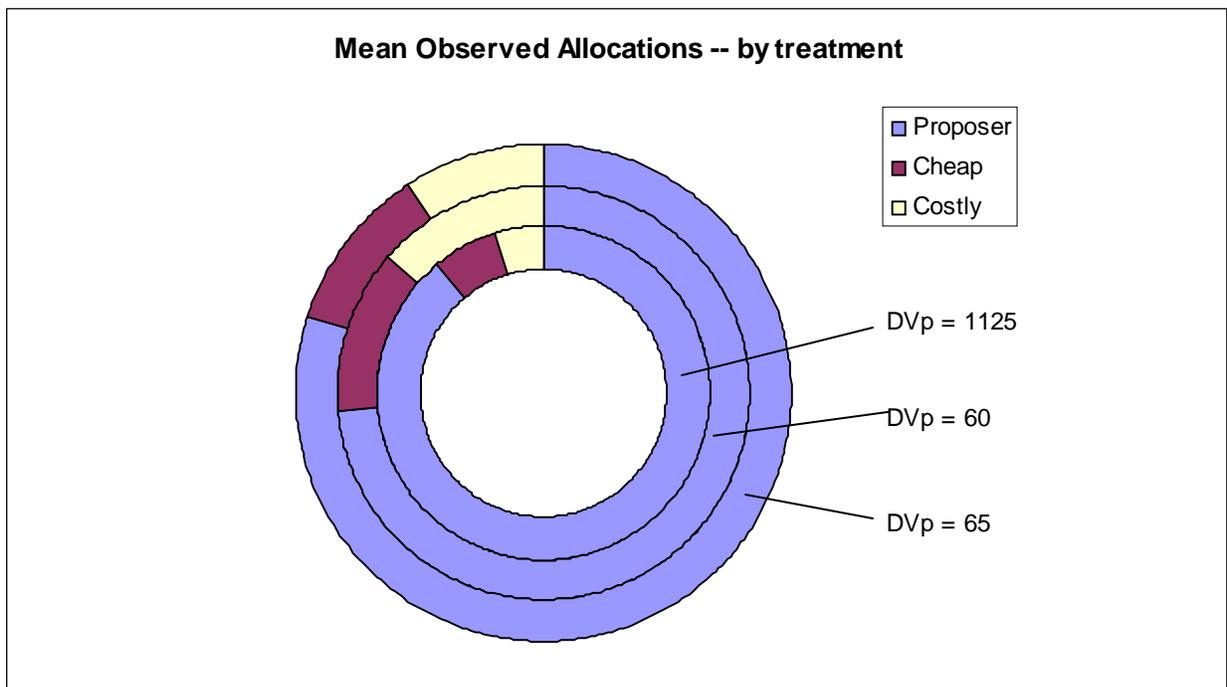
¹⁹ We also conducted a small number of sessions of the ultimatum game as a check on our procedures. Like other researchers (e.g. Fischbacher, Fong, and Fehr 2003) we find that results are closer to selfish outcomes in the three-person sessions than in our ultimatum sessions. We report more results from these sessions below.

Figure 1



Note in particular that according to the theory, proposer behavior should be identical across treatments. The following figure shows the real observed proposals.

Figure 2



The data deviate from the predicted allocations in critical ways. Proposers do not capture a large enough share of the pie. Costly voters receive a significant share, not a zero proposal as predicted. There can be two reasons for that: proposers may propose three-player coalitions or they may select the “wrong” two-player coalition (including the wrong player). Specifically, about 60% of all proposals make non-zero offers to only two group members, i.e., are minimal winning coalitions. Of these, about 2/3 make the non-zero offer to the cheaper voter. An additional 20% of all proposals make a minimum offer of less than 8% of the pie, with each voter about equally likely to receive the lower share.²⁰ The remaining roughly 15% of the proposals offer at least 100 points to both voters. Among these proposals, voters receive comparable shares, and proposers on average offer themselves about 686 points, 60 points more than half the pie.

One possible explanation for these deviations is error (despite the simple nature of the game, subjects still need to familiarize with the technology, etc.) or subject heterogeneity. Perhaps there are a few subjects in our sample with altruistic or egalitarian preferences. However, the cross-treatment comparison of observed allocation eliminates such explanations. That is, if the observed distributions from the predicted model were due to error or idiosyncratic preferences, at least the observed distribution should be identical *across* treatments.²¹ The same subjects *modify their behavior* in response to changes in the proposer’s disagreement value, changes that should be strategically irrelevant if the original proposer-pivot model was correct.

To confirm these findings we conduct several statistical tests. The following table provides Kolmogorov-Smirnov test statistics (i.e., $\max_x |F_t(x) - F_s(x)|$, where F_r is the cumulative distribution function of offers in treatment r) and p-values for offers.²²

²⁰ These coalitions are similar to the pittance coalition observed by Diermeier and Morton (2004).

²¹ Recall that all subjects play in all treatments, so we can control for subject-specific effects such as the presence of “altruists” or erroneous behavior.

²² Results on p-values are similar for Wilcoxon tests of difference in population, except that the DVp = 60 vs. DVp = 65 test for the cheap voter yields a p-value of .295.

Table 2. Kolmogorov-Smirnov Tests of Equality of Offer Distributions: p-values
 In parentheses: Test statistics and direction of change for 2nd treatment relative to 1st

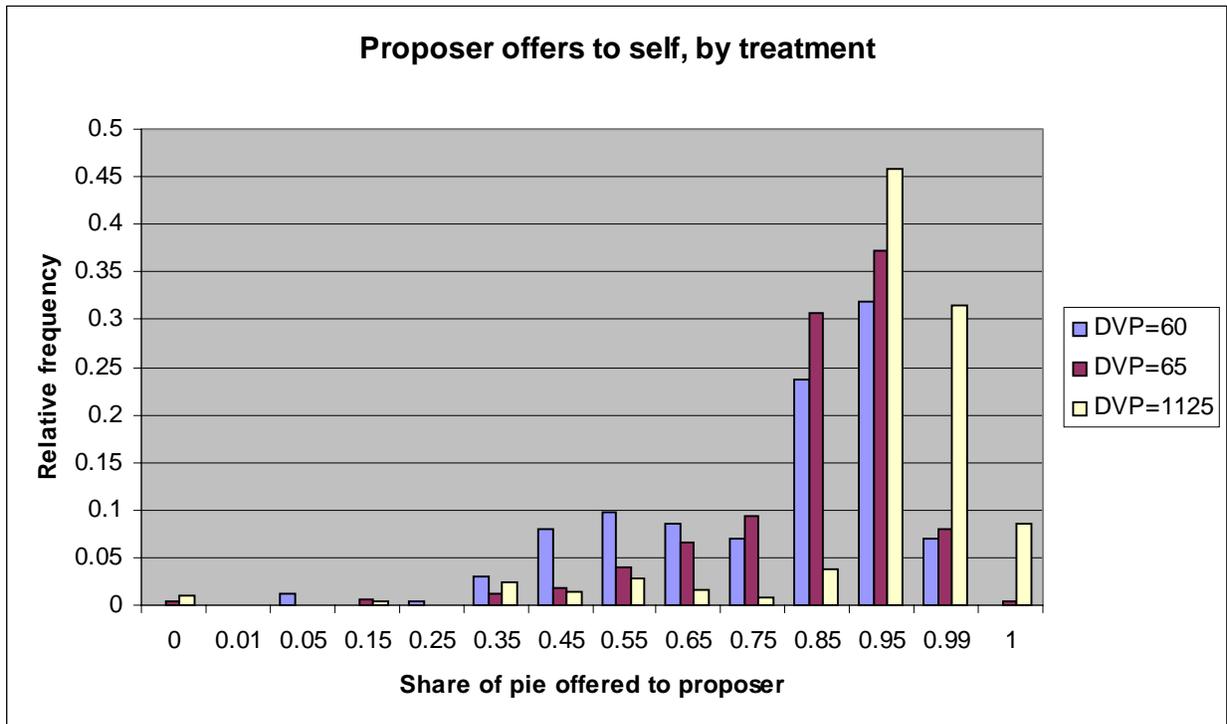
	Offer to Proposer	Offer to Cheap Voter	Offer to Costly Voter
DVp = 65 or 60 vs. DVp = 1125	0.000 (0.574) (+)	0.000 (0.400) (-)	0.000 (0.360) (-)
DVp = 60 vs. DVp = 65	0.000 (0.170) (+)	0.003 (0.097) (-)	0.000 (0.168) (-)

As can be seen from the table, proposers are more “greedy” (i.e. demand more for themselves) as their reservation values increase: they demand most in the case of DVp = 1125 and least in DVp = 60.²³

One may suspect that because DVp = 1125 is close to the maximum payoff of 1250, proposers may simply choose to propose 1250 even if they are rejected. This turns out not to be the case. The following figure shows proposers’ offers to themselves, by treatment.

²³ Some of the difference between DVp = 60 and 65 may come from experience, since DVp = 65 always took place after DVp = 60. However, we do not find strong experience effects over the course of an entire session. Some of the difference also occurs because proposers are surprisingly non-strategic in DVp = 60 when it occurs first in the session. When DVp = 60 occurs after DVp = 1125, results resemble the data for DVp = 65 data rather than the case of DVp = 60 data.

Figure 3



About 8% of proposers in DVp = 1125 offer themselves the entire pie (2% do in the other treatments). About 27% more offer themselves 1200 or more (but less than 1250), and 48% more offer themselves 1125 or more (1125 is exactly 90% of the pie, and 1200 is 96%). In each treatment the modal offer to the proposer is between 85% and 95% of the pie.

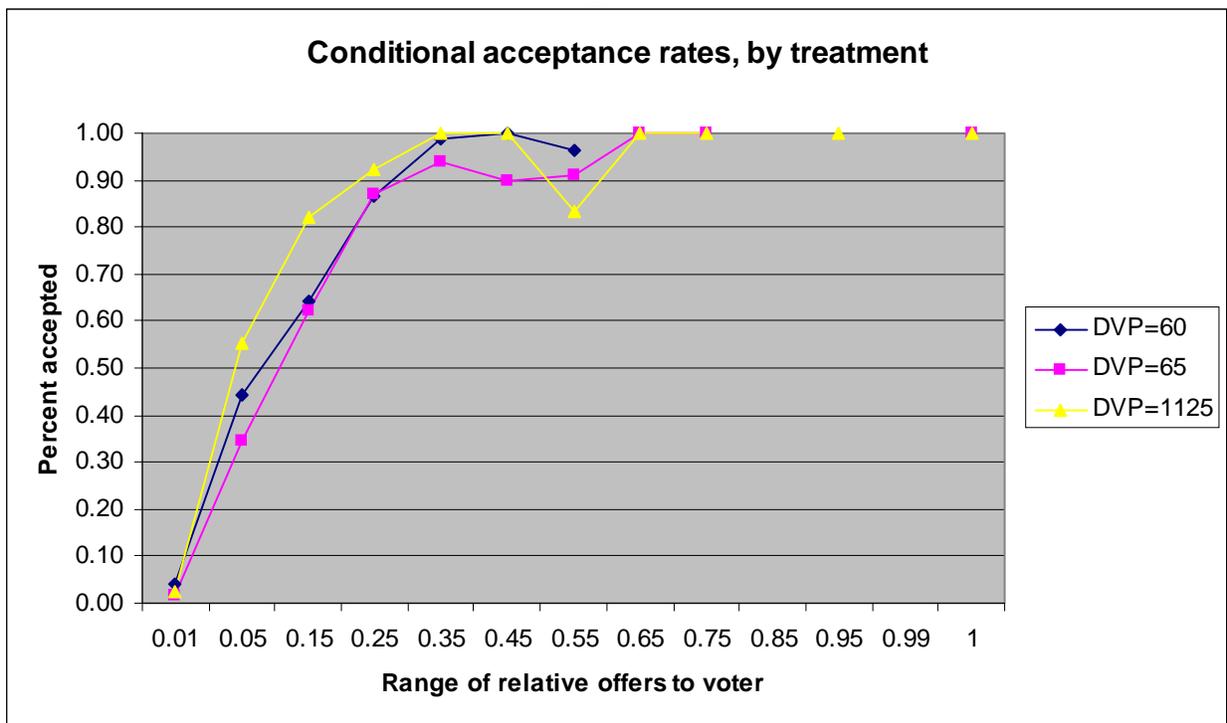
When proposers do offer themselves the whole pie (54 occurrences overall), it is almost always when DVp = 1125 (53 times out of 54), and their proposals are almost always rejected by the group (52 times out of 54). In the round following a rejection of a 1250 offer when DVp = 1125, proposers lower offers to themselves about 34% of the time. The proposers who reduce offer themselves about 1162 points on average in the next round. Three subjects who nearly always offered themselves 1250 under DVp = 1125 account for 27 of these 53 whole-pie proposals. With these subjects removed (leaving 15 other subjects), the remaining proposers lower their offers to themselves about 70% of the time after 1250 is rejected.

One problem with focusing solely on proposer data is that (under the null hypothesis that the theory is correct) proposers would best respond to expected voter decision rules. Hence, departures of proposer behavior from theoretical predictions can only be viewed as casting doubt

on the *joint* hypothesis of selfish agents *and* subgame perfection. If voters depart from own-income maximization, a selfish, backward-inducting proposer might do so as well, but for strictly selfish reasons. It is therefore critical to investigate voter behavior directly. Here the predictions of the model refer to conditional probabilities, for example acceptance rates conditional on receiving an offer above the reservation value.

As the following figure demonstrates, the change to DVp = 1125 has a large effect on voters as well, conditional on the type of offer received.

Figure 4

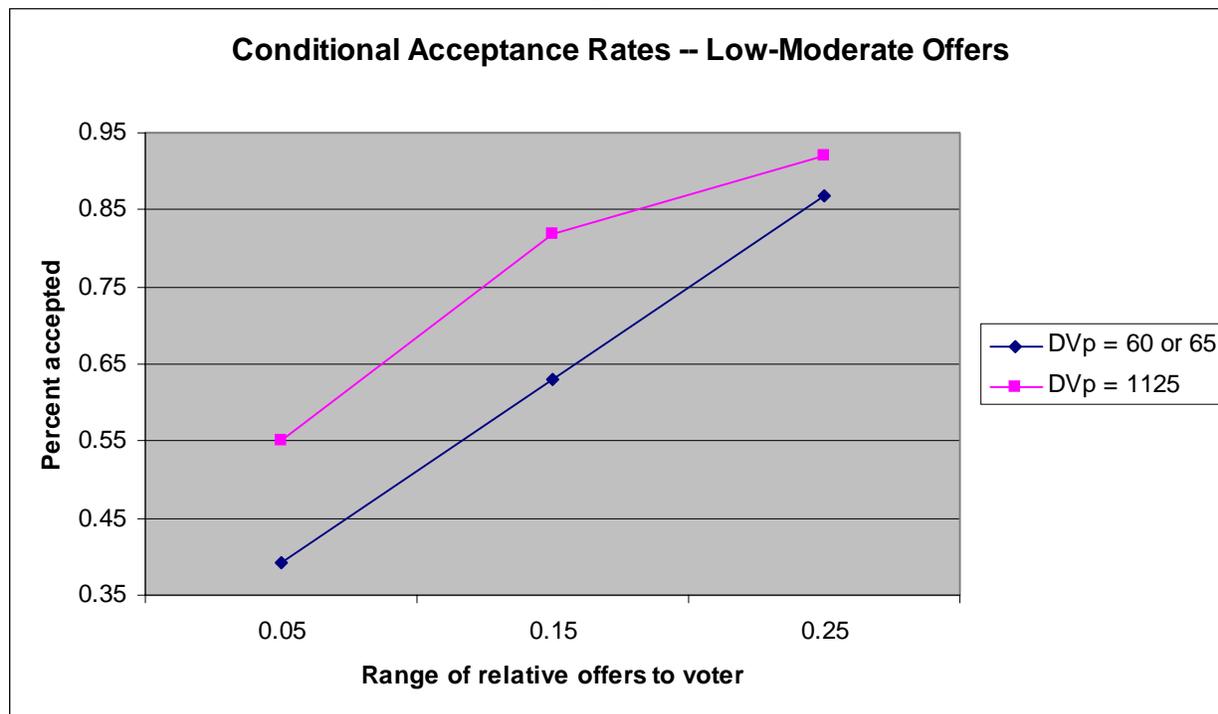


Voters are generally much more accepting in the DVp = 1125 treatment.²⁴ This is especially evident for offers in the range of 1% to 25% of the total pie, a range that contains 56% of all proposals.²⁵ In the following figure we focus on this range and pool the cases with a low proposer reservation value (DVp=60/65).

²⁴ Interestingly, there is a higher proportion of votes against, and rejections by the group, in DVp = 1125 than in the other treatments. The reason is that although voters are conditionally more accepting, proposers are also demanding more.

²⁵ The acceptance rate drops in the 45-55% bin for DVp = 1125. There are only 12 offers in this bin (less than 1% of all offers made), so a few anomalous observations are exerting a large impact.

Figure 5



Consider, for example the 5-15% range (62.5-187.5 points). This is a large segment of the data; it contains 29% of all offers in DVp = 60, 34% in DVp = 65, and 23% in DVp = 1125. In this range acceptance rates are over 30% higher in DVp = 1125 than in the other two treatments (19 percentage points; p-value less than 0.001). Thus, proposers not only demand more when their reservation value is higher, voters are also willing to give it to them.

A reasonable modification of the Proposer-Pivot mode is to allow for some error or randomness in voting. We can capture such a variation as a random utility model. In this case the selfish model yields an explicit functional form for a more detailed econometric analysis of vote choices. If the theory is true but voter utility is observed with error, the probability that voter i (conditioning on being pivotal) votes in favor of an offer giving him x_i is just $\Pr[\gamma_i + x_i + \varepsilon_{offer} > DV_i + \varepsilon_{dv}]$, or $F_{\Delta\varepsilon}(\gamma_i + x_i - DV_i)$, where γ_i is a voter-specific fixed effect to account for any fixed (but unobserved) disposition to vote in favor of the offer on the table. To test this we estimate a fixed effects logit model of the probability of observing i 's actual voting pattern, conditional on the total number of "yes" votes by i . The variable *Own Offer* captures the points offered to the voter (out of 1250), while the variable *Own DV* captures the voter's own disagreement value.

To account for the effect of the proposer’s disagreement value, we include dummy treatment variables (with DVp=60 as the baseline case). As discussed above, they should have no effect if the selfish theory is correct.

Table 3. Means and Fixed Effect Logit Results, Selfish model

Variable name	Mean value	Parameter estimate ²⁶	Standard error	p-value
Vote “For” (dependent variable)	0.480	-	0.001	-
Own offer	106.54	0.031	0.002	0.000
Own DV	48.78	-0.041	0.007	0.000
DVp = 65	0.251	-0.321	0.207	0.121
DVp = 1125	0.498	1.018	0.178	0.000
No. obs.: 2631 ²⁷	No. subjects: 99	Observations per subject: (min, mean, max): 10, 26.6, 30		

Log likelihood: -720.07

The parameter estimates for *Own Offer* and *Own DV* do have the right signs and are highly significant. However, again we see the strongly significant effect of the DVp = 1125 treatment compared to the baseline DVp = 60. Relative to DVp = 60, DVp = 65 reduces the probability of favorable votes, but only at a p-value of .12. Denoting the parameter estimate for variable k by β_k and estimating the model with the theoretical restrictions $\beta_{own\ offer} = -\beta_{own\ dv}$ and $\beta_{65} = \beta_{1125} = 0$ produces a log likelihood of -759.68. The χ^2 (with 3 degrees of freedom) statistic from the likelihood ratio test with a null hypothesis of non-constraining restrictions²⁸ is 79.22 – a value that has a probability of essentially zero if the null is true.²⁹

²⁶ The marginal effects are difficult to obtain, since they depend on the value of the fixed effects, which are not directly estimated in conditional logit because the estimators would be inconsistent. Assuming a specific value of say $\gamma_i = 0$ would allow marginal effects to be pinned down, but it is not possible to assert that this is the marginal effect given the mean fixed effect, since the distribution of them is unknown.

²⁷ 2640 votes actually took place. Nine observations from the data set are missing because of a software problem in session 2.

²⁸ The test statistic is twice the difference in the log likelihoods for the model without the constraints and the model with the theoretical constraints imposed. If the theory is correct, imposing the constraints should not matter much, and the log likelihoods should be similar, producing a small test statistic.

²⁹ However, using only $\beta_{own\ offer} = -\beta_{own\ dv}$ and leaving the parameters of the treatment dummies unrestricted produces a χ^2 (1 d.f.) of only 1.8 with a p-value of .180.

In short, we can conclude that the original Proposer-Pivot model (purely self-interested agents and subgame perfection) is inconsistent with our data in important respects. Hypothesis 1 fails to be supported in a simple environment where the complexity of discovering a continuation value – a plausible rationale for departures from selfish behavior in previous experiments – is largely eliminated. To be precise, voters do respond to incentives. For example, voters respond favorably to higher offers, but they do so in a fashion inconsistent with the theory: their behavior is strongly affected by strategically irrelevant features of the decision context, in particular the proposer’s reservation values. That is, the selfish hypothesis not only implies certain behavior, but it also predicts which behavior should *not* occur: i.e. which aspects of the choice environment should be ignored by decision-makers. Yet, subjects strongly adjust their behavior in the high reference point treatment ($DV_p = 1125$ treatment): voters are more accepting of unequal offers, and proposers offer more unequal distributions.

3.2. Egalitarian Behavior

The egalitarian model also found some support in earlier Baron-Ferejohn experiments (e.g. Diermeier and Morton 2004) and, to a lesser extent, in the ultimatum game. The implications of the egalitarian hypothesis in our design are obvious. In the strong version proposers will allocate about 1/3 of the pie to each member; under the weak version proposers will allocate the pie evenly to members of the coalition receiving benefits. As above, behavior should be unaffected by changes in the proposer’s disagreement value, or that of any other group member.

Both versions of the egalitarian model perform poorly enough in explaining our data that a more detailed econometric analysis seems unnecessary. In particular, the dependence of the proposers’ reservation values (proposers exploiting the security in $DV_p = 1125$ to their advantage, and voters increasing their conditional acceptance rates, especially of offers of 10% – 30% of the pie) is equally damaging to the egalitarian hypothesis. In addition, while coalition formation does not follow the purely selfish model, over 80% of all proposals offer some voter 100 points (8%) of the pie or less, and over 60% offer one voter nothing, thus resulting in a minimal winning coalition. Within minimal winning coalitions proposers offer themselves almost eight times as much as the coalition member. Voters receiving nonzero offers when the other voter receives a zero offer support the proposal over 71% of the time. In short, an

egalitarian model, either with respect to all three players or just each voter and the proposer, does not have much explanatory power in our data: behavior is too opportunistic and sensitive to context.

In sum, neither the selfish SPNE, nor the egalitarian model can account for the dramatic impact of the changes in the proposer’s reference points.

3.3. Inequality Aversion and Reference Shares

With inequality-averse players, changes in the proposer’s disagreement value could matter, but in a specific way. For example, when a voter is offered a share close to her disagreement value, she should be more likely to reject the proposal when the distribution of disagreement values is relatively equal, compared to the proposed allocation, than when it is relatively unequal.

Two of the most prominent and empirically successful models of inequality aversion are due to Bolton and Ockenfels (2000) and Fehr and Schmidt (1999). These models are built on several decades of experimental research across diverse strategic settings which show that players care about their own monetary payoffs, but also about the payoffs of other agents. The models have much in common: both retain subgame perfection as a solution concept, both base utilities on the entire payoff vector on the path of play, both assume that utility increases in own payoff (all else constant) and that greater “inequality” reduces utility. But they also differ in the specific way inequality enters individual utility functions.

Fehr and Schmidt propose that, for a fixed number of players n , the utility to individual i from the monetary payoff vector $x = (x_1, x_2, \dots, x_n)$ is

$$u_i(x) = x_i - \alpha_i \sum_{j \neq i} \max(x_j - x_i, 0) - \beta_i \sum_{j \neq i} \max(x_i - x_j, 0)$$

with $0 \leq \beta_i < 1$ and $\alpha_i > \beta_i$. In other words, utility is the sum of (a) i ’s own monetary payoff, (b) bilateral “disadvantageous” inequality (in which j receives more than i), and (c) bilateral “advantageous” inequality (in which i receives more than j). Each type of inequality is negatively weighted to reflect that it reduces utility. The difference in weights captures the intuition that players dislike disadvantageous inequality more than advantageous inequality.

Fehr and Schmidt’s model, like the one based on selfish behavior, readily produces a functional form suitable for econometric testing assuming a random utility model. We use conditional fixed effects logit to estimate a model of the probability of observing i ’s vote pattern, conditional on the explanatory variables given by the theory, the total number of “yes” votes by voter i , and a fixed effect γ_i for voter i to capture unobserved heterogeneity in voter dispositions to vote in favor. This model, unlike the selfish one, does not include treatment dummies because they are collinear with the disagreement pie inequality measures.

Table 4. Means and Fixed Effect Logit Results, Fehr-Schmidt Inequality Aversion

Variable name	Mean value	Parameter estimate	Standard error	p-value
Vote “For” (dependent variable)	0.480	-	0.001	-
Own Offer	106.54	0.040	0.003	0.000
Own DV	48.78	-0.005	0.021	0.803
Disadvantageous Inequality in the Offer	983.52	0.001	0.001	0.132
Disadvantageous Inequality in the DV pie	554.37	0.001	0.0002	0.000
Advantageous Inequality in the Offer	61.02	-0.009	0.002	0.000
Advantageous Inequality in the DV pie	11.29	-0.036	0.021	0.085
No. obs.: 2631	No. subjects: 99	Observations. per subject: (min, mean, max): 10, 26.6, 30		

Log likelihood: -710.17

First, voters are not more sensitive to disadvantageous inequality than advantageous inequality. Second, two of the parameter estimates have incorrect signs – the sign on *Disadvantageous Inequality in the Offer* should be negative, while the sign on *Advantageous Inequality in the DV pie* should be positive. This suggests that subjects do not treat inequalities in the disagreement values in the same way as inequalities in the proposal. We can directly test for this conjecture by

estimating a restricted model in which voters only respond to the difference in inequality between offer and disagreement value. That is, in the restricted model (*Own Offer – Own DV*), (*Disadvantageous Inequality in DV pie – Disadvantageous Inequality in the Offer*), and (*Advantageous Inequality in DV pie–Advantageous Inequality in the Offer*) are the explanatory variables. The corresponding likelihood ratio test yields a χ^2 (3 degrees of freedom) statistic of 20.46, with a p-value of .0001. Hence, in contrast to the predictions of the Fehr-Schmidt model, voters distinguish between inequalities in disagreement values and inequalities in offer: they seem to be more tolerant of inequality in disagreement values than in proposed allocations.

The ERC model of Bolton and Ockenfels (2000) also includes inequality aversion as part of agents’ utility functions, but with a different functional form. Agents compare their own share of the total pie with an even three-way split of the pie: the further their share is from the even-split “social reference point” (whether above or below), the worse off they are – all else constant. As in the Fehr-Schmidt model, however, agents’ utilities are also increasing in their own monetary payoff, for a given proportion of the social reference share. Formally, in our setting the utility of a money payoff vector x is³⁰

$$u_i(x) = v_i(x_i, \sigma_i) \equiv v_i(x_i, x_i/\sum_j x_j),$$

with the key assumptions being that (i) fixing σ_i , v_i is increasing and strictly concave in x_i , and (ii) fixing x_i , v_i is strictly concave with a maximum at $\sigma_i = 1/n$. Simply put, fixing their relative payoff, agents prefer more money to less, but fixing their monetary payoff, agents prefer to be closer to *their own share* of an even split of the pie. ERC players do not care how their money payoff compares to any specific individual’s, but to the average, and ERC neither asserts nor precludes that agents are more sensitive to disadvantageous inequality (own share below the social reference share) than to advantageous inequality.

The ERC theory does not specify an explicit functional form. Here, we assume that $u(x) = (x_i)^5 + (\sigma_i - 1/3)^2$ for some outcome vector x . Results with other functional forms (other powers, logs, etc.) yield similar results. Results of the (unconstrained) conditional fixed effects logit estimation are listed below.

³⁰ This simplified version assumes that $\sum_i x_i > 0$, which is satisfied in our context.

Table 5. Means and Fixed Effect Logit Results, ERC Inequality Aversion (parametric)

Variable name	Mean value	Parameter est.	Standard error	p-value
Vote "For" (dependent variable)	0.480	-	0.001	-
(Own Offer) ⁵	7.687	0.615	0.064	0.000
(Own DV) ⁵	6.931	0.052	0.160	0.746
(Own Offer)/(Sum of Offers)	0.090	-6.197	6.860	0.366
(Own DV)/(Sum of DV's)	0.172	-5.762	4.009	0.151
((Own offer)/(Sum of Offers)) ²	0.025	-5.436	10.737	0.613
((Own DV)/(Sum of DV's)) ²	0.050	2.102	10.520	0.842
No. obs.: 2631	No. subs.: 99	Observations per subject: (min, mean, max): 10, 26.6, 30		

Log likelihood: -578.88

Again, we find some significant deviations from the model's predictions. Four of six coefficients have the wrong sign: the one for $(Own\ DV)^5$ should be negative, that for $Own\ DV/Sum\ of\ DV's$ should be positive, that for $((Own\ offer)/(Sum\ of\ offers))^2$ should be positive, and that for $((Own\ DV)/(Sum\ of\ DV's))^5$ should be negative. As in the case of the Fehr-Schmidt model we wish to know whether voters evaluate the proposed offer the same way they evaluate the DV pie. The corresponding theoretical restriction for the ERC model is that the coefficient for each variable in the table is -1 times the one for the variable above it. Estimating the constrained model constrained yields a log likelihood of -589.29. The χ^2 (3 d.f.) statistic from the likelihood ratio test that this restriction is not important is 20.84, with a p-value of .0001.

Thus, key components of the Fehr-Schmidt and Bolton-Ockenfels (ERC) models are inconsistent with our data. Voters do not value the proposed offer or the disagreement pie in the ways predicted by the theories, nor do they evaluate the characteristics of the disagreement pie the same way they evaluate the same characteristic in the proposed offer. This finding is not restricted to existing inequality-aversion models. *Any theory* in which utility solely is a function of the vector of payoffs along the path of play will require voters to evaluate proposals the same way they evaluate the DV pie, a prediction not supported by our data.

4. Accounting for the Findings: The Importance of Entitlements

We can summarize the key findings of our experiment as follows:

1. Agents do not behave according to the proposer-pivot model with purely self-interested agents. Rather, their behavior is significantly influenced by strategically irrelevant variables that according to the theory should not matter – most importantly the proposer’s reservation value.
2. However, agents’ behavior clearly does respond to monetary incentives: both proposed and accepted allocations are frequently highly unequal. In over 40% of all proposals, zero is offered to the voter with the higher disagreement value. Neither proposers nor voters follow a simple equal-split rule.
3. Inequality-aversion theories alone cannot account for voters’ evaluations of offers. In particular, voters appear to be less concerned with inequality in the disagreement value compared to inequality in the proposed allocation.
4. When the proposer’s disagreement value is high (1125 out of 1250 points), proposers are more opportunistic and voters are conditionally more accepting.

Taken together these findings suggest a theory that in addition to selfishness and fairness (in the form of inequality aversion) incorporates a basic form property rights. Subjects seem to consider an agent’s reservation value as determining an entitlement and are more willing to accept less generous offers if a proposer’s reservation value is high. This approach would explain the dramatic percentage-increase in voters’ acceptance rates (more than 30%) if the proposer’s reservation value changes from low to high. According to the same approach proposers make more unequal offers that are nevertheless accepted. This change in proposer behavior may reflect a self-interested calculation as proposers recognize an opportunity to exploit this willingness on the side of the voters, or it may be due to the fact that proposers feel entitled to a larger share when their disagreement values are high.

An entitlement approach implies that voters are willing to punish proposers that act “too greedily.” This seems to be at least partially the case: voters are less likely to accept an offer in which the proposer’s share is perceived to be excessive. The following table displays fixed effect logit results from a model of vote choice. Specifically, we look at voters in the condition where the proposer’s reservation value is low ($DV_p = 60$ or 65) and the specific voter’s offer is at least

as great as the other voter’s offer (which helps to alleviate confounding entitlement comparisons between voters).

Table 6. Means and Fixed Effect Logit Results
 DV_p = 60 or 65, Own offer ≥ Other voter’s offer

Variable name	Mean value	Parameter est.	Standard error	P-value
Vote For (dependent variable)	0.750	-	0.019	-
Offer – DV	175.68	0.014	0.003	0.000
1100 > Proposer Keep > 1000	0.203	-0.529	0.540	0.327
Proposer Keep > 1100	0.465	-1.614	0.615	0.009
No. obs.: 513	No. subjects.: 57	Observations per subject: (min, mean, max): 3, 9, 17		

Log likelihood: -114.16

The last two variables are indicator variables, for a proposer’s offer to him or herself between 1000 and 1100, and a proposer offer to self above 1100, respectively. Controlling for a voter’s own Offer-DV margin, acceptance rates are not significantly affected by offers to the proposer below 1100. On the other hand, when proposers attempt to keep 1100 points or more – at least 88% of the pie – acceptance rates drop dramatically. Voters do not object to proposers attempting to keep a large share of the pie, as long as they do not reach for *too* large a share.

So far, we have focused on the ability of the entitlement theory to explain changes in the relationship between proposer and voter. However, the theory also has implications for the relationship between the two non-proposing voters. Consider a proposal where voter A receives a higher share than voter B, but both voters receive more than their reservation value. If the entitlement hypothesis is correct, voter B should be more likely to accept such an offer if B’s reservation value is lower than A’s, compared to the case where B’s reservation value is higher. That is, according to B, A would be “entitled” to a higher share because of his higher reservation value. On the other hand, if B’s reservation value was lower *the same offer* would violate B’s sense of entitlement.

Indeed, as Table 7 (bottom row) indicates, voters do respond to violations of a perceived entitlement. When offered less than the other voter, voters are significantly (p -value = 0.0001) more likely to accept a proposal if the other voter's reservation value is higher – supporting the view that reservation values serve as property rights. This result is robust in logit models controlling for the voter's offer or the difference between the voter's offer and reservation value.

Table 7. Voter's Acceptance Rates

Rates are for $(\text{Own Offer} - \text{Own DV}) < 250$, and $\text{DV}_p = 60$ or 65

In parentheses: Number of observations and standard errors

	Own DV > Other DV	Own DV < Other DV
Own offer > Other offer	.672 (180, .035)	.680 (225, .031)
Own offer < Other offer	.080 (289, .016)	.296 (240, .030)

A rights-based explanation would also suggest that if $\text{Own Offer} > \text{Other Offer}$ (top row of table 7), acceptance rates are higher if $\text{Own DV} > \text{Other DV}$: an advantageous (and unequal) offer is apparently easier to accept if one can justify an entitlement to it. The difference, while present, is not as strong as when $\text{Own Offer} < \text{Other Offer}$. If we condition instead on $0 < \text{Own Offer} - \text{Own DV} < 250$, the difference begins to appear, and if $\text{Own Offer} - \text{Own DV} < 70$, it becomes relatively large (.556 accept rate for costly voters and .474 for cheap voters).³¹ In short, we find evidence that if offers are not too high, voters do incorporate rights-based concerns into decisions on offers that advantage them. These concerns, however, are not as important as when offers disadvantage them.

The following table shows that these results are robust when the voter's Offer-DV margin is controlled for. In particular, as indicated by the p -value of .023 on the final parameter estimate, voters are significantly less likely to vote in favor of a proposal if their DV is greater than the other voter's but their offer is lower.

³¹ Looking at it differently, if we condition on $\text{Own Offer} > \text{Other Offer}$, but $\text{Own Offer} < \text{Other Offer} + 100$, acceptance rates are .551 for costly voters (98 obs., s.e. = .050) and .460 for cheap voters (74 obs., s.e. = .058).

Table 8. Means and fixed effects logit results, Voter-Voter comparison, DVp = 60 or 65

Variable name	Mean value	Parameter estimate	Standard error	p-value
Vote "For" (dependent variable)	.527	-		-
Offer-DV	96.98	.023	.002	.000
=1 if Other Offer > Own Offer	.414	-.734	.311	.018
=1 if Own DV > Other's DV	.500	-.044	.411	.915
=1 if Own DV greater AND Own offer lower	.207	-1.11	.491	.023
No. obs.: 1280	No. subjects: 89	Observations per subject: (min, mean, max): 10, 14.4, 20		

It is important to note that both rights and other-regarding considerations can be swamped by sufficiently high individual payoffs (cf. Bolton and Ockenfels 2000): voters appear to have a price for their sense of entitlement. In DVp = 60 or 65, with Own offer – Own DV > 250, almost 97% of all offers (212 out of 219) are accepted.³² In short, when a voter's offer is high enough (roughly 1/5 of the total pie), other aspects of the proposal have no effect on the acceptance decision.³³

5. Entitlements in Bilateral Bargaining

In order to investigate whether the entitlement theory holds in more general circumstances we conducted a set of bilateral bargaining experiments. Specifically, we ran three sessions of bilateral proposer games, including the standard ultimatum game. These sessions had 12, 10, and 10 participants, respectively, and took place under the same conditions described above: each session had 40 rounds with three treatments per session, each subject participated in each treatment, and subjects interacted anonymously at computer terminals. The pie to split was again 1250 points, and we again varied disagreement values as the treatment variable. In particular we used the following pairs of disagreement values (proposer, responder) (0,0), which corresponds to the ultimatum game, (120,65), and (1150,60). The ultimatum game condition was included to make our results comparable to the existing literature and exclude treatment effects.

³² The conditional acceptance rate is somewhat higher (about 97.5%) if DVp = 1125 is included, but voters are generally more accepting in that treatment in any case.

³³ This is reminiscent of the self-serving evaluations of equity uncovered in Knez and Camerer (1995) and Fehr and Schmidt (1999).

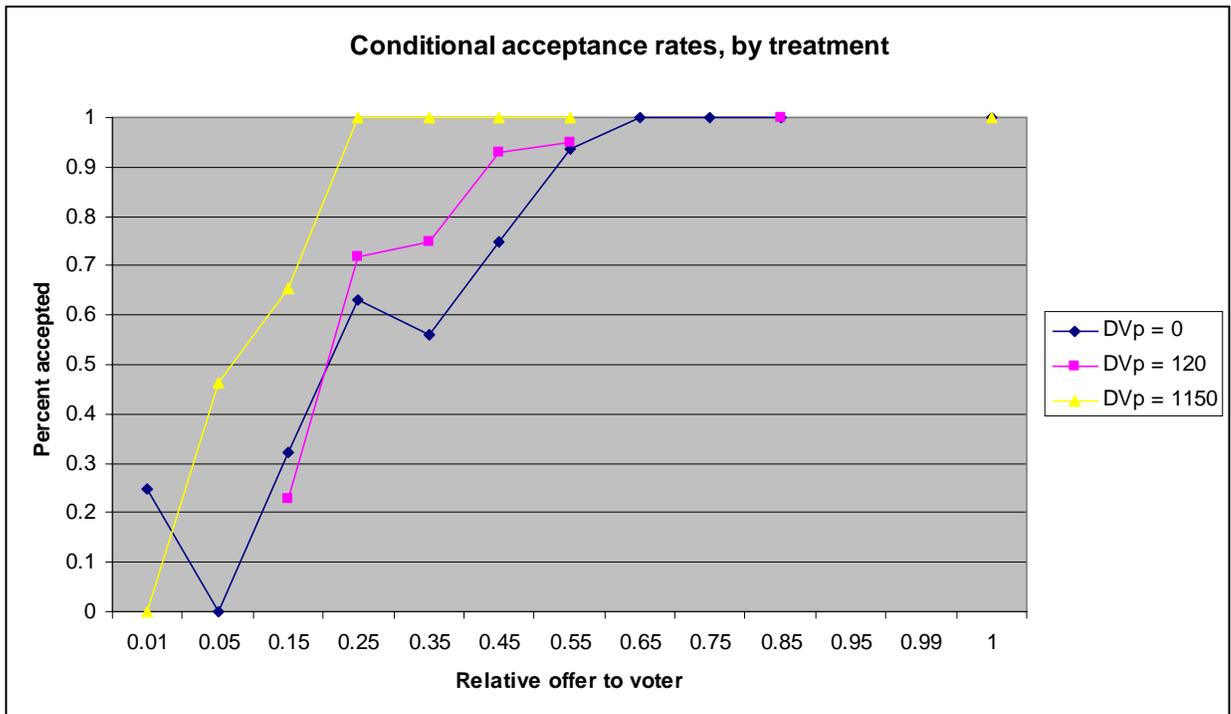
Letting the proposer's disagreement value indicate treatment, the sessions were conducted as follows:

Table 9. Design - Bilateral Experiment

Session	No. Subjects	Treatment Order (DVp)
1	12	0, 120, 1150, 0
2	10	1150, 0, 120, 1150
3	10	0, 120, 1150, 0

If the entitlement approach is correct, we should expect different acceptance depending on the proposer's disagreement value. Responders should be more likely to accept the same offer if the proposer's disagreement value is high. Indeed, this is the case as the following figure indicates.

Figure 6

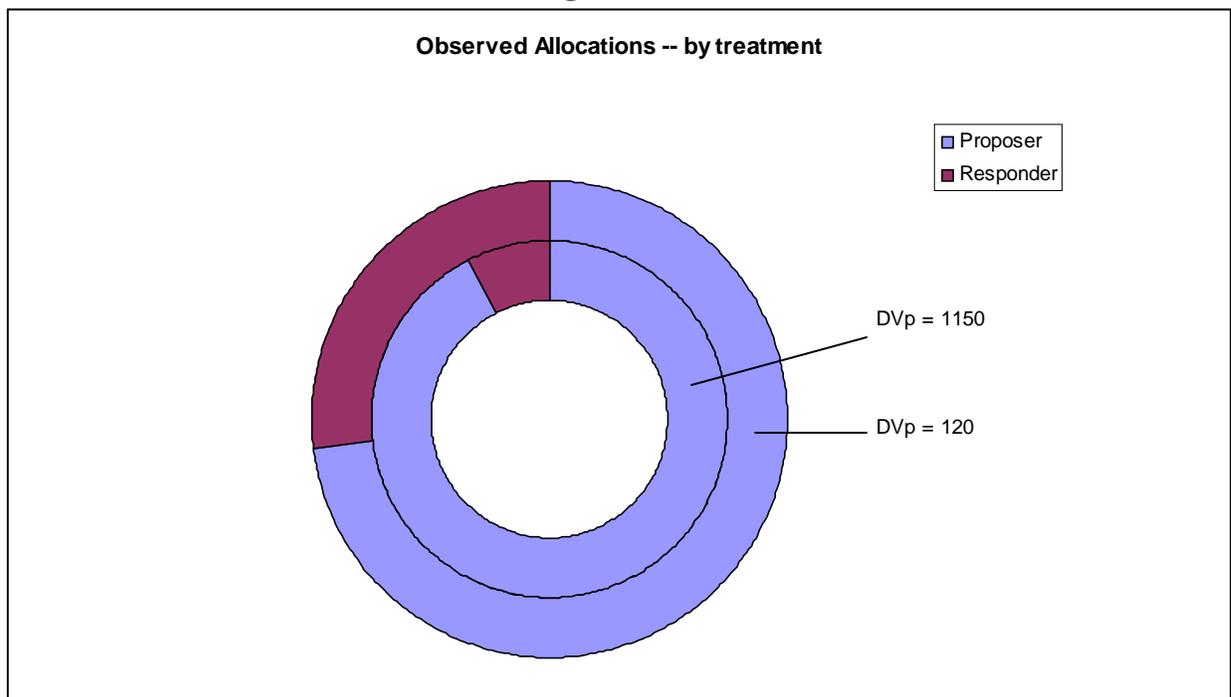


First, observed acceptance rates in the ultimatum case are similar to the existing literature. More importantly, as in the case of majoritarian decision making, acceptance rates increase

substantially as we change the proposer’s disagreement value from 120 to 1150. Thus, we find the same entitlement effect as in the proposer-pivot case.

The effect of the change in treatment on proposer behavior is also similar to the majoritarian decision making case. The following figure shows the mean observed proposed allocations for the $DV_p = 1150$ compared to the $DV_p = 120$ case. The figure is reminiscent of figure 2, in that a (strategically irrelevant) increase in the proposer’s disagreement value shifts proposed allocations strikingly in favor of the proposer.

Figure 7



In short, the results from the bilateral experiments clearly confirm the entitlement explanation.

6. Conclusion

We propose an experimental test of proposer-pivot models using a simple three-player game that instantiates both the Romer-Rosenthal (1978) model and the Baron-Ferejohn (1989a) model. In the game both proposers and voters are assigned a known reservation value, i.e. a fixed amount of money that they will receive if the proposed allocation is not passed by majority vote. We focus on three different assumptions about the extent to which subjects exhibit fairness

concerns in their behavior: selfish, egalitarian, and “fair” behavior (in the sense of reference shares and inequality aversion). The key design variable in our experiments is the variation in the proposer’s reservation value. In the experiment the proposer’s reservation value varies between about 5% – 10% of the pie (low-value condition) and almost 90% (high-value condition).

We find that none of the proposed explanations is able to account for key features of the data. Proposers are much more opportunistic than an egalitarian model would imply, to the point of taking over 90% of the pie over 90% of the time in some treatments. At the same time, proposers do not exploit their proposal power enough for the selfish hypothesis, particularly in the low-value treatments, even if these treatments occur after many rounds of the high-value treatment. Moreover, both proposer and voter behavior is sensitive to changes in the proposer’s reservation value, which is fundamentally inconsistent with *any* explanations based solely on the pivotal voter’s reservation value. Finally, effects of treatments on conditional acceptance rates are the opposite of effects predicted by models with inequality aversion.

A closer analysis of the data suggests that subjects interpret the reservation values as a basic form of entitlement. That is, everything else equal, they are more accepting of unequal offers if the proposer’s (strategically irrelevant) reservation value is higher. Similarly, voters are more tolerant of offers that allocate more money to the other non-proposing voter if that agent’s reservation value was higher. In turn, in the case of higher proposer reservation values, proposers demand significantly more of the total payoff for themselves, even if this results in somewhat higher overall rejection rates. The effects of both other-orientation and a sense of entitlement are strongest when the offers to the respective voter are low. At a given point, roughly at 1/5 of the total payoff, subjects accept offers with high probability irrespective of distributional or entitlement concerns.

The entitlement hypothesis is confirmed by experiments on bilateral interactions. Again, responders are more willing to accept the same offer if the proposer has a higher reservation value. Otherwise subjects behave exactly as in known experiments such as the ultimatum game.

Our analysis suggests that the ethical aspects of decision-making are an important ingredient of any descriptive theory of majoritarian decision-making. In addition to the known fairness and inequality concerns, voters also significantly respond to a basic form of entitlements. This finding not only has important theoretical, but also practical policy

consequences. It suggests that public policies are particularly difficult to reform if they are perceived as entitlements. The politics of social security or Medicare are instructive examples. Our findings also suggest that real subjects exhibit a complex interaction between selfish motivation and different forms of ethically motivated behavior, an interaction we are just beginning to understand.

References

- Austen-Smith, David and Jeffrey Banks. 1988. "Elections, Coalitions, and Legislative Outcomes." *American Political Science Review* 82:405-422.
- Baron, David P. 1989. "A Noncooperative Theory of Legislative Coalitions." *American Journal of Political Science* 33:1048-84.
- Baron, David P. 1991a. "Majoritarian Incentives, Pork Barrel Programs, and Procedural Control." *American Journal of Political Science* 35:57-90.
- Baron, David P. and John A. Ferejohn. 1989a. "Bargaining in Legislatures." *American Political Science Review* 89:1181-1206.
- Baron, David P. and John A. Ferejohn. 1989b. "The Power to Propose." in *Models of Strategic Choice in Politics*, ed. by Peter C. Ordeshook, Ann Arbor: University of Michigan Press, p. 343-366.
- Bereby-Meyer, Yoella and Muriel Niederle. 2003. "Fairness in Bargaining." Forthcoming, *Journal of Economic Behavior and Organization*.
- Bolton, G. and A. Ockenfels. 2000. "Strategy and Equity: An ERC analysis of the Güth-van Damme Game." *Journal of Mathematical Psychology* (42)2, 215-226.
- Camerer, Colin. 2003. *Behavioral Game Theory*. Princeton, NJ: Princeton University Press.
- Diermeier, D., and R. Myerson. 1999. "Bicameralism and Its Consequences for the Internal Organization of Legislatures." *American Economic Review*, December:1182-1196.
- Diermeier, D. and R. Morton. 2004. "Proportionally Versus Perfectness: Experiments in Majoritarian Bargaining." Forthcoming.
- Fehr, E. and K. Schmidt. 1999. "A Theory of Fairness, Competition, and Cooperation." *Quarterly Journal of Economics* 114(3), 769-816.
- Fischbacher, Urs. 1999. "z-Tree: Zurich Toolbox for Readymade Economics Experiments." Mimeo, University of Zurich.
- Fischbacher, Urs, Christina Fong, and Ernst Fehr. 2003. "Fairness and the Power of Competition." mimeo. University of Zurich and Carnegie Mellon University.
- Forsythe, Robert, Joel L. Horowitz, N. E. Savin, and Martin Sefton. 1994. "Fairness in Simple Bargaining Experiments." *Games and Economic Behavior* 6:347-69.
- Frechette, G., Kagel, J.H. and S. Lehrer. 2003. "Bargaining in Legislatures: An Experimental Investigation of Open versus Closed Amendment Rules." *American Political Science Review*.

- Grosskopf, Brit. 2003. "Reinforcement and Directional Learning in the Ultimatum Game with Responder Competition." *Experimental Economics*.
- Güth, W., R. Schmittberger, and B. Schwartz. 1982. "An experimental analysis of ultimatum bargaining." *Journal of Economic Behavior and Organization*. 75:367-388.
- Güth, W., N. Marchand, and J. L. Rulliere. 1997. "On the Reliability of Reciprocal Fairness – An Experimental Study." mimeo. Humboldt University of Berlin.
- Güth, W. and E. Van Damme. 1998. "Information, Strategic Behavior and Fairness in Ultimatum Bargaining: An Experimental Study." *Journal of Mathematical Psychology*. 42(2/3), 227-247.
- Hoffman, E., K. McCabe, K. Shachat, and V. Smith. 1994. "Preferences, property rights and anonymity in bargaining games." *Games and Economic Behavior*, 7:346-380.
- Kagel, J.H. and Wolfe, K.W. 2001. "Test of fairness models based on equity considerations in a three-person ultimatum game." *Experimental Economics* 4: 203-220.
- Knez, Marc and Colin Camerer. 1995. "Outside Options and Social Comparison in Three-Player Ultimatum Experiments." *Games and Economic Behavior*, 10: 65-94.
- Krehbiel, Keith. 1998. *Pivotal Politics*. Chicago and London: University of Chicago Press.
- McKelvey, Richard D. 1991. "An Experimental Test of a Stochastic Game Model of Committee Bargaining." in *Laboratory Research in Political Economy*, ed. by Thomas R. Palfrey, Ann Arbor: University of Michigan Press, p. 139-168.
- Romer, Thomas, and Howard Rosenthal. 1978. "Political Resource Allocation, Controlled Agendas, and the Status Quo." *Public Choice* 33: 27-43.
- Roth, A. E., V. Prasnikar, M. Okuno-Fujiwara, and S. Zamir. 1991. "Bargaining and Market Behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: An Experimental Study." *American Economic Review* 81: 1068-1095.
- Roth, A.E. 1995. "Bargaining Experiments." In *The Handbook of Experimental Economics*, A.E. Roth and J. Kagel, eds. Princeton: Princeton University Press.
- Snyder, James M, Jr. 1991. "On Buying Legislators." *Economics and Politics* 3:93-109.