Legislative Bargaining with Teams*

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March 16, 2014  

Abstract  
We experimentally investigate the Baron-Ferejohn (1989) model of legislative bargaining with two player teams versus individuals. Teams pass minimum winning coalitions (MECs) significantly more often than individuals, meeting or beating the demanding truth wins norm. Teams have significantly more proposer power, and come significantly closer to the SSPE prediction. This results from proposers capturing almost all the money going to redundant voters, in conjunction with teams forming significantly more MWCs. A little over seventy percent of all teams discuss forming MWCs in the dry run or in the first bargaining round.

Key words: Legislative bargaining, teams versus individuals, truth win’s norm.  
JEL codes: D73, D03, D02

*This research was partially supported by NSF grant SES-1226460. We have benefited from comments of participants at seminars at the Ohio State University and the ESA North American meetings in Santa Cruz. The usual caveat applies.
We experimentally investigate the Baron-Ferejohn (BF, 1989) legislative bargaining model comparing the behavior of two person teams to individuals. The Baron-Ferejohn model is the leading formal model of the legislative bargaining process. It has been explored under a variety of different specifications, including variations in the size of the committee, voting rules ranging from majority rule to a veto player, whether proposals can be amended or not, and different costs of delay in reaching agreements, to name a number of the variations that have been subject to experimental investigation (see Palfrey, 2013, for a review of the many experimental variations). The key reason for extending these experimental investigations to two person teams is that teams are known to behave more “rationally” (i.e., closer to game theoretic equilibrium predictions) than individuals. So that while previous experiments have shown that behavior qualitatively satisfies the key static predictions of the model, there are significant deviations from the quantitative predictions of the stationary subgame perfect equilibrium (SSPE) outcomes that two person teams might come closer to satisfying. These include the frequency with which minimum winning coalitions are formed, the extent to which proposer power is exercised, and the frequency with which proposals pass without delay.

Our experimental results show that behavior is substantially closer to the SSPE predictions regarding the first two of these outcomes, but not with respect to the third outcome. Minimum winning coalitions (MWCs) form significantly more often with teams to the point that they are close to 100% in later bargaining rounds, at which point they beat the truth wins norm (Lorge and Solomon, 1955). The truth wins norm is the demanding criteria that teams play strategically more often than their most able member would acting alone. Proposer power moves significantly closer to the SSPE prediction with teams, with proposer payoffs going from 66.7% of the SSPE prediction for individuals, to 79.5% for teams. This results from two factors: (1) teams as proposers take a larger share of the money available while (2) simultaneously providing more money for the highest paid “other” player resulting from the increased frequency of MWCs, which is sufficient to buy off that player’s vote.

Examination of the team chats provides additional insights. First, and foremost, 72.7% of all teams are coded as discussing MWCs during either the dry run or the first bargaining round. Adding those teams that discussed only needing to get the minimum requisite number of other

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1 See Charness and Sutter (2012) and Kugler, Kausel, and Kocher (2012) for surveys comparing team versus individual subject play in a variety of games of interest to economists.
teams to vote for the proposal so that they should give more money to those teams than the others (but do not explicitly discuss giving zero to the redundant teams), increases this percentage to 87.9%. Only a limited number of teams discuss (18.2%) giving money to all teams to be fair or to guarantee their proposal passes, and act on these discussions. \(^2\) Contrary to the SSPE refinement, a number of teams discuss and act on punishing the proposer, following rejection of a proposal.

The remainder of the paper is structured as follows: Sections 1 and 2 summarize the experimental design and the predictions of the Baron-Ferejohn model in the context of the experimental design. Section 3 reports the experimental results, with section 4 reporting results from the analysis of the team chats. Section 5 concludes with a brief summary and discussion of the main results.

1. Experimental Design

The Baron-Ferejohn (BF, 1989) legislative bargaining model has five major components: the number of bargainers, a proposal recognition rule, a proposal amendment rule, a voting rule for determining whether a proposal passes, and a rule effects of delay in passing a proposal (a discounting rule). The bargaining group consists of three agents (three two person teams or three individuals) deciding how to split $30. In each bargaining round, all agents make a proposal, one of which is randomly selected to be voted on. Proposals are voted up or down with no opportunity for amendment. If a simple majority votes in favor of the proposal, it passes. Otherwise, the process repeats itself with no shrinkage in the $30, until a proposal passes.

Once a proposal passes, agents are randomly reassigned to bargaining groups of three agents. There were ten bargaining rounds in each experimental session, along with initial dry run where subjects were walked through the software. There were between 3 and 5 bargaining groups in each experimental session. \(^3\) Groups that ended early saw a “please wait” screen until all groups had successfully passed a proposal. Payments were based on the distribution of the $30 in one randomly selected bargaining round, plus an $8 participation fee. Each member of a two person team received the money allocated to their bargaining group. Sessions lasted approximately one hour and 15 minutes.

\(^2\) This is for any bargaining round. Note that multiple categories could be coded in any given bargaining round and there is very limited agreement between coders for this category. Coding categories and agreement rates are discussed in detail in the body of the paper.

\(^3\) There were 9 teams in one of the team sessions, 12 in the other two; 9 in one of the single player session, 15 in the other two.
In the baseline, individual subject sessions, each subject had one minute to make decisions (a proposal or a vote). Should a subject fail to make a decision in that time, which rarely happened, they were prompted to make a decision by the experimenter. For the teams treatment, team composition remained the same for the entire experimental session. Teams had three minutes to make a decision, with a chat box available to coordinate their actions. Each team’s decision was locked in after five seconds with both members submitting the same decision.4

Subjects were from the undergraduate student population at The Ohio State University who were enrolled in the Economics Department subject pool and who had not participated in any previous BF bargaining experiment.5 The experiment was programmed with z-Tree (Fischbacher 2007).

2. Theoretical Predictions

The BF model has multiple Nash equilibria with any proposal that is accepted constituting an equilibrium. The stationary sub-game perfect equilibrium (SSPE) offers a unique prediction. The SSPE is essentially the subgame perfect equilibrium for the game when players do not exercise any history based punishment strategies. Under the SSPE allocations are always achieved with zero delay with proposers forming MWCs. Potential coalition partners must receive a share equal to their continuation value for the game – their expected payoff after rejecting an offer. Under standard assumptions of perfectly rational, risk neutral players and no discounting, this is equal to $10 under our design, with the proposer keeping $20.

Previous experiments with individual subjects bargaining under similar designs have found qualitative support for these predictions, but with outcomes that are far from the point predictions of the SSPE. In particular, for inexperienced subject, MWCs account for less than two thirds of passed proposals, there is modest proposer power and 65% of all proposals pass in stage 1 of each bargaining round (Fréchette, Kagel and Morelli, 2005).6 Other related

4 Subjects in both treatments rarely ran out of time for making a proposal (0.5% of the time) and never on voting. This happened once in the individual subject sessions and four times in team’s treatment. If a team could not decide within the time limit, one member’s proposal was randomly selected. Individuals were prompted to make a choice.

5 One subject in the team’s treatment had participated in another legislative bargaining experiment. One subject was the fiancé of a subject who had participated in an earlier legislative bargaining experiment, with the team dialogues indicating the two had discussed some elements of the experiment.

6 With experienced subjects, there is some improvement toward the theoretical prediction for MWCs and passing proposals without delay.
experiments with different numbers of bargainers show similar results (see Palfrey, 2013 for a survey of the relevant research).

While we expect similar results for the individual subject sessions here, we expect closer conformity to the SSPE predictions for the team sessions based on a number of factors. First and foremost, we expect the frequency of MWCs to increase significantly for teams since it is straightforward for proposers to recognize that they need only one other player to vote in favor of their proposal for it to pass, with the third player being redundant. Further, since this is a straightforward “aha” type insight that one team member should be able to explain to her teammate, a more relevant reference point against which to evaluate team compared to individual outcomes is the truth wins (TW) norm (Lorge and Solomon, 1955). Namely, teams should form MWCs as often, or more often, than their most insightful member acting alone. Fairness concerns on the part of proposers could get in the way of this, but whether or not this is an important factor can be determined the team chats.7

Second, we would expect greater proposer power in teams (proposers getting a larger share of the $30) than individuals. This prediction is an empirical one based on the fact that in the ultimatum, teams propose smaller shares than individuals, and they are more likely to accept these shares (Bornstein and Yaniv, 1998). In addition, if teams form MWCs more often than individuals, proposers will have more money to work with in terms of buying their coalition partner’s vote. So while we don’t expect teams to propose and pass substantially more SSPE allocations, we do expect proposers to have more power.8

3. Experimental Results

In analyzing the experimental results, the emphasis will be on outcomes in the last five bargaining rounds, at which point subjects are much more familiar with the software and procedures. For payoffs, we refer to the voter getting the largest payoff as the included agent and the voter getting the smaller payoff as the excluded voter.9 Typically there are only minor

7 Note that the leading other-regarding preference models in the literature predict that voters with these preferences will be more likely to vote in favor of a lower share than under standard selfish preferences.
8 There are two reasons not to expect a significant increase in the frequency of SSPE allocations: (i) solving for the continuation value of the game is exponentially more difficult than recognizing that a MWC is enough to ensure that the proposal passes and (ii) past experiments show that subjects are very unlikely to accept such unequal terms even within an MWC.
9 If both voters receive the same share, we count both as included, since they could each cast the pivotal vote.
differences between all proposals versus passed proposals, so unless otherwise noted, the analysis deals with passed proposals.

Figure 1: Proportion of MWCs

The SSPE predicts 100% MWCs. Teams come quite close to this in the last five bargaining rounds averaging 96.1% of all proposals, and 92.7% of all passed proposals. This is in sharp contrast to individuals where 65.0% of all proposals were MWCs, and 55.4% for passed proposals. However, the more relevant question is whether teams meet or beat the TW norm. Figure 1 compares teams with individuals over time on this score, along with the 90%

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10 The definition of an MWC used here is when the Excluded member receives $1 or less (typically $0). The $1 is a throw away payment to the excluded agent, and virtually never secures their vote. There are only minor differences in results reported using a strict definition for the Excluded member receiving a $0 payment.
confidence interval for the TW norm.\textsuperscript{11} Teams perform favorably against the TW norm falling within the 90\% confidence interval for all but the first bargaining round, and being at the upper bound of the 90\% confidence interval in each of the last 5 bargaining rounds. Aggregating over the last 5 bargaining round, teams beat the TW norm, forming MWCs 96.1\% of the time, with the 90\% confidence interval for the TW norm simulation being in the interval [82.5\%, 92.5\%].

Result 1: With the exception of the first bargaining round, teams satisfy the TW norm for all subsequent bargaining rounds. Teams are close to the upper bound of the 90\% confidence interval for beating the TW norm in rounds 5-10, so that aggregating over the last 5 bargaining rounds teams beat the TW norm.

The SSPE predicts that all proposals will pass without delay. This averages 81.8\% of the time for teams versus 80.0\% for individuals, which is essentially the same over the last 5 bargaining rounds.

Result 2: Around 80\% of proposals pass without delay over the last 5 bargaining rounds, with essentially no differences between teams and individuals on this score.

Table 1 reports the percentage of proposals that follow the most common focal points – an equal split between the proposer and one other voter (referred to as the MWC equal split), an equal split ($10) between all three players (referred to as the true equal split), along with the SSPE allocation. In all cases, the percentages reported are either for the focal point exactly, or within $1.00 of the focal point.\textsuperscript{12} We use these weaker definitions as they better capture the frequencies for the focal points. For example, a split of ($11, $9.50, $9.50) where the proposer’s share is listed first, is not materially different from a $10 split all around and typically is voted in with the same frequency in both cases.

\textsuperscript{11} The 90\% confidence interval for the TW norm draws pairs of data for individuals (with replacement), with the “team” defined as meeting the TW norm if at least one member proposes an MWC. Sample sizes in each round are equal to the number of teams in the data. Then take the mean of each sample and repeat this process 100,000 times. To determine the 90\% confidence interval, exclude the lowest and highest 5\% of these means.

\textsuperscript{12} These are one sided bounds: SSPE is at least $19 and $9, with the last getting less than $1 (or equal to for all). Exclusive Equal split is at least 14 for two and less than $1 for one. True Equal Split is at least $9 for all.
<table>
<thead>
<tr>
<th>Focal Points</th>
<th>Prediction</th>
<th>Teams Last 5</th>
<th>Individuals Last 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSPE (20/10/0)</td>
<td>100%</td>
<td>9.09</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(29.01)</td>
<td>0</td>
</tr>
<tr>
<td>MWC Equal Split</td>
<td>0%</td>
<td>40.00</td>
<td>49.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(49.44)</td>
<td>(50.38)</td>
</tr>
<tr>
<td>True Equal Split</td>
<td>0%</td>
<td>7.27</td>
<td>27.69</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(26.21)</td>
<td>(45.10)</td>
</tr>
<tr>
<td>Observations</td>
<td></td>
<td>55</td>
<td>65</td>
</tr>
</tbody>
</table>

Table 1: Focal Allocations as % of all passed allocations, (standard errors)

By far the most attractive focal allocation for both teams and individuals is the MWC equal split, accounting for 40% or more for passed allocations. There are no passed allocations approximating the SSPE for individuals (with none proposed as well), with a handful (9.1%) passing for teams (a little less than 50% of the proposed allocations). True equal splits are much more frequent for individuals, which is in part reflective of the lower frequency of MWCs between the two treatments.

Result 3: The most attractive focal allocation for both teams and individuals is an equal split between the proposer and one of the voters within an MWC. Teams submit more SSPE type proposals than individuals, but these are rejected a bit more than 50% of the time.

Table 2 shows dollar amounts agents received averaged over all allocations that passed in the last 5 bargaining rounds. Share for the included voter refers to the voter getting the larger share, with share for the excluded voter referring to the voter getting the smaller share. Standard errors of the mean are reported in parentheses below the averages.
### Table 2: Bargaining Shares for Accepted Proposals (standard errors)

<table>
<thead>
<tr>
<th>Shares of $30</th>
<th>Prediction</th>
<th>Teams Last 5</th>
<th>Individuals Last 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share for Self ($)</td>
<td>$20</td>
<td>16.21</td>
<td>13.61 (2.11)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2.37)</td>
</tr>
<tr>
<td>Share for Included ($)</td>
<td>$10</td>
<td>13.08</td>
<td>12.90 (1.64)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2.20)</td>
</tr>
<tr>
<td>Share for Excluded ($)</td>
<td>$0</td>
<td>0.71</td>
<td>3.50 (2.56)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4.34)</td>
</tr>
</tbody>
</table>

Table 2: Bargaining Shares for Accepted Proposals (standard errors)

Proposers in the teams treatment averaged $2.60 more than in the baseline treatment (p < 0.01 using a Mann-Whitney rank sum test). While this is still reasonably far from the $20 predicted under the SSPE (81.1% of the SSPE share), it represents an increase of 13.0% in proposer power compared to individuals (measured as a percentage of the SSPE prediction). At the same time, there is a very small increase of $0.18 in the average dollar amount for the highest earning coalition partner, which is far from significant at conventional levels. Experience with the ultimatum game suggests that the greater spread between the proposer’s payoff versus the payoff for the voter included in the MWC would result in an increase in rejection rates in the teams treatment. The fact that it does not no doubt results from the increased pressure the included voter faces, as rejection sets up the possibility of a zero payoff when new proposals are called for. The fact that rejection rates do not increase is consistent with risk aversion on the part of the included member (Harrington, 1990) and/or the prediction that agents with other regarding preferences are willing to accept lower offers than the SSPE in legislative bargaining games (Montero, 2007).

Figure 2 provides more details regarding payoffs for passed proposals, with team results in the top panel and individual results in the bottom panel. The focal allocation – MWC equal split – shows up with the cluster of proposer and included member payoffs at $15. What the figure really highlights is the relatively high frequency with which proposers in the teams treatment keep more than $15, exercising some proposer power within the context of an MWC, along with a handful of cases where they get close to the $20 predicted under the SSPE. In

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13 The unit of observation here is outcome for each member (team or individual) over the last five bargaining rounds.
contrast, with individual agents, there are no outcomes in which proposers get to keep $20, along with a lower frequency with which proposers get more than $15 within the context of an MWC.

The increase in proposer power under the teams treatment is partly due to increased proposer power conditional on having an MWC: Proposers in the teams treatment earn $1.27 more than individuals conditional on having an MWC (48.8% of the $2.60 overall difference reported in Table 2). The remaining increase comes from the higher frequency of MWCs under the teams treatment (92.7% versus 55.4% of passed proposals), as non-MWCs almost always have smaller differences between proposers and the included member (with no differences for the true equal splits with their high frequency for individuals).

**Result 4:** Proposer power is significantly greater for teams compared to individuals with proposers in teams earning $2.60 more on average in each bargaining round than individuals.

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14 Proposers keep $16.66 for teams versus $15.39 for individuals over the over the last 5 rounds. This difference is significant at the 1% level.
The increase in proposer power is roughly equal due to the increased share proposers get within MWCs for teams, along with the increased frequency of MWCs within teams, as non-MWCs almost always have smaller differences between proposers and the included member.

Voting patterns: To study voting patterns, we use a probit regression that only includes the vote of the included member. We drop data for excluded voters (those receiving the smaller share) as most of these consist of $0 or $1 allocations under an MWC as these are routinely rejected (in this case 100% of the time for both teams and individuals), which would distort the estimates reported. Regressors include a dummy variable for the teams treatment (Teams), own share for the included voter (S), share to the excluded voter (SO; to account for possible other regarding preferences), and interaction terms between the team dummy and own share and other’s share. Errors are clustered at the agent level. Table 3 reports the regression results over all bargaining rounds and the last 5 bargaining rounds alone.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) All Rounds</th>
<th>(2) Last 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teams</td>
<td>-0.334</td>
<td>6.508**</td>
</tr>
<tr>
<td></td>
<td>(2.494)</td>
<td>(3.109)</td>
</tr>
<tr>
<td>S</td>
<td>0.362**</td>
<td>0.751***</td>
</tr>
<tr>
<td></td>
<td>(0.158)</td>
<td>(0.208)</td>
</tr>
<tr>
<td>Teams*S</td>
<td>0.072</td>
<td>-0.420*</td>
</tr>
<tr>
<td></td>
<td>(0.179)</td>
<td>(0.225)</td>
</tr>
<tr>
<td>SO</td>
<td>0.110</td>
<td>0.339***</td>
</tr>
<tr>
<td></td>
<td>(0.077)</td>
<td>(0.103)</td>
</tr>
<tr>
<td>Teams*SO</td>
<td>-0.055</td>
<td>-0.254**</td>
</tr>
<tr>
<td></td>
<td>(0.087)</td>
<td>(0.114)</td>
</tr>
<tr>
<td>Constant</td>
<td>-4.259*</td>
<td>-9.865***</td>
</tr>
<tr>
<td></td>
<td>(2.262)</td>
<td>(2.965)</td>
</tr>
<tr>
<td>Observations</td>
<td>358</td>
<td>170</td>
</tr>
<tr>
<td>σ</td>
<td>0.462</td>
<td>0.406</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-164.9</td>
<td>-73.30</td>
</tr>
</tbody>
</table>

Table 3: Voting Probits

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15 Both voters are included if they get the same amount.
Focusing on the last five bargaining rounds, the teams dummy is large, positive and statistically significant. This, in conjunction with the negative coefficient value for the teams by own share interaction effect (Teams*S in Table 3), indicates that for smaller own shares teams are more likely to accept a proposal than individuals are. This is nicely illustrated in Figure 3, which graphs the probability of a favorable vote at various levels for own share, holding other’s share fixed at its average level. At very low shares, there are no differences in voting between the two treatments, which start to emerge at own share equal to $6-$7, with no differences again at own shares of $12 and above.

Figure 3: Predicted Voting Outcomes
(last 5 bargaining rounds)

Figure 4 shows the probability of voting for a proposal by the included member as a function of the excluded member’s share, evaluated at the average level of the included member’s share. Here there are clear differences between the two treatments, with individuals less likely than teams to vote in favor of a proposal with a lower excluded member’s share (p < 0.05 over the interval [$0, $2] for the excluded member’s share).

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16 This is averaged over teams and individuals.
17 Evaluating the differences at each integer value for own share, these differences are statistically significant at the 0.05 level between own shares in the interval [$7, $11].
Figure 4: Votes of Included Member as a Function of Excluded Member’s Share (last 5 bargaining rounds)

The results in Figure 4 suggest that teams have much less concern for the excluded member than do individuals. However, this conclusion cannot be supported here since more money for the excluded member is strongly associated with less money for the proposer, resulting in a smaller difference between the included member’s share and the proposer. As such, one could just as well conclude that the higher frequency with which individuals reject proposals with lower shares for the excluded member represents distaste for larger differences between their payoff and the proposer’s payoff.18

6. Team Dialogues

We analyzed team dialogues for further insight into the behavioral processes underlying the choices teams made. To do this, we (the experimenters) first looked at the team chats to identify relevant categories for better understanding behavior. We then had two undergraduates independently code up the data for one session. We then met with the two coders to go over their works in an effort to resolve any obvious discrepancies in how the two were coding relative to the categories of interest. After that, the two made some modifications in their coding and

18 Replacing SO in the probits with proposer’s share yields the same absolute values for proposer’s share (and proposer’s share interacted with the teams dummy but opposite in sign to those reported in Table 3. This follows from the fact that proposer’s share plus own share plus share to other sum to $30. It is not clear if one could distinguish between these two interpretations with a larger group size, say five, as proposers would almost certainly allocate the same share to the two included members under an MWC.
independently coded up the other two sessions. Our focus was on determining why and when teams proposed MWCs, or proposals in which they decided to give disproportionate amounts to their two potential coalition partners. The categories in question are reported in Table 5, along with the frequency with which each category was coded by one of the coders (reported in the right-most column) as well as the agreement rate between the two coders (reported in parentheses).

<table>
<thead>
<tr>
<th>Coding Category</th>
<th>Description of Coding Category</th>
<th>Percentage of Teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Team recognizes in either the trial run or Round 1 of actual play, that they only need one other team to vote for their proposal so make very uneven proposals designed to capture one of the two voters.</td>
<td>15.2% (20.0%)</td>
</tr>
<tr>
<td>2</td>
<td>Same as category 1 but explicitly discussing an MWC; i.e, giving the excluded voter $1 or less.</td>
<td>72.7% 75.8% (80.0%)</td>
</tr>
<tr>
<td>3</td>
<td>Same as categories 1 or 2 above but not want to make payoffs too uneven until later rounds out of concern for group dynamic.</td>
<td>6.1% (100.0%)</td>
</tr>
<tr>
<td>4</td>
<td>Reach agreement on category 1 or 2 after Round 1.</td>
<td>30.3% (80%)</td>
</tr>
<tr>
<td>5</td>
<td>Discussing giving money to all teams.</td>
<td>18.2% (16.7%)</td>
</tr>
<tr>
<td>6</td>
<td>Team is concerned with fairness, but switches to making offers like 1 or 2 above on the grounds that others are selfish, and they will not act on these concerns with others being selfish.</td>
<td>9.1% (0.0%)</td>
</tr>
<tr>
<td>7</td>
<td>Breakdowns of the stationarity assumption on the part of proposers; Voters discussing punishing the proposer in stage t, making them the excluded member of the coalition in stage t+1 should they become the proposer.</td>
<td>21.2% (42.9%)</td>
</tr>
<tr>
<td>8</td>
<td>Breakdowns of the stationarity assumption on the part of proposers; Proposers who made unequal allocations in stage t discussing punishing a voter in stage t+1 should they become the proposer again.</td>
<td>27.3% (11.1%)</td>
</tr>
</tbody>
</table>

The most commonly coded category is 2 - recognizing in the dry run, or in Round 1, that they only needed one other team to vote for their proposal. An example of a dialogue of this sort follows, in this case during the dry run (subject numbers precede each comment):
what do you want to do for the trial round?
10 each?
sure
that starts off fair
Now how do you want to play the real game?
iddk what's the best way?
we only need a majority vote. That means make it fair enough for at least 2 people to vote yes
That means we need us and 1 other team to like our proposal

At least two teams recognized the benefits of an MWC, but argued against making payoffs too uneven to begin with on account of group dynamics:

so 50/50?
ok that sounds good
I don't want the game to get that harsh on round 1, but for round 9 I want to do 50/50

This team follows through on this in Round 1 proposing a (13, 10, 7) split ($13 for themselves) and voting against the proposal selected which was an MWC in which they got $14. With the proposal rejected, in Stage 2 the proposed allocation gave them zero (which they rejected) and $14 to the team that had been allocated zero in Stage 1. That proposal passed. Beginning in Round 2 this team proposed an MWC and continued to do so for all subsequent rounds:

so do you want to do 16/14/0 then?
yeah
so 18/12/0 for next round?
sure

This basic understanding that the way to make the most money is to form an MWC is characteristic of teams coded as 2, as the following example makes clear (again coded in the dry run):

So I think I have a strategy
same here
We only need the vote of one other team
you want to play this to win or to be nice to everyone
WIN
ok same
lets not give it away in the trial run now though

........
do something like 17 us, 13 another, then just give 0 to the last
The frequency with which 2 was coded is a bit above the actual frequency of MWCs in Round 1 on account of considerations expressed in category 3, as well as coding errors reflected in disagreements between the two coders.\(^{19}\)

Other coding categories of particular interest are 5 and 6 reflecting fairness considerations, both of which are coded infrequently. Also of interest are categories 7 and 8 which call into question the stationarity assumption underlying the SSPE. Although these are not coded that frequently (on account of the high frequency of Stage 1 proposals being accepted), and there is disagreement between the coders on this score, there is definitely retaliation against the team proposing an MWC after their proposal was rejected: 80.0% of the time the proposer in stage 1 whose proposal was rejected, were given $1 or less by a new proposer in Stage 2.

This breakdown in the stationarity assumption is more prevalent for teams than for individuals, as 34.6% of individuals gave $1 or less to the proposer in Stage 2 after a new proposer was selected. However, this difference is exaggerated, as teams were much more likely to propose MWCs. As such, a better comparison would be to the frequency with which new proposers in Stage 2 offered the Stage 1 proposer the smallest share in Stage 2, which rises to 57.7% for individuals, and stays at 80.0% for teams.

Finally, there is little evidence that teams are concerned with “fairness” issues, as only 3 out of 33 were coded under category 6.\(^{20}\) And no teams were identified that maintained their concern with fairness through the end of the session. Rather, most of the teams roughly follow standard theory and propose MWCs, either on their own or by imitating other teams who propose MWCs.

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\(^{19}\) We tried combining closely related categories to increase agreement rates – in particular categories 1 and 2, and 7 and 8, but this had minimal impact.

\(^{20}\) To take one case: In Round 1 they propose a true equal split which passes. In Round 2 they propose (15, 7.5, 7.5; with their payoff listed first) which is rejected, only to have an MWC equal split (where they get $0) passing. In Round 3 they vote in favor of an MWC equal split where they are getting $15 (their proposal was for a 12, 12, 6 split). In round 4, they propose an MWC equal split noting “they’re gonna continue doing the 15 15 0, so we might as well do the same” and continue to propose MWCs (with one exception) for the remainder of the session.
7. Summary and Conclusions

We report results for teams versus individuals in the Baron-Ferejohn (1989) legislative bargaining game. We do so for several reasons: First, many economic decisions are made by teams as opposed to individuals, which is likely to be particularly true in multilateral bargaining settings, so it is important to understand what, if any, differences there are in behavior in the two cases; e.g., do teams come closer to the SSPE prediction than individuals? Second, the BF game is a particularly attractive one to study since the notion of a minimum winning coalition in the game is a reasonably obvious one that can be easily explained to others, thereby satisfying the criteria under which a truth wins norm could hold. As noted, the TW norm is considerably more demanding than teams performing better (closer to “rational” economic norms) than individuals, and is rarely met in the psychology literature on team play (Davis, 1992), so that it is interesting to study whether teams meet this demanding criteria under conditions where it has a decent chance of being satisfied. Third, team dialogues provide a window into the beliefs underlying agents actions, which is inherently interesting and of considerable importance, as players’ beliefs are important to determining outcomes in most game theoretic settings.

There are a number of substantive results reported. First, teams meet the demanding TW norm with respect to formation of MWCs and are near 100% satisfying it in later bargaining rounds. Second, conditional on forming MWCs, proposers are able to extract larger shares with teams compared to individuals. This may well be a result of the higher probability of MWCs forming with teams, which increases the probability of getting nothing, as opposed to getting a smaller share than the proposer, but at least being in the MWC. Nevertheless, this increase in proposer power stops well short of the SSPE prediction, the standard equilibrium reference point for the BF model, as the SSPE allocation is rejected 50% of the time, resulting in a lower expected value than, for example, the proposer taking somewhere between $16-$18, which brackets proposers’ average share ($16.21) for teams over the last 5 bargaining rounds.

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21 On this point, it is important to note that risk averse voters should be willing to accept a smaller share than the risk neutral types the SSPE operates under (Harrington, 1990).
22 Using predicted probabilities for voting from the probits, the expected payoff maximizing proposal has the proposer taking $16. Alternatively, proposers asked for $18 twelve times in the last 5 bargaining rounds, with these proposals always passing.
References


