Gains versus Costs in Legislative Bargaining*

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Abstract

We experimentally investigate bargaining over how to allocate Costs versus Benefits under the Baron-Ferejohn (1989) model. The treatments are isomorphic and include pre-play communication (cheap talk) between players. There is greater proposer power under Costs than Gains, with most bargaining trials ending with no delay. However, there are significantly more delays with Gains, inconsistent with what might be expected under reference dependent preferences. This results from the high frequency of minimum winning coalitions in conjunction with greater attention paid to avoiding the worst outcome under Costs: losing their full endowment versus obtaining zero benefits under Gains.

Key words: legislative bargaining, pork versus taxes, reference dependent preferences
JEL classification: D72, C70, C92

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We experimentally investigate the Baron-Ferejohn (1989) model of legislative bargaining. It is one of the leading models of legislative bargaining in the political science literature and has been the subject of a number of experimental studies (see Palfrey, 2016 for a recent survey). The contribution of the present paper is threefold. First, pre-play communication (cheap talk) between the proposer and potential collation partners is permitted, as opposed to the proposal being voted on absent any consultation with potential coalition partners. Adding pre-play communication to the model does not change the equilibrium predictions but procedurally comes closer to how legislative bargaining occurs outside the lab. Empirically it generates outcomes closer to the strong proposer power predicted under the stationary subgame perfect equilibrium (SSPE) as shown in Agranov and Tergirman (2014) and Baranski and Kagel (2015). Second, we investigate the model when proposers are tasked with distributing benefits (the Gains treatment) and with raising money to pay for a proposed project (the Costs treatment). To our knowledge there have been no other experimental studies of the Baron-Ferejohn model comparing Gains versus Costs, with or without pre-play communication. Third, we compare Gains versus Costs under different initial endowments and procedures when the two treatments are isomorphic. This permits investigation of reference dependent preferences (Kőszegi and Rabin, 2006) in a novel environment, which is of independent interest beyond what it has to say about legislative bargaining.

Experimental results show that in both treatments the large majority of proposals pass without delay and there is strong proposer power. In the Gains treatment proposer power is similar to what has been reported in other studies with pre-play communication. However, there is significantly greater proposer power in Costs compared to Gains. The frequency with which proposals are rejected is greater under Gains than Costs, consistent with greater risk loving under Gains than Costs. This was not expected given past results for reference dependent preferences. A post experiment questionnaire shows that this difference results from the high frequency of minimum winning coalitions (MWCs), in conjunction with greater concern for being left out of the winning coalition and losing their entire starting balance under Costs compared to a zero payoff under Gains. The questionnaire also showed that in Gains voters were more concerned with their own share versus the proposer's share, increasing the likelihood of rejecting a comparable Costs offer. Analysis of pre-play communication between proposers and voters shows that in both treatments potential coalition partners' initiate the bargaining process,

competing to offer lower shares and calling for a zero share for their rivals. This pre-proposal bargaining increases over time, resulting in a sharp reduction in the frequency of equal shares for all and a high frequency of minimum winning coalitions with strong proposer power.

The structure of the paper is as follows: Section I briefly reviews previous experimental results for the Baron-Ferejohn model with pre-play communication, as well as reference dependent preferences as they apply to our setting. Sections II reports the experimental design and procedures. Theoretical predictions are given in Section III. Section IV reports the experimental outcomes. Section V discusses the results with respect to the previous literature on reference dependent preferences. Section VI concludes with a summary of the main results.

I. Prior Experimental Research

Both Agranov and Tergiman (2014; AT) and Baranski and Kagel (2015; BK) report investigations of the Baron-Ferejohn (BF) model of legislative bargaining with pre-play communication. Both experiments involve distributing a sum of money by majority rule. AT employ a 5 player game with the amount of money to be distributed shrinking by 20% following a rejected offer, with BK employing a 3 player game with no discounting. There are a number of other, smaller differences between the two experiments, but the major results are quite similar. In both cases proposers' payoffs are substantially closer to the SSPE prediction with than without pre-play communication – 84.7% of the SSPE prediction versus 64.7% in AT and 88% versus 73.0% in BK. In both cases this was accompanied by a modest *increase* in the frequency with which first stage offers were accepted.[1]

The literature on reference dependent preferences stems from differential responses to gains and losses as modeled in prospect theory (Kahneman and Tversky, 1979). There are pure framing effects of the sort identified in the Asian Disease problem (Tversky and Kahneman, 1981) where different choices are made over two equivalent situations, with one described in terms of gains (the number of lives saved), the other in terms of losses (the number of lives lost).[2] There are also experiments where agents' endowments differ between treatments,

[1] From 81% to 89% in AT and from 76% to 80% in BK.

[2] Also see Neale and Bazerman (1985) who show that framing a collective bargaining game in terms of financial gains as opposed to "serious financial losses" results in fewer negotiations being sent to arbitration, and Kristensen and Gärling (1997) where buyers and sellers negotiate over the price of a condominium.

beginning with the original "mugs" paper (Kahneman et al., 1990), where agents endowed with a mug value it more than agents who do not have one.[3]

Most closely related to the present experiment are structured bargaining experiments, with agents being given differential initial endowments: Camerer, et al. (1993) investigate a shrinking-pie, multi-round, *bilateral* bargaining game, comparing the results to an isomorphic treatment in which losses increase over time.[4] They find more dispersed offers, greater initial rejections and lower proposer payoffs with increasing losses as opposed to an equivalent shrinking of benefits. Christiansen and Kagel (2015) investigate the Jackson and Moselli (2002) multilateral bargaining experiment where agents bargain over both a public policy outcome and private benefits versus private costs. They find higher rejection rates with costs than with benefits, consistent with risk aversion in the case of benefits and risk loving with costs. In the concluding section of the paper we point out significant differences between the present experiment and the Christiansen-Kagel experiment that account for this difference in outcomes.

II. Experimental Design and Procedures

We consider a three-player Baron-Ferejohn (BF) legislative bargaining game under a majority voting rule. In Gains players decide on how to split $30 where, as is typically the case, all players had $0 to begin with. In Costs players must decide how to raise funds to "pay for a common project." The initial cost of the project is $60, with each player endowed with a voucher worth $30 (see Figure A1 in the appendix) against which to cover her costs. No player can be taxed more than the value of the voucher. (The word tax is never used, rather the phrase, "the cost of the project" was used.) A bargaining round begins with one of the three players randomly chosen to propose the distribution of benefits, or costs, to be voted up or down without amendment. If the proposal passes the bargaining round ends with the proposed allocation binding. If the proposal is rejected the group moves on to a new bargaining *stage*. A new proposer is randomly selected, and in Gains the amount of money to be split is reduced by 15%. In Costs the tax increases by an equivalent amount, maintaining the strategic equivalence between the two treatments. This process repeats itself until a proposed allocation passes, after which play moves to the next bargaining round.

[3] Plott and Zeiler (2005) report that small, seemingly inconsequential, changes in the details of the experimental design and instructions go a long way to eliminating the reference point effect in this case.

[4] Their emphasis is on using eye-tracking to record information search to determine the extent to which agents use backward induction.

Prior to offering a proposal to be voted on there is a period of free form communication between the proposer and each of the voters. Messages could be sent via public communication, seen by all, or privately between a voter and the proposer, or between the two voters. This communication stage could last for up to three minutes, after which the proposer submits the final allocation to be voted on.[5] Proposers were automatically counted as voting in favor of their proposal, making each of the two voters pivotal. During the communication phase subjects were instructed to remain anonymous, not to reveal their names or any other identifying information.[6]

When voting, subjects saw the proposed allocation to all three players, with results reported immediately after the vote. Feedback following voting consisted of the proposed allocation to each player and how that player voted. Players had access to this data within a given bargaining round as well as for allocations passed in prior bargaining rounds.

There were ten bargaining rounds in an experimental session, plus a dry run at the beginning to familiarize subjects with the software, voting rules and feedback provided. Subjects were randomly reshuffled into new bargaining groups following the completion of each bargaining round. Earnings were based on one randomly selected bargaining round, plus an $8 show up fee. All payoffs were in cash at completion of the ten bargaining rounds.

There were four Cost sessions and four Gains sessions, with between 12 and 18 subjects in each session (six of the sessions employed 15 subjects), with a total enrollment in the Gains treatment of 63 and 57 for Costs. There was no overlap in subject participation between sessions. All participants were Ohio State undergraduate students. Software was developed using z-Tree (Fischbacher, 2007).

III. Theoretical predictions

There are multiple equilibria in the BF bargaining model. To narrow down these predictions researchers focus on the stationary subgame perfect equilibrium (SSPE), which requires strategies to be time and history independent. Behavior will be compared to the SSPE point predictions, as well as a number of robust qualitative predictions of the model; e.g., the existence of proposer power, minimum wining coalitions (MWCs), etc.

[5] The communication stage could be terminated earlier once the proposer and both voters clicked the end communications button. This rarely happened.

[6] Reviewing the conversations, no one violated the anonymity rule. The complete set of instructions is reported in the online appendix.

In the SSPE for the Gains treatment the proposer forms an MWC, giving the coalition partner her discounted continuation value and keeping the rest. The coalition member receives $\delta^t(30)/3$ in stage $t = 1, 2, ...$ Since $\delta = 0.85$ stage 1 payoffs are \$8.50 to the included voter, \$0 to the voter outside the MWC, and \$21.50 to the proposer. Bargaining is predicted to end without delay. To minimize the need for calculations, the amount of money left to be distributed following a rejected offer was posted on players' computer screens prior to each stage of the bargaining process.

The Costs treatment is isomorphic to the Gains treatment. The total value of the vouchers is \$90 (\$30 for each player), with \$60 to be raised in stage 1 of the bargaining process, so that in effect players were tasked with distributing \$30 in both treatments. The amount of money to be raised following a rejected proposal was set to maintain the strategic equivalence with the Gains treatment (rounded off to two decimal places), and again posted on players computer screens prior to each stage in the bargaining process.[7]

Within standard expected utility theory the Gains and Costs treatments are strategically equivalent, with the same SSPE outcome. If subjects have reference dependent preferences, with standard prospect theory assumptions regarding gain and loss functions (Kahneman and Tversky, 1979), predicted outcomes would still be identical if subjects use the same reference point in both treatments, e.g., the continuation value for the game. However, if subjects use \$0 as their reference point for evaluating a proposed allocation under Gains and the \$30 voucher as their reference point under Costs, there will be risk loving with Costs, and risk aversion over Gains (Kőszegi and Rabin, 2006). The same qualitative predictions – greater risk loving over Costs than Gains would be true for some variation in these reference points. For example, if under Costs subjects do not fully adjust their reference point to the \$30 value of the voucher (Arkes et al., 2008) subjects would remain risk-loving as long as payoffs were below the adjusted reference point.

Even if reference points are somewhat different from \$30 and \$0, one can imagine scenarios where risk aversion over Gains and/or risk loving over Costs would not hold. For example, there might be risk aversion in Costs if subjects overweigh the probability of, or have extreme disutility for, the \$30 loss. The chance of losing their full endowment is particularly

[7] The restriction on the maximum amount of any given player's tax remained fixed at \$30.

relevant for the BF bargaining game as one of the robust qualitative implications of the model is a high frequency of MWCs which is satisfied in the data.

IV. Experimental results

Results will be reported for sessions as a whole and broken down by the first and last five bargaining rounds. For ease of comparison between the two treatments, Cost outcomes will be expressed in terms of money earned.

Table 1 shows outcomes for proposals passed without delay. Pass rates were relatively high in both cases – but somewhat higher for Costs than Gains – 94.7% versus 91.9%. Notably, pass rates are higher in the first five compared to the last five bargaining rounds, with a larger decrease for Gains than Costs. There are a number of factors responsible for this decrease in pass rates discussed below.

[Insert Table 1 here]

Average proposers' payoffs over the last five bargaining rounds were 73.2% and 78.3% of the SSPE prediction for Gains and Costs, respectively, averaging $1.10 more under Costs ($p < 0.01$), but well below the SSPE. [8] Figure 1 shows the distribution of proposers' payoffs over the last five bargaining rounds. There is a noticeable shift toward higher proposer payoffs under the Costs treatment. Figure 2 plots payoffs for the proposer against the payoff of the non-proposing player with the highest share (the "included voter") over the last five bargaining rounds for proposals accepted without delay. The size of the circle represents the number of observations, with the dashed line showing when shares of the proposer and included voter sum to $30 (an MWC). Most of the proposals are MWCs or very close to it. Outside of these there is a mass of true equal splits ($10 for each player) in both treatments (the large circles centered on 10-10). One noticeable difference between the two treatments is the number of circles down and to the left of the dashed line for Gains where the proposer is offering positive, but unequal, payoffs to both voters.

[Insert Figs 1 and 2 here]

There is a reasonable amount of proposer power, with proposers earning $2.83 more than the highest voter share in Gains and $4.39 more under Costs ($p < 0.01$ in both cases) over all

[8] Statistical test based on a Wilcoxon rank sum sign test with bargaining round as the unit of observation.

bargaining rounds.[9] In both cases there is considerably more proposer power over the last five bargaining rounds, with the difference between the proposer's share and the highest voter's share increasing by about 70% in both treatments ($3.96 under Gains and $5.94 under Costs). A large part of this increase in proposer power can be attributed to a decrease in equal-shares-for-all proposals (which always passed) in the last five bargaining rounds (see Table 1).

For classification purposes, MWCs are defined as proposals in which one of the players received a token payoff of $1 or less, as these excluded players virtually never vote in favor of the proposed allocation. The rate of MWCs starts out much higher under Costs than Gains, converging to essentially the same rate in the last five bargaining rounds. There is a notable difference in the frequency of almost SSPE outcomes (MWCs with shares within plus or minus $2 of the SSPE prediction) occurring roughly twice as often for Costs than for Gains ($p < 0.05$).[10] The frequency of equal splits between the proposer and the included voter within a MWC ($15-$15 splits) start out higher under Costs, but have effectively been eliminated in the last five bargaining rounds, while remaining steady at around 12% for Gains.

Conclusion 1: Outcomes are closer to the SSPE prediction under Costs than Gains: Average proposer payoffs are larger in the Costs treatment. There is greater proposer power with Costs, defined as the difference in the proposer's payoff and the voter receiving the largest payoff. There are significantly more "almost SSPE" type proposals under Costs than Gains. There is a higher frequency with which proposals pass without delay under Costs.

Table 2 reports probits for voting on stage 1 proposals. The dependent variable has value 1 for the included voter, the one receiving the largest payoff, voting in favor of the proposal (0 otherwise). Explanatory variables include S, the dollar payoff to the included voter, Costs, a dummy variable equal to 1 for the Costs treatment (0 otherwise), and Costs*S, for the interaction between the Costs dummy and payoffs to included voters. Voters other than the included voter are left out of the probit as they usually vote against the proposed allocation, always doing so

[9] Based on a Wilcoxon rank sum sign test with bargaining round as the unit of observation.
[10] In this case it's possible to follow the same subject over time so the statistical test is based on a probit, with errors clustered at the subject level to avoid repeated measure problems. The previous statistical tests are for bargaining round outcomes (the net effect of the proposal and whether it passed or not) so that clustering at the subject level is not meaningful.

within an MWC. True equal split proposals are excluded as in virtually all cases they pass unanimously.[11] As such to include them (i) adds no new information and (ii) would conceal responses to proposals where the included voter is offered $10, with the proposer taking all, or most, of the remaining money. [12] The probits were run for all rounds and separately for rounds 1-5, and 5-10, with error terms clustered at the subject level.

The included voters share (S) is statistically significant at the 1% level in all three cases. What is interesting here is the Costs dummy in conjunction with the Costs*S interaction effect, with its implications for the likelihood that the included voter approved the allocation at different levels of S. To do this we calculated the 90% confidence interval for Costs + Costs*S over the range of included voter payoffs ($5-$15). For the first five bargaining rounds, included voters were significantly more likely to vote in favor of proposed payoffs under Costs up to $9, with the mean rate higher through $11, and a bit lower after that. For the last five bargaining rounds, mean rates of voting in favor of the proposed allocation were always higher for Costs, and significantly higher in the interval $9-$12.[13] Pooling over all bargaining rounds, mean voting rates were significantly higher for Costs through $11, and higher on average through $12, after which they were essentially the same. Figure 3 illustrates these differences for the pooled data.

[Insert Table 2 here]

The expected stage 2 payoff for rejecting a stage 1 proposal is $8.50. Rejection of proposals greater than $8.50 is indicative of risk loving, as the proposed payoff exceeds the expected value in stage 2. The significantly higher pass rates for Costs versus Gains over the interval $9-$11 in Figure 3 are counter to the reference dependent preference argument discussed earlier.[14] Finally, there are very few observations below $8.50 against which to determine if

[11] For Gains 100% of these 10-10-10 allocations passed unanimously, failing to pass unanimously in 2 out of 92 cases for Costs.
[12] There were a handful (8) of proposals where the proposer took 12 and offered 9 to both voters. These always passed and received 13 out of 16 votes. These too are excluded so as to better isolate the effect of a $9 payoff within when the proposer gave a negligible payoff to the "excluded" voter.
[13] The large variance at lower dollar values precludes statistical significance, and just at the lower bound of the 90% confidence interval at $12.
[14] The minimum offer to an included voter in stage 1 was $5.

voters were more risk averse in Costs compared to Gains. But what data there is suggests that they were.[15]

[Insert Fig 3 here]

Conclusion 2: Voting on the part of included voters for stage 1 payoffs greater than $8.50 show significantly higher pass rates under Costs through $11, consistent with higher rates of risk loving behavior in Gains compared to Costs. These higher pass rates for Costs are inconsistent with reference dependent preferences under the assumptions that (i) voters use their starting balance as the reference point against which to evaluate gains and losses and (ii) that they have prospect theory type preferences.

Obviously, there is a breakdown here in the assumptions underlying the reference dependent preference argument. Possible reasons for this breakdown will be discussed in the concluding section of the paper.

IV.1. Analysis of Pre-Proposal Communication

The analysis of pre-proposal communication is limited to stage 1 of the bargaining process. Given the volume of communication, the analysis is further limited to the first, fifth and tenth bargaining games. Two graduate students (not part of the research team) independently coded the chats between proposers and potential coalition partners using categories established by the experimenters. The latter were based on a sampling of the chat records in conjunction with prior ideas of what kinds of communication underlie the results reported. The students first coded up one Cost and one Gain session after which they met with the experimenters to reconcile differences and to establish a clear, common understanding of what the different categories were intended to capture. This was followed by two rounds of e-mail clarifications, during which the students coded the remaining sessions. The average overall agreement rate across categories was 88.9%.

Coding categories:

[15] Of the subjects receiving one of these offers, 1 out of 3 vote in favor with Gains and 7 out of 9 for Costs ($p = 0.24$, two tailed Fisher exact test). In addition, there was a higher frequency of rejected offers at each included voter's share at each dollar value beginning with in the interval $9-$13.

1. Equality - discussions aimed at resulting in significant payments for all, whether initiated on the part of the proposer or one of the potential coalition partners. Proposer must always be in agreement.
2. Proposer initiated "auction" – proposers actively play voters off against each other to solicit low reservation values, typically within the context of an MWC.
3. Voter initiated "auction" - one or both voters make one or more *unsolicited* offers to the proposer who then chooses which voter to give a share to. If the proposer joins in the bargaining, playing voters off against each other, this is coded under the proposer auction category as well. (These auctions almost always resulted in a MWC.)
4. Proposing zero payoff for the other voter – a voter calls for zero payoff to the other voter via private communication with the proposer. When both voters call for this, both are counted.

A number of other categories were coded, all of which resulted in only a few observations. These consisted of lying, efforts to form a blocking coalition, to name two of these categories. In addition, the coders identified the minimum amount each voter claimed they would be willing to accept during the bargaining process (only the final number was recorded, as the minimum amount typically gets bid down in the bargaining process).

Table 3 reports the percentage of bargaining games coded in each of these categories. One noticeable characteristic is that proposer initiated auctions decrease over bargaining games, being replaced by voter initiated auctions. This increase is accompanied by an increase in the frequency of voters calling for a zero payoff for the other voter, a common element within the voter initiated auctions.

[Insert Table 3 here]

In the vast majority of bargaining games at least one non-proposer submits a reservation value. This occurs at a similar rate in both treatments, 75% and 82% in Gains and Costs, respectively. Average reservation values were almost identical in both cases (10.8 Gains and 10.7 in Costs).The average rate at which the proposer takes the minimum offer is also similar, 60% in Gains versus 57% in Costs, with proposers offering more than this minimum for most of the remaining proposals.

Table 4 reports a probit for proposers' decisions to take the minimum reservation in the presence of competing offers in stage 1 bargaining rounds (i.e., restricted to cases where voters

submit different reservation values).[16] The dependent variable takes the value 1 when the proposer offers the voter an amount equal to the stated reservation value. Marginal effects are evaluated at average values (these are 9.9 and 12.4, respectively).[17] Costs is a dummy variable equal to 1 for the Costs treatment (0 otherwise).

[Insert Table 4 here]

The coefficient for the minimum offer is positive and significant, indicating that the proposer is more likely to take the minimum offer (and less likely to exceed it) as the value of the minimum offer increases. (When proposers don't take the minimum offer, they usually go a little above it.) More surprisingly, the coefficient on the maximum offer is negative and significant, so that holding the minimum offer constant, a higher maximum offer makes the proposer *less* likely to take the minimum offer. The two results appear related to the perceived sincerity of subjects who submit low reservation values. Holding the minimum offer constant, a higher maximum offer likely casts doubt over the seriousness of the minimum offer. Similarly, holding the maximum offer constant, low offers are less likely to be believed and proposers respond by offering an amount above the minimum. Finally, Table 4 shows that when voters make competing offers, the proposer is more likely to accept the minimum offer in Costs than in Gains holding minimum and maximum offers constant. This is consistent with the higher proposer shares for Costs in Table 1.

Conclusion 3: Voters in both treatments frequently submit reservation values to the proposer. When this occurs, proposers accept the minimum reservation value submitted just over half the time, otherwise offering something in excess of this amount. In the case of competing reservation values, proposers are more likely to take the minimum offer in the Costs treatment.

V. Why the Higher Frequency of Risk Loving in Gains Compared to Costs?

The experiment was designed to be able to directly investigate the possibility of reference dependent preferences in the BF bargaining game. Significant differences in bargaining outcomes are reported but not of the sort reported in previous experiments as (i) for both Gains

[16] A probit including cases where a single reservation value is reported for a given bargaining round is reported in the Appendix.

[17] Marginal effects look very similar if using separate dummies for minimum and maximum reservation values for both treatments.

and Costs the vast majority of offers are accepted and (ii) what differences there are in acceptance rates between the two treatments shows a higher frequency of risk loving in Gains compared to Costs. This is in contrast to previous experiments investigating endowment effects within structured bargaining environments, or with respect to closely related buyer-seller relationships (Kahneman et al., 1990, Camerer, et al. 1993, Christiansen and Kagel, 2015).[18]

With respect to the high rates of acceptance in both treatments, subjects would have to be extremely risk loving to reject typical offers, especially given the discounting of payoffs between stages. For example, take a stage 1 offer of $10 made to a coalition member within an MWC. The continuation value is lower than this ($8.50). If she rejects the offer and the proposer in stage 2 offers an average proposal, it would imply a payoff of $15.30 if the voter wound up as the proposer, $10.20 if she was the included voter, and $0 otherwise. Thus, there is a one-third chance of (i) being considerably better off, (ii) of being modestly better off and (iii) being considerably worse off if the proposal is rejected, not a terribly attractive alternative to the $10 offer.

With respect to more frequent risk loving over Gains compared to Costs, to the extent that players are sensitive (or attentive) to losing their entire initial endowment in the Costs treatment they would be more likely to accept a $9 or $10 offer. There is direct evidence from the present experiment to support this: After running the third session of each treatment, subjects completed a short questionnaire at the end of the fourth session designed to support or reject this conjecture, along with other factors that might be responsible for the greater frequency of risk loving under Gains.

The questionnaire posed five questions to subjects, using a five point scale: You are a **voter** who is considering whether to vote in favor of, or against, the following proposal: The proposed allocation to the *other voter* is $0 and your allocation is less than the proposer's. What factors influenced your choice to vote *in favor* of the proposed allocation:

(1) The size of the difference between the proposer's share and your share?
(2) Concerns that if you did not accept the offer, you *might* get $0 in the next proposed allocation.
(3) Concerns about the other voter getting $0?
(4) The fact that *if* you did *not* vote in favor of the proposed allocation, total benefits will decrease in the next voting stage?

[18] Pure framing effects are not included here.

(5) From the above 4 issues – which had the *most* influence on your decision to vote in favor of the proposed allocation 1 2 3 or 4 (circle one).

The 5 point scale consisted of not Important, mildly unimportant, neither unimportant nor important, mildly important, and very important. (For the Costs treatment the questions were reframed; e.g., the proposed payment for the *other voter* is $30 and your payment is more than the proposer's.)

For Gains the response to question 5, the most important factor influencing their decision, 3 out of 15 chose concerns about getting $0 in the next stage if the proposal was rejected compared to 7 out of 15 for paying $30 in the next stage if the proposal was rejected. While this difference is not statistically significant ($p = 0.25$ two tailed exact Fisher test statistic), space was provided where subjects were asked to give a free form answer to any additional considerations taken account of in voting to accept or reject an offer. For Costs, 5 subjects voiced major concerns about paying the $30, 2 of which had *not* assigned this as having the most influence on their voting decision. For Gains, 2 subjects expressed major concerns for getting a $0 payoff, both of which had noted this as their most important concern.[19] Adding these 2 additional subjects to the 7 who were most concerned with losing $30, the difference between Gains and Cost is statistically significant ($p = 0.06$, two-tailed test).

There also appears to be more concern for payoff inequity between proposer and coalition members in Gains than in Costs, which would contribute to the significantly higher rejection rates of low payoff shares under Gains. To measure the average importance of a factor in decision-making, we created an index which assigns 1 point to "not important", 2 points to "mildly unimportant, and so on. In response to question (1) about differences in payoffs between coalition member and proposer, the average importance of this factor in Gains was 3.9 compared to 3.1 in Costs.[20] Of all the factors subjects were asked to consider in the questionnaire, this was the largest difference in index values between the two treatments. There is also independent evidence for decision makers placing greater importance on differences in payoffs in the domain

[19] For example, "I always voted chose to accept as long as I was paying less than the other voter." "I would vote yes if I wasn't the one paying 30."

[20] In addition, 6 out of 15 subjects in Gains rated this as the most important factor compared to 4 out of 15 subjects in the Costs treatment.

of gains as opposed to losses, and that own payoffs are more important in the domain of losses (De Dreu, Lualhati, and McCusker, 1994).[21]

This still leaves open the fact that in the three player multilateral bargaining game reported in Christiansen and Kagel (2015) there clearly was an initial endowment effect resulting in risk aversion under Gains and risk loving over Costs for strategically equivalent games. Several factors no doubt contributed to this. First, there was no shrinkage of initial endowments following rejected proposals so that other things equal, the gamble implicit in rejecting a stage 1 proposal was less risky there than here. Second, that experiment investigated the Jackson and Moselle (2002) model of legislative bargaining, which involves voting over two dimensions – a policy proposal and "pork" (or its' opposite "taxes"). In operationalizing the comparison between pork versus taxes, both treatments required a positive initial endowment, and resulted in positive end game payoffs regardless of the outcome of the bargaining process. The net result was the player left out of the MWC always came away with a substantial positive payoff under both treatments. So the negative consequence of losing one's total initial endowment following rejection of a proposal was not present in the Costs treatment.

VI. Summary and Conclusions

We investigate behavior in the Baron-Ferejohn legislative bargaining model for both Gains and Costs with pre-play communication before proposals are made and voted on. Under the experimental design implemented, the two treatments are isomorphic. The data show similar results under both treatments – the existence of proposer power and a high frequency of MWCs – both of which increase with experience. However, the Costs treatment is closer to the point predictions of SSPE under all dimensions: (i) proposers earn larger payoffs under Costs compared to Gains, (ii) proposer power (the difference in proposers' payoffs compared to the highest earning coalition member) is larger under Costs than Gains, (iii) there are higher rates of MWCs and lower rates of equal shares for all under Costs and (iv) proposals are more likely to pass without delay under Costs.

The difference in results between the Costs and Gains treatments may help to explain some of the increased contentiousness in the politics of the United States and other countries facing budget decreases as opposed to increases. The results suggest increased selfishness in the

[21] Note, it is no unheard of for a majority of subjects to be risk loving over positive payoffs for some gambles (Battalio, Kagel and Komain, 1990, Table 3). .

presence of the budget decreases, implicit in the Costs treatment, or at least a focus more on own payoffs, rather than what others are getting. They also suggest a focus on the worst possible outcome in the face of budget of budget decreases. Both of which are likely to result in increased contentiousness from those left out of the MWC, or from voters who under understand they can't do any better than the current offer.

The differences in voters initial endowments between Gains and Costs necessary to maintain the isomorphism between the two treatments might be expected to generate reference dependent preferences where, as in other experiments, there would be risk loving over losses compared to risk aversion with gains. However, this was not observed, as most proposals passed without delay in both cases. We argue that this result stems largely from the shrinking pie following a stage 1 rejection in Gains, with a corresponding increase in taxes in Costs, so that the implicit gamble resulting from rejection is not very attractive. The greater risk loving with Gains compared to Costs is largely attributed to the high frequency of minimum winning coalitions in both treatments, in conjunction with the greater pain resulting from losing one's total initial endowment under Costs compared to remaining at a zero payoff under Gains (along with a boost from the greater concern with relative payoffs in the Gains treatment). This difference between Gains and Costs is totally consistent with the differential responses to bargaining over losses compared to gains embedded in prospect theory (the reflection effect). So that our results are not necessarily inconsistent with reference dependent preferences of the sort identified in other bargaining experiments. That is, the failure to observe risk loving over losses compared to risk aversion over gains can be attributed to differences in the underlying bargaining game studied here compared to these other environments.

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Table 1
Allocations Passed without Delay
(standard errors of the mean in parentheses)

	Gains			Costs		
Bargaining Rounds	All	Rds 1-5	Rds 6-10	All	Rds 1-15	Rds 6-10
Proposer's Share	\$14.75 (0.14)	\$13.86 (0.19)	\$15.73 (0.19)	\$15.82 (0.17)	\$14.82 (0.22)	\$16.83 (0.25)
Highest Voter Share	\$11.92 (0.08)	\$11.94 (0.12)	\$11.77 (0.11)	\$11.43 (0.09)	\$11.96 (0.13)	\$10.89 (0.11)
Percentages						
Percentage Approved	91.9%	96.2%	87.5%	94.7%	95.7%	93.7%
MWC	59.9%	47.5%	73.6%	72.1%	66.7%	77.5%
$SSPE\pm_2$	11.5%	6.9%	16.5%	22.9%	12.2%	33.7%
\$15-\$15 Split	12.0%	12.9%	11.0%	11.2%	20.0%	2.3%
Equal Shares for All	28.3%	34.7%	20.9%	26.8%	31.1%	22.5%

Table 2
Voting Probits
(standard errors are in parentheses)

Vote	First 5 rounds	Last five rounds	All rounds
Costs	5.42**	0.637	2.61**
	(2.51)	(1.48)	(1.27)
S	0.541***	0.267***	0.339***
	(0.17)	(0.08)	(0.07)
Costs*S	-0.482**	0.019	-0.196*
	(0.22)	(0.13)	(0.12)
Constant	-4.73**	-2.137**	-2.82***
	(1.88)	(1.02)	(0.79)
Pseudo R^2	0.19	0.14	0.13
Log-likelihood	-39.2	-49.9	-82.5
Observations	138	160	298

** significant at the 5% level, *** significant at the 1% level.

Table 3

Coding Outcomes: Gains and Costs[1]

Bargaining Game	Coding Category							
	Equality		Proposer Auction		Voter Auction		Zero Payoff	
	Gains	Costs	Gains	Costs	Gains	Costs	Gains	Costs
All Games Coded[2]	23.8	40.4	27.0	22.8	53.9	66.7	41.3	64.9
Game 1	19.0	21.1	42.9	42.1	23.8	42.1	9.5	36.8
Game 5	28.6	42.1	19,0	15.8	57.1	68.4	52.4	68.4
Game10	23.8	57.9	19.0	10.5	81.0	89.5	61.9	89.5

[1]Percentage of bargaining rounds coded. [2] Weighted average of rounds coded.

.

Table 4

Probit over Proposer's Decision to Take Minimum Reservation Value with Competing Offers

	Coefficient (standard error)	Marginal Effect (standard error)
Minimum Reservation Value	0.43*** (0.167)	0.17*** (0.066)
Maximum Reservation Value	-0.30* (0.163)	-0.12* (0.065)
Costs	0.69* (0.399)	0.28* (0.159)
Constant	-0.77 (1.509)	-
Pseudo R^2	0.15	-
Log-likelihood	-27.6	-
Observations	47	47

* significant at the 10% level, *** significant at the 1% level.

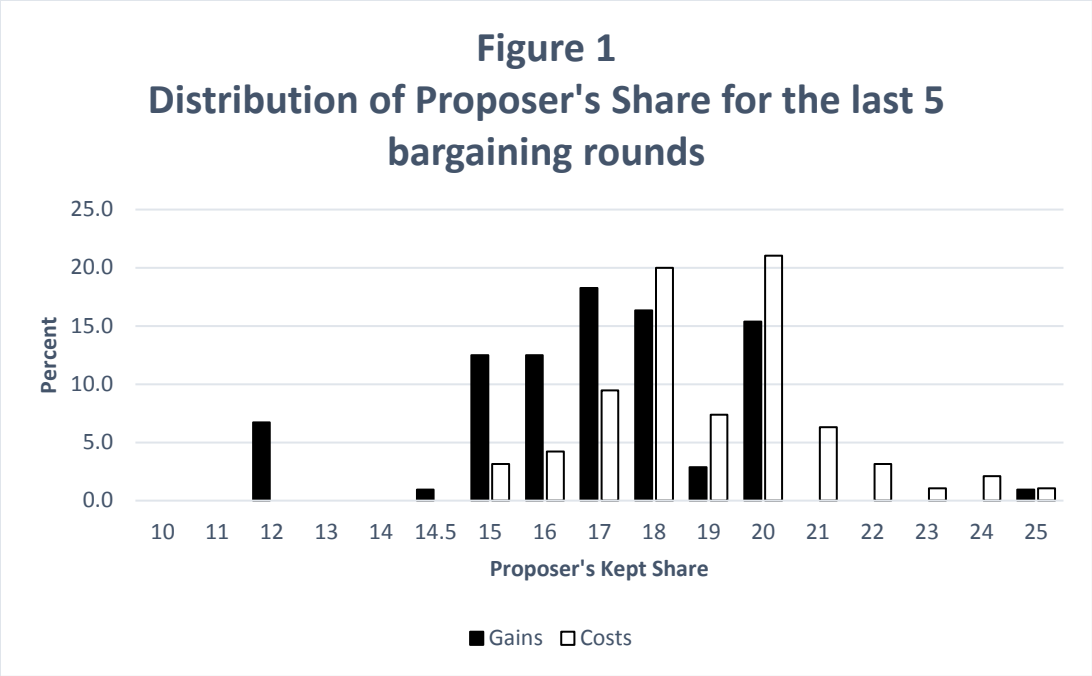
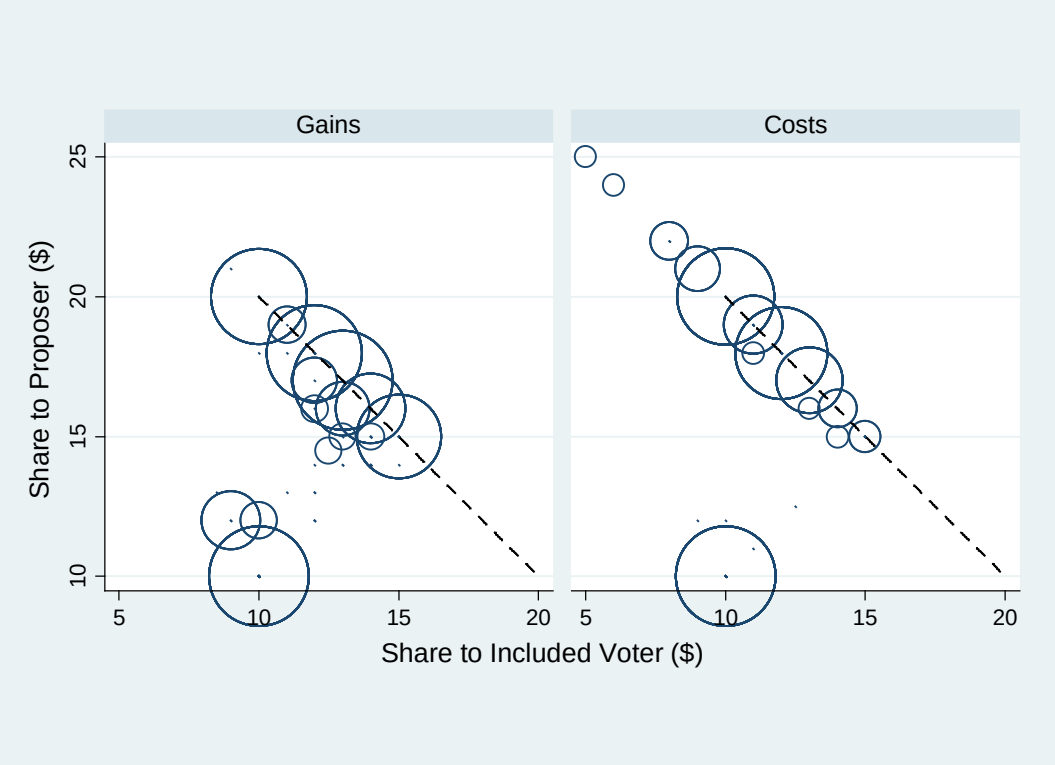


Figure 2

Proposer and Included Voter Shares: Proposals Accepted without Delay

(*last* five bargaining rounds)



Fgure 3

Probability of Voting in Favor of Proposed Allocation at Different Dollar Values