Pork Versus Public Goods: An Experimental Study of Public Good Provision Within a Legislative Bargaining Framework*

Guillaume R. Fréchette
New York University
Department of Economics and CESS

John H. Kagel†
Ohio State University
Department of Economics

Massimo Morelli
Columbia University
Departments of Economics and Political Science

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†Corresponding Author. Department of Economics, 410 Arps Hall, 1945 N High Street, Columbus OH 43210; Tel. 614-292-4182; Kagel.4@osu.edu.

Abstract

We experimentally investigate a legislative bargaining model with both public and particularistic goods. Consistent with the qualitative implications of the model: There is near exclusive public good provision in the pure public good region, in the pure private good region minimum winning coalitions sharing private goods predominate, and in the "mixed" region proposers generally take some particularistic goods for themselves, allocating the remainder to public goods. As in past experiments, proposer power is not nearly as strong as predicted, resulting in public good provision decreasing in the mixed region as its relative value increases, which is inconsistent with the theory.

Keywords: Legislative Bargaining, Public Goods, Efficiency.

JEL classification: C7, D72, C92, C52.

1 Introduction

One of the most important questions in economics and political science is understanding how any collective body makes decisions, and, in particular, under what conditions we can expect an efficient provision of public goods by such collective bodies. Public good provision is a key aspect of what governments and legislatures do, with governments and legislatures typically being the most important suppliers of public goods. Even in countries where the government is not the most important supplier of goods like health care and education, it is often the sole supplier of some key public goods such as defense and law enforcement. However, collective decision making bodies are far from being "benevolent unitary actors." Rather their members are constantly trading off the virtues of the public goods under consideration against the attractiveness of spending the money on particularistic goods (pork) benefiting themselves individually or their districts.[1] Theoretical and experimental methods can help clarify this trade-off, with our goal in this paper being to identify and characterize the *behavioral patterns* of a collective body facing these types of choices.

Most of the experimental literature on public good provision has focussed on voluntary contribution mechanisms, or provision point mechanisms, in which individual agents decide between allocating their personal endowment to their own private use or to benefit the group as a whole. Both of these mechanisms have a very different structure from the one legislators face in bargaining over budget allocations, as public goods (both level and scope) have to be determined by some collective-choice procedure, and there always are particularistic goods available as alternative ways to use the budget. Thus, we need to turn to a reasonably appropriate model that explicitly considers the political process by which public goods are provided to capture the competing forces at work in political institutions.

For the most part, legislative bargaining theory has focused either on distributive politics[2] or on policy decisions. Only recently have there been major efforts to model legislators' incentives to provide public goods when the alternative use of the budget is to provide partic-

[1] Particularistic goods here can be local public goods in the sense that they primarily yield benefits within the district the legislator represents. In this sense public goods refer to more global public goods which are enjoyed by all districts.

[2] The paper by Battaglini and Palfrey in this issue contains a dynamic model of distributive politics and a rich experimental analysis thereof. Their results are not directly comparable with ours, not even in the treatment where the theory that we test predicts only particularistic goods in equilibrium, since the two models are very different.

ularistic goods.[3] Volden and Wiseman (2005, henceforth VW) provide a benchmark model for our experimental analysis, since they model a bargaining game where legislators can agree on any division of the budget between particularistic and collective good spending.[4]

Previous experimental work on legislative bargaining has focused on purely distributive settings. The motivation behind these experiments has been to investigate the ability of the (stationary) subgame perfect equilibrium (henceforth SSPE) outcome to characterize allocations compared to alternative models, to measure the bargaining power of the agenda setter, and to determine whether or not Riker's minimum-winning-coalition view of bargaining is confirmed (see for instance McKelvey 1991; Fréchette, Kagel and Lehrer 2003 (henceforth FKL); Diermeier and Morton 2004; Diermeier and Gailmard 2006; Fréchette, Kagel and Morelli, 2005a, b (henceforth FKM(2005a, b))).[5]

Adding the possibility of proposing different combinations of private and public goods introduces a number of interesting new behavioral questions: Given that the public good provides benefits to everyone, will agents be biased (relative to the theory) in favor of public good provision out of equity, efficiency or some other considerations? Can the possibility of public goods increase proposer power in some situations? What happens to the proposed combinations of private and public goods when the relative value legislators place on private goods changes?

The VW model extends the Baron-Ferejohn (1989, henceforth BF) alternating-offer model of majoritarian bargaining to a legislature determining how to allocate a fixed budget between public goods that benefit all legislators' districts and particularistic goods that benefit an individual district. In its closed-rule, infinite-horizon form, someone is picked at random to make a proposal, then the others simultaneously vote yes or no on it. If the

[3] There is a line of research incorporating collective and particularistic elements (e. g., Austen-Smith and Banks 1988, Crombez 1996, Banks and Duggan 2000, Baron and Diermeier 2001, Jackson and Moselle 2002, Morelli 1999, Goertz 2006), but those models do not capture the explicit trade-offs resulting from the fact that private and public good spending are alternative uses of the same fixed budget.

[4] Lizzeri and Persico (2001) capture some of the trade-offs between public and private goods in party platforms. Leblanc, Snyder and Tripathi (2000) and Battaglini and Coate (2006) also contain interesting predictions about legislative bargaining when deciding on multiple policy issues. We focus on the VW model because it explicitly deals with the comparative statics we are interested in, namely the changes in bargaining behavior as legislators' utility from pork relative to common interest policies varies.

[5] There are many more recent, closely related, experimental investigations of Baron and Ferejohn (1989) type models: Kagel, Sung, and Winter 2010; Diermeier and Gailmard 2006; Battaglini, Nunnari, and Palfrey 2010; Drouvelis, Montero, and Sefton 2007.

majority rejects the proposal then a new proposer is chosen at random, with the process repeating until an allocation is determined (with discounting on the size of the budget).[6] Legislators utility functions attach value to the public and private goods, with weights being the same across all legislators. This utility function and the weight associated with the value of public versus particularistic goods can be thought of as a reduced form expression incorporating the impact of the electoral system; e.g., in systems where a politician's survival is determined more by what happens locally, then the weight put on public goods will be smaller than when their survival depends more on what happens nationally.

In our experiment we vary these weights across treatment conditions in order to produce (1) a situation in which there is a unique equilibrium in which only public goods are provided (a dominant strategy for all players), (2) a "mixed region" in which both public and private goods are provided and (3) a region with only private goods provided within a minimum winning coalition (henceforth MWC). The model predicts that in the mixed region the proposer takes some private goods for herself, allocating the remainder of the budget to public goods. Further, using the standard subgame perfect equilibrium logic, as the relative value of private goods increases, the proposer offers *more* public goods in order to keep responders on their "participation constraint."

Our main experimental results can be summarized as follows: Within the pure public good region, the vast majority of offers are all public goods. In the pure private good region, the predominant tendency is for MWCs with no public goods. In the mixed region we observe a multiplicity of allocations which, over time, slowly converges toward "equilibrium type allocations" with private goods allocated exclusively to the proposer, and the remainder of the budget devoted exclusively to the public good. The level of the public good is substantially higher than predicted under the SSPE allocation, as proposers are unable to get a favorable vote for anything approaching the SSPE. That is, there is far less proposer power within the mixed region than predicted, consistent with the limited proposer power found in past legislative bargaining models with only particularistic goods (e.g., Diermeier and Morton, 2004; FKM, 2005a, b), as well as the results reported here for the all private goods region. Unlike past experiments where the absence of high levels of proposer power had no impact (at least directionally) on the comparative static predictions of the model, in

[6] The discounting is designed to capture delay costs, including the fact that legislators may not be reelected to enjoy the fruits of their labor.

this case it does: the share of the budget allocated to the public good *decreases* within the mixed region as the value of the public good decreases, contrary to the model's prediction that more public goods need to be provided *in the mixed region* to keep potential coalition partners on their participation constraint.

Our experiment has implications for the public goods literature as it analyzes an entirely different framework for public good provision compared to voluntary contribution and provision point mechanisms that are typically investigated. Our results are similar in some dimensions to VCM and provision point experiments (e. g., the level of public good provision is higher than predicted throughout most of the mixed region). However, there are some major differences: Given the marginal per capita return (MPCR) of a contribution to the public good within the mixed region, public goods provision is substantially higher than reported in VCM games and does not decrease over time as typically reported in VCM games. These differences reflect differences in equilibrium outcomes between the legislative bargaining game and VCM games, as well as the constraints placed on proposer power typically reported in legislative bargaining games. The experiment also has implications for the "other regarding preference literature" that has grown up around bilateral bargaining games in the economics literature (i.e., concern for others' income that goes beyond the usual assumption that only own income matters). These implications are discussed in the concluding section of the paper.

The plan of the paper is as follows: Section 2 outlines the Volden-Wiseman (2005) model that serves as our benchmark. Sections 3 and 4 give the experimental design and the results, respectively. Summary and concluding remarks are reported in Section 5.

2 Benchmark Model and Related Hypotheses

In this section we describe the VW (2005) model.

Consider a legislature of N politicians, representing different legislative districts, who have to make a collective decision on how to allocate a fixed budget between a public good and private goods (pork barrel projects). Let N be an odd number. Denoting by y the share of the budget allocated to the public good and by x the N-dimensional vector of private good shares allocated to the N legislators ($y + \sum_{i=1}^{N} x_i \leq 1$), the utility function of each

legislator is given by[7]

$$U_i(x, y) = \alpha x_i + (1 - \alpha)yq$$

where $\alpha \in [0, 1]$ is the relative weight of private goods in the utility function[8] and q represents the absolute value (or return) of spending a dollar in public good production.[9] Each legislator has the same probability of being selected by Nature as the proposer of a division of the (unitary) budget. If at least $(N - 1)/2$ responders accept the proposal the budget is divided according to the proposal. If the majority rejects, another random proposer is selected, and the budget shrinks using the discount factor δ. The status quo is no budget allocation. The bargaining game is a straightforward extension of the (closed rule) infinite horizon bargaining game of BF (1989) to a budget division involving two dimensions - public and particularistic goods. The solution concept is stationary subgame perfection (SSPE).

The model predicts that, fixing q, for low values of α only public goods will be supplied as it is a dominant strategy to do so. At the other extreme, for high values of α only private goods will be supplied, in which case only members of a minimum winning coalition (MWC) receive positive shares. For intermediate values of α the public good is supplied and the proposer takes some private benefits for himself, but does not offer private benefits to anyone else. The lower bound on the mixed region is given by

$$\alpha_{CM} = \frac{q}{1 + q}.$$

The upper bound on the mixed region is given by

$$\alpha_{MP} = \frac{q(N + 1)}{2 + q(N + 1)}.$$

If $\alpha < q/(1 + q)$ it is a dominant strategy to offer only public goods as particularistic have a lower marginal utility than the public good. If $\alpha \in [\alpha_{CM}, \alpha_{MP})$, a proposer has no

[7] The expression here corresponds to the corrected expression provided by VW in their errata corrige for their utility function. See http://psweb.sbs.ohio-state.edu/faculty/awiseman/VW_APSR_final.pdf.

[8] VW (2006) develop a slightly different model where α is not constrained to take on values between 0 and 1, and legislators' utilities are defined as $\alpha x_i + qy$. This specification does not qualitatively effect the equilibria, nor does it affect the comparative statics predictions that we experimentally examine in this paper. We prefer to investigate the model in its (2005) formulation because we want to vary the "relative" value of private and public goods (by varying α across treatments) without scaling total utility up or down.

[9] The weight placed on private goods, α, can vary across legislators, which introduces a number of interesting possibilities that lie beyond the scope of the present paper. See Christiansen (2010) for an experiment exploring some of these implications.

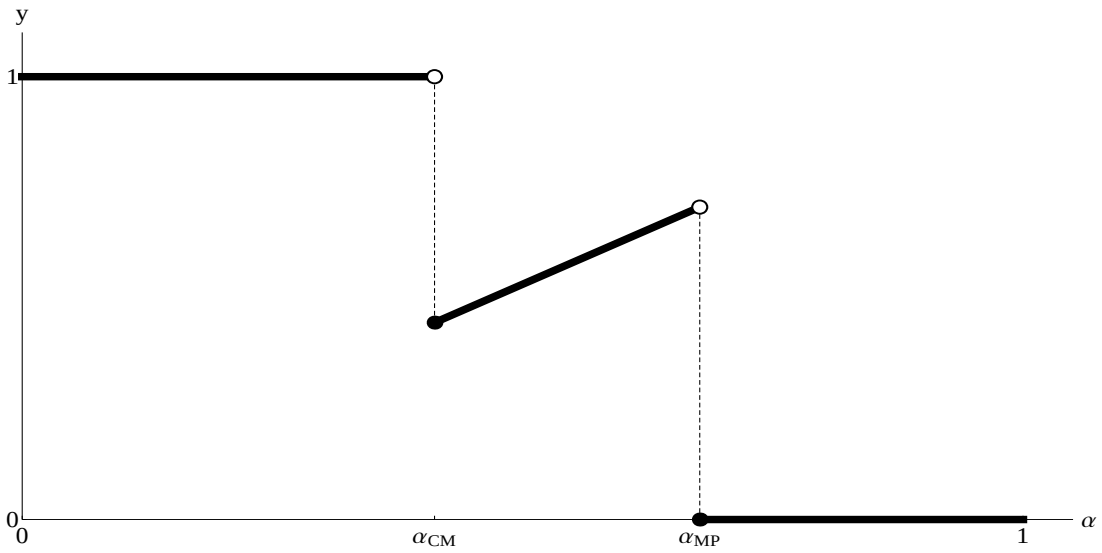

Figure 1: Public Good Contribution

incentive to deviate and offer all public goods even though such a proposal would surely be approved. The proposer prefers the mixed outcome to the all public goods outcome since he is better off taking a share of the budget for himself while still getting his proposal passed.

In the mixed region, as α increases, the proposer *decreases* the share of the budget he takes for himself in terms of private benefits. In other words, the theory predicts a *non monotonic* relationship between the supply of the public good and the value legislators place on private goods (α) as can be seen in Figure 1. Thus, starting with low values for the private good (low values of α) the budget share going to private goods is zero. Once α reaches α_{CM} the budget share for private goods jumps up (with all of it going to the proposer), only to decrease within the mixed region up to the point where the value of α becomes so high that only private goods are offered within a MWC (at which point the share going to the proposer remains constant for further increases in α). In addition, under the SSPE all stage one proposals pass, so that bargaining ends with the first proposal.

3 Experimental Design

Each experimental session used a legislature/committee comprised of $N = 5$ subjects, with the value of the public good $q = 0.7$ and the discount factor $\delta = 0.8$ constant for all treatments. Thus the range for the mixed region is given by $[\alpha_{CM}, \alpha_{MP}) = [0.412, 0.677)$. The different values of α used in experimental treatments were 0.3, 0.45, 0.55, 0.65 and 0.75. N and δ were selected to correspond to values used in previous experimental studies of the BF game. Given those parameters, q was selected to provide a reasonably wide mixed region.

Subjects were told that they had to decide how to divide 50 "francs" between "... two types of allocations: (i) allocations to individual voters or (ii) allocations to the group of voters as a whole (called the group allocation)." They were told the payoff in francs allocated to the group as a whole as well as the payoff in dollars and that those were a function of "...francs allocated to you as an individual as well as your share of the group allocation." Everything was computerized with subjects screens automatically calculating the conversion rate from the group allocation to individual payoffs, as well as the dollar payoffs for any proposed allocation.[10]

Table 1 gives the equilibrium predictions for each value of α. The share of the budget devoted to the public good is reported as well as the share going to the proposer, along with payoffs (listed in dollars). Note that except for the case of pure private goods ($\alpha = 0.75$), shares to responders represent only payoffs from the public good. In the pure private goods case, shares are allocated only to members of the minimum winning coalition (MWC). Table 1 also shows the efficiency levels predicted under the SSPE. In all cases efficiency is maximized when $y = 1$ as this provides maximum total money payoffs. Efficiency is measured as the ratio of the difference in the sum of the utilities (monetary payoffs) in equilibrium and the sum of the utilities when $y = 1$.

Between 10 and 20 subjects were recruited for each experimental session, so that there would be a minimum of 2, and a maximum of 4, groups of 5 subjects bargaining simultaneously in each session.[11] After each bargaining round (when all groups had reached

[10] http://homepages.nyu.edu/~gf35/print/fkm_pg_online_appendix.pdf provides sample instructions and screen shots.

[11] Our intention was to have a minimum of 15 subjects in each session, but in some cases enough extras showed up to be able to run four bargaining groups. Two sessions fell short of the desired 15 subjects and were conducted with 10 subjects each (see Table 2 below). There are no discernible differences between

α	Budget Share		Payoffs		Efficiency
	Public Good	Private Allocation	Proposer	Responders	
0.3	1	0	\$24.50	\$24.50[a]	1.000
0.45	0.483	0.517	\$20.93	\$9.30[a]	0.604
0.55	0.583	0.417	\$20.65	\$9.18[a]	0.728
0.65	0.680	0.320	\$18.74	\$8.33[a]	0.850
0.75	0	0.68	\$25.50	\$6.00[b]	0.857

α = weight placed on private goods in members utility function.

[a] Given to all responders.

[b] Given to coalition partners within a minimum winning coalition.

Table 1: Theoretical Predictions

agreement on an allocation), subjects were randomly re-matched. Subject numbers also changed randomly between bargaining rounds (but not between the stages within a given bargaining round).

Procedures for each bargaining round were as follows: First all subjects entered a proposal on how to allocate the 50 francs. Then one proposal was picked randomly to be the standing proposal. This proposal was posted on subjects' screens giving the amounts in francs allocated to each subject along with the dollar shares implied by the given allocation as determined by the utility function $U_i(x, y)$ along with the value of α in effect for that treatment.[12] Proposals were voted up or down, with no opportunity for amendment. If a simple majority accepted the proposal the payoff was implemented and the bargaining round ended. If the proposal was rejected, the process repeated itself (hence initiating a new stage of the same bargaining round). Complete voting results were posted on subjects' screens, giving the dollar amount allocated by subject number along with the francs allocated to the public good, whether that subject voted for or against the proposal, and whether the proposal passed or not.[13]

sessions as a consequence of the number of subjects present.

[12] For example, in the $\alpha = 0.55$ treatment, if a proposal allocated 40 francs to the public good, and the remaining 10 francs to the proposer, subjects would see the implied dollar allocations (\$12.60 for responders, \$18.10 for the proposer) on their screens for all players along with the allocations in francs.

[13] Screens also displayed the proposed shares and votes for the last three bargaining rounds as well as the proposed shares and votes for up to the past three stages of the current bargaining round. Other general information such as the number of votes required for a proposal to be accepted were also displayed.

Treatments (value of α)	Session	Number of Subjects	Number of Rounds	Rounds for Payment	Final Payment in $ (per subject) Min	Max	Average
0.3	1	10	12	1	27.60	30.40	29.30
	2	15	12	1	32.50	32.50	32.50
	3	15	12	1	31.10	32.50	32.09
0.45	4	15	12	1	25.40	27.60	26.61
	5	20	12	1	21.50	27.30	25.00
0.55	6	20	12	1	19.10	26.10	21.48
	7	25	12	1	20.70	25.00	23.03
0.65	8	20	12	1	8.00	22.70	15.61
	9	15	12	1	15.40	25.60	18.20
	10	20	12	1	8.00	28.40	15.60
0.75	11	15	12	1	8.90	20.20	15.73
	12	20	12	1	8.40	22.30	15.56
	13	15	12	1	8.00	26.80	15.18
0.45 to 0.55	14	10	20[a]	2	39.30	45.40	42
0.55 to 0.45	15	15	20[a]	2	37.40	44.20	40.81

[a] See text.

Table 2: Experimental Sessions

A total of 15 sessions, all with inexperienced subjects, were conducted. Table 2 lists the values of α along with the number of subjects in each session. Sessions 1-13 all employed 12 bargaining rounds, with one of the rounds, selected at random, to be paid off on.[14] Sessions 14 and 15 employed a cross-over design with an initial set of 12 bargaining rounds with values of α equal to 0.45 and 0.55, respectively. These were followed by another 8 bargaining rounds in which the value of α was changed from 0.45 to 0.55 in session 14 and from 0.55 to 0.45 in session 15.[15] These cross-over sessions were conducted as the between session results with $\alpha = 0.45$ and .55 failed to show the predicted increase in the budget share allocated to the public good. This design was employed to enable us to use own subject control to test this sensitive comparative static prediction of the model, and to provide subjects with the most striking contrast in terms of their own payoffs for the predicted increase (decrease) in public good allocation following the increase (decrease) in α that the theory predicts. In both of these sessions, subjects were paid on the basis of one random draw from each of the two sets of bargaining rounds. However, these draws were only made *after* both sets of bargaining rounds had been completed, while the planned change in the value of α, along with the extra 8 bargaining rounds, was only announced at the end of the first set of 12 bargaining rounds.[16]

Subjects were recruited through e-mail solicitations from students enrolled in economics classes at Ohio State University. This resulted in recruiting a broad cross-section of undergraduate students. All subjects received a participation fee of $8 along with whatever monetary allocation they obtained from the randomly selected bargaining round(s). Sessions lasted between an hour and fifteen minutes to an hour and forty five minutes. Table 2 gives the minimum, maximum, and average earnings including the show-up fee for each session.

This design generates four central questions for investigation: (1) Do negotiations stop immediately as predicted? (2) Are proposals within each region "equilibrium type" propos-

[14] These cash bargaining rounds were preceded by a bargaining round in which subjects were "walked through" the various contingencies resulting from, for example, accepting or rejecting offers.

[15] These crossovers were announced after completion of the initial set of bargaining rounds, and were completed well within the time frame for which subjects were recruited. Upon completion of the entire session, a single round was randomly selected for payment from the first set of bargaining rounds as well as from the second set.

[16] That is, instructions for the first 12 bargaining rounds were in all respects the same as the instructions for the corresponding sessions without the change in the value of α.

als? (3) Do proposers exploit their power as predicted? (4) Do we observe the predicted relation between α and y across regions as well as within the mixed region?

The rest of the paper will be organized as follows. First, the performance of the SSPE predictions of the model will be evaluated in terms of the four questions noted above. These results will be organized by first presenting evidence dealing with a question, followed by a summary of the evidence in the form of a "Conclusion." Second, the main deviations from the theory identified in the mixed public and private good region will be explored. Finally, we discuss the present results in relationship to results from other legislative bargaining experiments as well as their implications for the public goods literature and the other regarding preference literature.

4 Results

4.1 Overview of Experimental Results

Most bargaining rounds had only 1 stage (ended with the first proposal voted on), as the theory predicts. More specifically, 86% of bargaining rounds ended in stage 1, 13% in stage 2, and 1% in stages greater than 2 (with 5 being the maximum number of stages in any bargaining round). These numbers are essentially unaffected when looking at rounds 10 and above when subjects would have had more experience with the game.[17] There were minimal differences in time to agreement across treatments, with treatments which had large numbers of public good offers taking slightly fewer stages (on average) to reach agreement (reflective of the fact that all public good allocations were always accepted).[18]

Conclusion 1 *The vast majority of bargaining rounds ends in stage 1 as the theory predicts, with only 1% of all bargaining rounds extending beyond stage 2.*

[17] Given that most of the data is in stage 1, the data analysis that follows uses stage 1 data only, unless noted otherwise. This is done for convenience, as it makes comparisons simpler since we do not have to worry about the effect of discounting on payoffs.

[18] For $\alpha = 0.3$, the average number of rounds to agreement was 1.05 versus 1.27 for $\alpha = 0.65$, with the other averages between these two values. A Kruskal-Wallis test rejects the null of equality across all α, but one cannot reject the null that $\alpha = 0.3$ and 0.45 are the same, while $\alpha = 0.55$, 0.65, and 0.75 are the same.

The number of subjects who were offered strictly positive amounts of private goods is reported in Table 3.[19] Looking at all rounds, the modal offer consists of equilibrium type allocations with $\alpha = 0.30, 0.55$ and 0.75 (no private allocations with $\alpha = 0.30$, all private goods split between a MWC with $\alpha = 0.75$, and only 1 player, the proposer, receiving private goods with $\alpha = 0.55$). The two notable exceptions are $\alpha = 0.45$ and 0.65, at either end of the mixed region, where equilibrium type allocations also consist of 1 player, the proposer, receiving private goods. In contrast to this prediction, there are too many all public proposals with $\alpha = 0.45$ and too many MWC type offers with $\alpha = 0.65$. Equilibrium type offers are more frequent for all treatments in rounds 10 and above, indicative of a clear, consistent learning process favoring equilibrium type allocations for all treatments except for $\alpha = 0.30$ (which remained quite steady throughout). These learning patterns are reported in detail in Section 4.2 below.[20] These changes are sufficiently strong that for rounds 10 and above the modal offer is an equilibrium type offer for $\alpha = 0.65$, and equilibrium type offers have increased from 32% to 40% for $\alpha = 0.45$.

The $\alpha = 0.3$ condition reveals some inefficiencies as 20% of all proposals involve some private goods. However, these misallocations are relatively small in magnitude, as the average share of the budget allocated to the public good was 92.9% calculated over all rounds, and 96.1% for rounds 10 and above (see Table 4). Finally, in round 12, these allocations of particularistic goods represent just 2% of the budget.

Conclusion 2 *Looking at all rounds, the modal offer yields private benefits to as many subjects as the theory predicts with the exception of* $\alpha = 0.45$ *and* $\alpha = 0.65$*, with too many all public good offers in the first case and too many players receiving private goods in the second case. There is learning/adjustment going on within sessions in that equilibrium type offers are more common in later bargaining rounds for all values of* α*.*

Table 4 gives the average proposed share of the budget allocated to the public good by treatment for all proposals and for equilibrium type proposals.[21] It also shows the share

[19] The appendix contains a table equivalent to Table 3 except that it only includes accepted offers. The relative frequencies are very similar to those shown in Table 3.

[20] For the cross-over sessions we include data for all 8 bargaining rounds after the change in α when characterizing experienced play (periods 10 and above). We do so on the grounds that subjects are already quite familiar with the structure of the game. Results for experienced play are robust to limiting the data to the last 3 bargaining periods before and after the crossover.

[21] Average accepted shares are quite similar to proposed shares, see Table 10 in the appendix.

	Number of Subjects Offered Private Allocations					
	0	1	2	3	4	5
$\alpha = 0.3$	**0.80**	0.01	0.00	0.07	0.02	0.10
$\alpha = 0.45$	0.54	**0.32**	0.01	0.05	0.01	0.07
$\alpha = 0.55$	0.28	**0.43**	0.01	0.13	0.04	0.11
$\alpha = 0.65$	0.09	**0.27**	0.00	0.44	0.03	0.17
$\alpha = 0.75$	0.06	0.03	0.00	**0.62**	0.05	0.25
Rounds 10 and Above						
$\alpha = 0.3$	**0.82**	0.02	0.00	0.08	0.02	0.08
$\alpha = 0.45$	0.53	**0.40**	0.01	0.02	0.00	0.04
$\alpha = 0.55$	0.28	**0.57**	0.01	0.08	0.02	0.04
$\alpha = 0.65$	0.06	**0.41**	0.01	0.39	0.01	0.12
$\alpha = 0.75$	0.09	0.01	0.00	**0.73**	0.02	0.15

Equilibrium Type Offers are in Bold.

Table 3: Frequencies With Which Different Numbers of Subjects Were Allocated Private Benefits: All Offers (including those not voted on).

	All Proposals		Equilibrium Type Proposals		
	All Rounds	Rounds > 9	All Rounds	Rounds > 9	SSPE
$\alpha = 0.3$	0.929	0.961	1.000	1.000	1.000
$\alpha = 0.45$	0.905	0.934	0.860	0.871	0.483
$\alpha = 0.55$	0.802	0.858	0.843	0.847	0.583
$\alpha = 0.65$	0.450	0.569	0.777	0.762	0.680
$\alpha = 0.75$	0.148	0.114	0.049	0.026	0.000

Table 4: Average Proposed Provision of Public Good

predicted under the SSPE. Public good allocations are only slightly smaller, on average, when going from $\alpha = 0.3$ to $\alpha = 0.45$. However, the distributions are statistically different between these two treatments (rank sum test, p-value < 0.1 for all rounds and < 0.05 for rounds 10 and above).[22] All of the other pairwise comparisons of the distribution of public good allocations between treatments are statistically significant at the 1% level or better. In particular, there is a statistically significant *decrease* in the budget share devoted to public goods going from $\alpha = 0.45$ to $\alpha = 0.55$ and then to $\alpha = 0.65$, *contrary* to what the theory predicts.[23] This difference, although relatively small going from $\alpha = 0.45$ to $\alpha = 0.55$ is quite robust. For example suppose that we drop all the subjects who always propose only public goods with $\alpha = 0.45$ on the grounds that they are simply miscalibrated, which biases the average allocation against what the theory predicts.[24] Then looking at the cross-over sessions, using own subject differences as the unit of observation, the average share of the budget allocated to the public good for all proposals for all rounds is 0.88 with $\alpha = 0.45$ versus 0.78 with $\alpha = 0.55$, and 0.89 versus 0.83 in rounds 10 and above, with both these differences statistically significant at the 5% level. Going from $\alpha = 0.55$ to $\alpha = 0.65$, the decrease in the budget share going to public goods is quite dramatic, in large measure because of the large number of proposals allocating private goods to three players instead of one. Finally, note the small share allocated to the public good with $\alpha = 0.75$, close in size to the misallocation (but in the opposite direction) as in the all public good region ($\alpha = 0.3$).

Within the mixed region, even conditioning on equilibrium type proposals, the average proposed share of the budget allocated to the public good decreases throughout. Although this contradicts one of the key comparative static predictions of the model, this reflects the absence of proposer power at anywhere near the levels predicted under the SSPE, consistent with the rather limited proposer power reported in earlier legislative bargaining experiments with all particularistic goods. This in turn is related to the fact that proposers are sensitive

[22] Throughout the paper descriptive statistics use all the relevant data, with statistical tests averaging all the observations for a given subject first, using subject averages as the unit of observation (except when regressions are estimated).

[23] This is established two ways. One way is using the ranksum test for all rounds except those after round twelve. The other is using the Wilcoxon matched-pairs signed-ranks test using data from the cross-over sessions. In both cases we can reject a null hypothesis of no difference in favor of a smaller allocation with $\alpha = 0.55$ at the 0.01 level or better.

[24] This accounts for 9 out of 25 subjects for all rounds and 11 out of 25 subjects for rounds 10 or higher in the cross-over sessions.

α		Budget Share		Payoffs	
		Public Good	Private to Proposer	Proposer	Responders*
0.3	SSPE	1	0	\$24.50	\$24.50
	Average All	0.973	0.009	\$23.96	\$23.90
	Avg. Eq. Type	1	0	\$24.50	\$24.50
0.45	SSPE	0.483	0.517	\$20.93	\$9.30
	Average All	0.929	0.049	\$18.99	\$18.01
	Avg. Eq. Type	0.884	0.111	\$19.51	\$17.04
0.55	SSPE	0.583	0.417	\$20.65	\$9.18
	Average All	0.886	0.080	\$16.15	\$14.19
	Avg. Eq. Type	0.868	0.127	\$17.17	\$13.70
0.65	SSPE	0.680	0.320	\$18.74	\$8.33
	Average All	0.548	0.223	\$13.95	\$8.58
	Avg. Eq. Type	0.798	0.187	\$15.86	\$9.90
0.75	SSPE	0	0.68	\$25.50	\$3.00
	Average All	0.179	0.319	\$13.53	\$6.27
	Avg. Eq. Type	0.045	0.396	\$15.25	\$5.63

SSPE = predicted under the stationary subgame perfect equilibrium.

Average All = averages for all accepted offers.

Avg. Eq. Type = averages for equilibrium type offers.

* Average over all 4 responders even when less than 4 subjects are allocated strictly positive amounts.

Table 5: Theoretical Predictions and Observed Averages for Accepted Offers

to the level of earnings inequality that potential coalition partners are willing to vote for (see Section 4.2 below).

Conclusion 3 *Public good provision decreases monotonically throughout as the value of private goods (α)increases, contrary to the model's prediction that within the mixed region public good provision increases as α increases. This is true whether we consider all proposals or condition on equilibrium type proposals.*

Table 5 gives the SSPE prediction in terms of public versus particularistic good allocations, as well as the payoffs to the proposer and responder. It also reports the average for

all accepted offers, and the average conditional on the accepted offer being an equilibrium type allocation.[25] Note that in the case of $\alpha = 0.75$, since the equilibrium calls for a MWC, responders payoffs must be multiplied by 2 to know how much coalition partners within the MWC are being offered.

Focusing on proposer power, the average payoff difference between proposers and responders is \$0.06, \$0.98, \$1.96, \$5.37, and \$7.26 for the α equal to 0.3, 0.45, 0.55, 0.65, and 0.75 treatments respectively. Conditioning on the offer being an equilibrium type offer, the differences are \$2.47, \$3.47, and \$5.96 for α equal to 0.45, 0.55 and 0.65, and \$3.99 *within* the MWC for $\alpha = 0.75$. Other than for all proposals with $\alpha = 0.3$, the higher payoffs of proposers are all statistically significant ($p < 0.01$ Wilcoxon matched-pairs signed-ranks test), with proposer power increasing as α increases. However, the higher payoffs represent only a fraction of what proposers are predicted to take for themselves: 21%, 30%, 33%, and 31% of what they are predicted to make with α equal to 0.45, 0.55, 0.65, and 0.75, respectively (percentages are for the equilibrium type offers).

Conclusion 4 *Proposers exploit their power by taking greater shares than responders in every treatment where they are predicted to do so. However, the level of proposer power is significantly less than predicted under the SSPE in all treatments.*

To summarize, the theory performs well on many dimensions. First, subjects almost always agree on a division in round 1 as predicted. Second, there is some proposer power in both the mixed region and in the all private goods region, and this increases as α increases. Third, the share of the budget allocated to public goods decreases going from $\alpha = 0.3$ to $\alpha = 0.45$ and from $\alpha = 0.65$ to $\alpha = 0.75$. There are however four main deviations from the theory. First, the extent to which proposer power is exercised is far from what is predicted in the SSPE. Second, in the $\alpha = 0.45$ treatment the modal offer is an all public goods offer. Third, in the $\alpha = 0.65$ treatment the modal offer in the last three rounds consists of an equilibrium type offer, but this is not the case when all rounds are considered. Fourth, the

[25] Up to this point, tables used all the data with the equivalent table restricting attention to accepted offers in the Appendix. The advantage of using all offers is mainly increased sample size (as well as the fact that conclusions are not materially affected using only accepted offers). The reason for the change of focus here to only accepted offers is that proposer power (which is what this table is used to study) is only relevant to the extent that it can be exercised. If proposers ask for a lot, but their offers are rejected, then they do not have proposer power.

fraction of resources allocated to public goods decreases as α increases within the mixed region.

In the next section we focus on these differences from equilibrium predictions within the mixed region. Of particular interest is the fact that the fraction of resources allocated to public goods decreases as α increases as this contradicts one of the key comparative static predictions of the model. Experience with experimental outcomes has taught us, and most of the profession, that the main gravitational forces inherent in any given model will often be at play even though the point predictions of the model are not satisfied. However, breakdowns in comparative static predictions are rarer, and are suggestive of more fundamental deficiencies, so that we take them much more seriously.

4.2 Deviations from Equilibrium Predictions in the Mixed Region

This section elaborates on the main factors we believe underlie the paucity of equilibrium type proposals with $\alpha = 0.45$ and 0.65, as well as the failure of public good allocations to increase within the mixed region. First, for all values of α within the mixed region players' first impulse is *not* to provide equilibrium type allocations. This is shown in Table 6 which reports proposals in the first bargaining round of each treatment: These average 12% of all proposals in the mixed region, which is substantially less than the round one frequency of equilibrium type proposals for $\alpha = 0.30$ or 0.75. Further, as shown in Figure 2, there are steady increases in the frequency of equilibrium type allocations for all values of α within the mixed region, which, arguably, at least for $\alpha = 0.55$ or 0.65, would ultimately result in frequencies of equilibrium type allocations like those reported for $\alpha = 0.30$ and 0.75 as subjects gained more experience. In this context, one reason why the frequency of equilibrium type allocations in rounds 10 and above within the mixed region are less than those found with $\alpha = 0.30$ or 0.75 is that they have far more ground to make up compared to these other treatments.

In addition to initial tendencies, voting patterns of responders place significant constraints on what kinds of proposals will be passed. In particular voting behavior limits the amount of proposer power that can be exercised. Table 7 shows this, where votes are regressed on own payoffs as well as payoffs to the proposer (votes of proposers are excluded from these regressions), the table also report the estimates of ρ defined as $\frac{\sigma_\alpha^2}{\sigma_\alpha^2+1}$ where σ_α^2

	Number of Subjects Offered Private Allocations					
	0	1	2	3	4	5
$\alpha = 0.3$	**0.68**	0.00	0.03	0.08	0.05	0.18
$\alpha = 0.45$	0.11	**0.11**	0.02	0.18	0.00	0.18
$\alpha = 0.55$	0.25	**0.18**	0.00	0.23	0.05	0.28
$\alpha = 0.65$	0.07	**0.07**	0.00	0.51	0.04	0.31
$\alpha = 0.75$	0.04	0.04	0.00	**0.38**	0.08	0.46

Table 6: Types of Proposals in Round 1

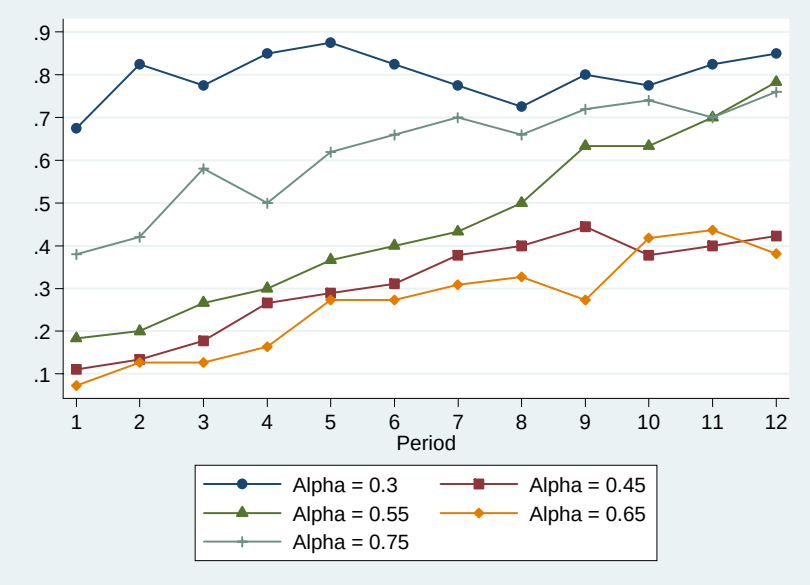

Figure 2: Fraction of Equilibrium Type Offers

	$\alpha = 0.3$	$\alpha = 0.45$	$\alpha = 0.55$	$\alpha = 0.65$	$\alpha = 0.75$
Own Payoff	16.03***	43.41***	27.95***	22.43***	20.99***
	(5.57)	(6.81)	(2.56)	(2.02)	(1.89)
Payoff to the Proposer	-6.28	-20.16***	-7.75***	-6.49***	-0.54
	(5.68)	(4.46)	(1.60)	(1.57)	(0.97)
Constant	-2.71***	-5.05	-3.81***	-1.54***	-2.55***
	(0.60)	(1.47)	(0.51)	(0.54)	(0.41)
ρ	$0.26^{\S\S\S}$	$0.69^{\S\S\S}$	$0.36^{\S\S\S}$	$0.27^{\S\S\S}$	0.04
	(0.12)	(0.11)	(0.09)	(0.09)	(0.09)
Observations	380	528	640	528	480
Number of subjects	40	60	70	55	50

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

§ significant at 10%; §§ significant at 5%; §§§ significant at 1%

using a likelihood ratio test

Table 7: Random Effects probit Estimates of the Determinants of Vote

is the variance of the subject specific random effects.[26] Own payoff is significant in every treatment. However, for the mixed region the proposer's payoff has a negative impact on the likelihood that a proposal will be accepted. This limits the ability of proposers to exploit their power. This is especially true for the $\alpha = 0.45$ and 0.55 treatments.

These voting patterns impact the growth of, as well as the nature of, equilibrium-type allocations that will pass in the mixed region. In particular, they go a long way to account for the fact that for $\alpha = 0.45$, all public good allocations grow faster than equilibrium type allocations (from 0.11 in round 1 to 0.53 in rounds 10 and above versus 0.11 to 0.40 for equilibrium type allocations). With $\alpha = 0.45$ the average payoff to proposers for equilibrium type allocations that pass averaged \$0.26 more than for an all public good allocation (\$19.51 versus \$19.25). This small increase in proposers' payoffs carries with it considerably greater risk of rejection, as 14% of equilibrium type allocations are rejected for $\alpha = 0.45$ as opposed

[26] As such ρ measures the extent of the individual subject effects. ρ has a minimum value of 0 (no individual subject effects) and a maximum value of 1 (all the variance in the error is explained by individual subject effects).

to *no* rejections of an all public good allocation. Thus, for $\alpha = 0.45$, there is little to be gained from an equilibrium type allocation, with its attendant risk of rejection and budget shrinkage, compared to an all public good allocation. In contrast, with $\alpha = 0.55$ proposers earned \$1.42 more than an all public good allocation, a stronger incentive to provide equilibrium type proposals than with $\alpha = 0.45$, with essentially no difference in the likelihood of these proposals being rejected (a 13% rejection rate with $\alpha = 0.55$, with the all public good allocation continuing to be passed 100% of the time.)

For $\alpha = 0.65$ the main rival to an equilibrium type allocation is one in which there is a MWC with all private goods, albeit one with a reasonably large share of the budget allocated to public goods as well (averaging 24% of the budget in round one for these proposals). It takes proposers some time to figure out that they can get more from equilibrium type allocations than MWC type allocations, while also having a better chance of their proposals being accepted: \$15.86 versus \$13.86, with 85% of equilibrium type allocations passed compared to 75% of MWC allocations.[27]

The evolution of equilibrium type proposals over time suggests that they would dominate for $\alpha = 0.55$ and 0.65, but not for $\alpha = 0.45$. However, only looking at equilibrium type allocations, the share of the budget going to public goods *decreased* within the mixed region, contrary to the model's prediction. This can largely be accounted for by voting patterns, with proposers best responding to how potential coalition partners were voting. This is shown under two scenarios in Table 8. Column 1 shows the value of α, with column 2 reporting the budget share devoted to the public good that would leave the median voter indifferent between accepting or rejecting a proposal. The share that would leave the median voter indifferent is obtained from the voting regressions: Assuming an equilibrium type offer (which determines the exact relation between "Own Payoff" and "Payoff to the Proposer") what value for "Own Payoff" yields an acceptance probability of 50%. Column 3 indicates the budget share that would have maximized the proposers expected payoff. To compute the offer that maximizes the proposers expected payoff we use (Payoff if accepted×Probability of acceptance+0.8×Average Payoff) where the second term approximates the continuation value of the game and probability of acceptance is obtained from the voting regressions.[28]

[27] Average payoffs to proposers for proposals that passed are biased downward compared to payoffs for proposals that were voted on - but not by much. The latter averaged \$19.61, \$17.34, and \$16.47 for $\alpha = 0.45, 0.55$ and 0.65 respectively compared to \$19.51, \$17.17 and \$15.86 for proposals that passed.

[28] "Payoff if accepted" corresponds to "Payoff to the Proposer" in the voting regression. "Average Payoff"

α	Median Voter Indifferent	Max EV Proposer	Actual*	Predicted
0.45	78.8%	88.9%	87.1%	48.3%
0.55	75.8%	83.8%	84.7%	58.3%
0.65	70.7%	67.7%	76.2%	68.0%

* Equilibrium type proposals only; rounds> 9.

Table 8: Budget Share Allocated to Public Good

Column 4 shows the average budget share actually going to the public good for equilibrium type allocations for periods 10 and above, with column 5 the budget share under the SSPE.

Perhaps the most striking aspect of Table 8 is the difference in public good levels between the SSPE and either the median voter or value maximizing allocations for $\alpha = 0.45$ and 0.55, with actual public good levels substantially higher than predicted. This reflects the fact that the SSPE prediction calls for substantially more income inequality between proposers and responders than is achievable under either scenario: - income differences of over \$11 in both cases, with proposers earning more than twice as much as those they would be counting on to vote in favor of such proposals. This is a level of income inequality that would stand little, if any, chance of passing ($p < 0.01$ for $\alpha = 0.45$ and $p < 0.05$ for $\alpha = 0.55$), and which virtually never surfaced in the proposed allocations. Alternatively, consider the extreme scenario of simply keeping public good provision at the *same* level (70.7%) required to keep the median voter indifferent with $\alpha = .65$, for lower values of α: The voting regressions indicate that such a proposal would have had a 39.3% chance of passing with $\alpha = .55$, with an expected payoff to the proposer if passed of \$7.50. In case of rejection, with the game continuing and $\delta = .8$, a reasonable upper bound for what the proposer might expect after rejection is \$12.60, compared to settling for an all public good allocation in the first place of \$15.75, with all public good allocations *always* passing.[29] Thus, given how players were voting, proposers would have had to be reasonably strong risk takers, for public good shares remaining constant (no less decreasing) in going from $\alpha = .65$ to $\alpha = .55$. And they would have had to be even more risk loving to keep public good shares constant in moving

is simply the unconditional average final payoff.

[29] The \$12.60 comes from an all public good allocation which is greater than the expected value of the SSPE allocation, the average actual allocation, or the average equilibrium type allocation. With all payoffs multiplied δ.

to $\alpha = .45$. As such there was hardly any room for public good shares to increase as α increased within the mixed region, reflective of the low levels of proposer power identified in earlier BF voting game experiments with only private goods. These low levels of proposer power are, in turn, reflective of a breakdown in the assumption underlying the SSPE that only own income matters.

4.3 Discussion

In the case where $\alpha = 0.75$ the results reported here are similar to results reported in previous experiments investigating the BF model. With $\alpha = 0.75$ the theory calls for an all private goods allocation within a MWC, which is the modal outcome observed. There is some learning involved as the frequency of MWCs is increasing throughout a session. The frequency of MWCs is very similar to results from prior experiments on multilateral bargaining with only particularistic goods. For example, FKM (2005b) report between 61% and 90% MWCs, depending on the treatment, with committees/legislatures of 3 subjects, and FKM (2005a) report between 63% and 83% MWCs, depending on the treatment, with committees/legislatures of 5 subjects. Here too the frequency of MWCs grows, more or less continuously, throughout a session. Within the MWC, proposers obtain significantly more private goods than their coalition partners, which is qualitatively what the theory predicts, but they obtain much less than the SSPE predicts. The level of proposer power observed with $\alpha = 0.75$ is close to what has been observed in previous legislative bargaining experiments with all particularistic goods. Here, proposer's take in a MWC is about 38% of the resources, while in FKL and FKM (2005a) proposers take about 40% of the resources under comparable procedures.[30]

Two additional results find a parallel in our earlier studies of the BF model. First, most bargaining rounds end in stage 1. That result has been observed in all of our prior experiments. Second, the fact that the proposer's share, which is typically greater than the shares offered to coalition partners, negatively affects voting has also been observed in one or more treatments in previous studies of the BF model (FKL, FKMa, b).

The mixed region, where both public and private goods are provided, is relatively narrow within the theory. It appears that it is even narrower behaviorally, as (i) the modal choice just coming out of the all public goods region ($\alpha = .45$) is still all public goods (with

[30] Both experiments involved legislatures with 5 members with $\delta = 0.8$ in FKL and $\delta = 1$ in FKM(2005a).

equilibrium type allocations coming in a close second) and (ii) MWCs with all private goods dominate proposals early on in the neighborhood ($\alpha = .65$) of the mixed region close to the all private goods region. With respect to point (ii) however, learning is such that in later bargaining rounds equilibrium type proposals constitute the modal offer, with these proposals continuing to grow. In some sense it's not terribly surprising that the mixed region is narrower than predicted since in this case equilibrium-type allocations are not quite so clear cut, unless subjects are doing the sorts of detailed calculations that the theory implies. Also note that under the constraints of having five players and $\delta = 0.8$ (parameter values that were selected in order to make the underlying bargaining structure close to our earlier experiments with all particularistic goods), we selected q (the return on the public good) to make the mixed region as large as possible.

Our results have implications for the other regarding preference literature in economics. First, the abundance of MWC proposals with $\alpha = 0.75$ (also reported in previous experiments with only particularistic goods) indicates that subjects do not have a taste for maximizing the benefits for the least well off as some have argued (Charness and Rabin, 2002; Englemann and Strobel, 2004).[31] Second, in the region where the model predicts only private goods, an all public goods allocation would have provided an egalitarian distribution that was also a more efficient allocation (in the sense of providing more total benefits) than an MWC with all private goods. Nevertheless, all public good allocations only accounted for 6% of all proposals overall, even though such proposals were almost certain to be passed. Rather subjects opted overwhelmingly for MWCs which provided greater benefits to the members of the coalition than they could have gotten with an all public good allocation. These results are inconsistent with recent suggestions from the other regarding preferences literature that subjects have a taste for efficiency (see, for example, Charness and Rabin, 2002). The primary difference between the present experiment and these other experiments is that the present experiment involves bargaining and these other studies involved simple dictator games. The clear suggestion from a number of dictator game experiments is that the results are not robust to small perturbations in the game, no less in the results

[31] Further, with respect to games with only particularistic goods Montero (2007) shows that the standard models of other regarding preferences (e.g., Fehr and Schmidt, 1999) predict that proposer would exhibit even more proposer power than if subjects didn't have other regarding preferences, and this is in clear contradiction with the data in this experiment and previous experiments as well.

transferring to bargaining environments.[32]

Our results have connections to VCM type public goods games. Even though there are radical differences in the structure between the present game and VCM games, they do have in common a well defined marginal per capita return (MPCR) for public good allocations that provides a basis for comparing across games. There are several major, relevant characteristics to VCM games with moderate numbers of players: (i) public good contributions typically start rather high and then trial off over time but rarely are reduced to zero, (ii) the starting level of public goods contributions is often surprisingly high but rarely exceeds 50% of the total possible contributions to begin with, and (iii) the level of public goods contributions is a decreasing function of the MPCR (see Ledyard, 1995 for a survey of the public goods literature). With respect to the first and second characteristics, sometimes our data matches it, other times it does not. Take, for example, the $\alpha = 0.55$ treatment which has an MPCR of 0.57, close to the 0.50 value often employed in VCM games. Here, the level of public good provision averages slightly over 80% of the maximum possible contribution and is *increasing* over time rather than decreasing (86% of the maximum possible in the last several rounds), consistent with characteristics (i) and (ii) above (see, for example, Croson, 1996).[33] In contrast, with $\alpha = 0.75$, we have an MPCR of 0.23 which is close to the 0.30 level others have used (see, for example, Isaac and Walker, 1988). In this case our results are much closer to those reported for VCM games as public good contributions are decreasing throughout the session, and start out with public good levels that are reasonably similar in the two cases (a little over 20% overall in our case versus a little over 30% in Isaac and Walker with four players). Characteristic (iii), decreasing public goods levels with the MPCR decreasing, is common to both cases, and provides one

[32] Battaglini and Palfrey (2011) also reject the possibility that social preferences drive their observed deviations from equilibrium outcomes. However, a difference between our model and Battaglini and Palfrey's dynamic bargaining model is that risk aversion can produce the more equitable outcomes that they observe, whereas in the BF model risk aversion generates more unequal outcomes than predicted with risk neutrality (Harrington, 1990). If all players share the same risk aversion and this is common knowledge, then the continuation value of the game is lower with risk aversion (as compared to without risk aversion). This is because of the risk of being excluded from the winning coalition in future rounds of the bargaining process. Hence the proposer will offer lower shares to coalition members and keep more for himself. This argument is similar to the argument of Montero for why other regarding preferences lead a proposer to take more for himself in this game.

[33] Croson's (1996) strangers treatment, which is what ours amounts to, has an initial contribution rate of just over 40%.

candidate explanation for the reduced public goods contributions in the mixed region, as subjects react in a "natural" way to the reduced value of the public good. Of course, the overwhelming difference between the present game and VCM games, particularly in cases such as $\alpha = 0.55$ where the results are very different, is that in our case large public good provision is an equilibrium outcome, whereas in the VCM game its a dominated strategy (assuming players only care about own income).

5 Conclusions

We investigated a simple model of public goods provision within a legislative bargaining framework. In the model, legislators/committee members have preferences over public and private goods that they must decide between given a fixed budget constraint. (Taxes required to support the budget are exogenous to the model.) Our experimental treatment conditions focus on varying the weight subjects place on public versus private goods, spanning the range of predicted outcomes from all public goods, to mixed public and private goods, to exclusively private goods. We put special emphasis on the mixed region as it provides novel predictions in that private goods will only be allocated to the proposer, and public good provision will increase as the value of public goods decrease.

Many of the qualitative predictions of the model find support: Bargaining typically ends in round 1, there is proposer power in all treatments (albeit, less than predicted), equilibrium type allocations tend to dominate throughout, and where they do not within the mixed region, they are growing over time. The one major qualitative failure of the model is that public good allocations decrease within the mixed region, rather than increase as the theory predicts. We have argued that this is reflective of much weaker proposer power than predicted under the SSPE, a result reported in earlier voting game experiments with all private goods, as well as in the all private goods region reported on here.

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A Additional Results

	Number of Subjects Offered Private Allocations					
	0	1	2	3	4	5
$\alpha = 0.3$	**0.88**	0.01	0.00	0.05	0.01	0.04
$\alpha = 0.45$	0.55	**0.30**	0.00	0.07	0.02	0.07
$\alpha = 0.55$	0.34	**0.45**	0.02	0.11	0.01	0.08
$\alpha = 0.65$	0.15	**0.28**	0.00	0.46	0.03	0.08
$\alpha = 0.75$	0.08	0.04	0.00	**0.59**	0.04	0.25
Rounds 10 and Above						
$\alpha = 0.3$	**0.88**	0.04	0.00	0.04	0.00	0.04
$\alpha = 0.45$	0.53	**0.38**	0.00	0.02	0.00	0.06
$\alpha = 0.55$	0.24	**0.66**	0.00	0.07	0.00	0.02
$\alpha = 0.65$	0.14	**0.43**	0.00	0.33	0.00	0.10
$\alpha = 0.75$	0.15	0.00	0.00	**0.57**	0.04	0.23

Equilibrium Type Offers are in Bold.

Table 9: Frequency With Which Subjects are Allocated Private Benefits in Accepted Proposals

	All Proposals		Equilibrium Type Proposals		
	All Rounds	Rounds > 9	All Rounds	Rounds > 9	SSPE
$\alpha = 0.3$	0.9725	0.9833	1.0000	1.0000	1.000
$\alpha = 0.45$	0.9290	0.9452	0.8838	0.8812	0.483
$\alpha = 0.55$	0.8862	0.8925	0.8680	0.8723	0.583
$\alpha = 0.65$	0.5484	0.7143	0.7976	0.8333	0.680
$\alpha = 0.75$	0.1788	0.1929	0.0447	0.0587	0.000

Table 10: Average Provision of Public Good for Accepted Proposals