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

September 22, 2008

*This research was partially supported by: National Science Foundation Grants No. 0213312, 0519205, 0519045 and 0721111; the Mershon Center at The Ohio State University, and the Center for Experimental Social Science and the C.V. Starr Center at New York University. We thank Alan Wiseman, Johanna Goertz, Pedro Dal Bó, participants at the Séminaire Matuszewski at Université Laval (Québec 2007) and at the Citibank Workshop in Economic Theory at Brown University (Providence 2007), Society for Economic Design 5th Conference on Economic Design (Ann Arbor 2008), Social Dilemmas Conference (Tallahassee 2008), Experimental and Behavioral Conference (Santa Barbara 2008), Allied Social Science Associations Annual Meeting (New Orleans 2008) for useful comments and Kirill Chernomaz for developing the software employed in conducting the experiment along with helping to run the sessions. The software was developed using zTree (Fischbacker 2006). Any opinions, findings, and conclusions or recommendations in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation or the other funding agencies.

†Corresponding Author. Department of Economics, 19 West Fourth Street, 6th Floor, New York, NY 10012-1119; Tel. (212) 992-8683; frechette@nyu.edu.

Abstract

Once the legislature is faced with an exogenous budget constraint, public goods (both level and scope) have to be determined by some collective-choice procedure. We experimentally investigate a recent model in which legislators allocate a fixed budget between collective public goods and particularistic goods. Our results confirm many aspects of the model. In particular when legislators value of collective goods is relatively low the budget is almost exclusively allocated to particularistic goods within a minimum winning coalition. However, in the "mixed region" in which both collective goods and particularistic goods are provided, the share of the budget devoted to the public good decreases as the relative value of the public good decreases, which is inconsistent with the stationary subgame perfect equilibrium prediction of the model but can be rationalized given how subjects voted.

Key-words: 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 public 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 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

[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.

particularistic goods.[2]. Volden and Wiseman (2005)[3] 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 used to characterize these settings, 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 2004; Fréchette, Kagel and Morelli, 2005c (henceforth FKM(2005c))).[5]

Adding the possibility of proposing different combinations of private and public goods introduces a number of interesting new behavioral questions: Given that public good offers are by definition to everyone, will agents be biased (relative to the theory) in favor of the 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 Volden and Wiseman (2005) 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

[2]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.

[3]Henceforth VW. For a list of variables, acronyms, and terms used with specific meaning, see the glossary in the appendix.

[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 Volden and Wiseman 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 experimental investigations of models related to the model of Baron and Ferejohn; some closely related ones are Kagel, Sung, and Winter 2005; Diermeier and Gailmard 2006; Battaglini and Palfrey 2007; Drouvelis, Montero, and Sefton 2007.

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 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 a unique equilibrium with only private goods provided (within a minimum winning coalition; henceforth MWC). The model predicts, somewhat counterintuitively, that for intermediate values of the public good (the "mixed region"), the level of public goods provided *increases* when legislators care more about particularistic goods. This is because the proposer, in using the standard subgame perfect equilibrium logic, needs to offer a public good amount *on* the "participation constraint" of responders, and the latter would be violated if the proposer didn't increase the budget share devoted to the public good when its value decreases.

This comparative static prediction within the mixed region is quite important for comparative politics and for our understanding of economic policy making in different systems: it is well known that when legislators are elected with Single Member District plurality or majority rule, they should care more about their performance for their district compared to legislators elected with national lists, like in many European countries. The prediction of the model in the mixed region, that the level of public goods will increase as legislators place greater weight on particularistic goods, suggests, in contrast with our intuition, that under some circumstances, single member district systems will induce legislators to produce

[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.

more public goods than Proportional Representation systems. Empirical research with field data supports the fact that single member districts produce *less* public goods (more pork) compared to proportional representation systems (see e.g. Persson and Tabellini 2006). But these results are clouded by the fact that the data for single member districts is dominated by the United States, which has a host of potentially confounding, idiosyncratic, factors associated with it. Our experimental investigation of the comparative static predictions of the Volden-Wiseman (2005) model within the mixed region provides another way of looking at this issue, one that is free from these (potential) confounding factors.

Our main experimental results can be summarized as follows: First, the level of public goods provided varies monotonically with the relative value of private versus public goods in the utility function, not only across regions but also within the mixed region. Within the pure private goods region, the predominant tendency is for minimum winning coalitions with no public goods. Within the pure public good region, the vast majority of offers are all public good. Within the mixed region there is a multiplicity of types of allocations, but over time, behavior slowly converges toward allocations with both public and private goods, with the latter allocated exclusively to the proposer (i.e., equilibrium type allocations).[7] In the mixed region, the overall allocation of public goods is substantially higher than the theory predicts, both because of all-public-good offers and the fact that the amount of money proposers take for themselves in equilibrium type offers is substantially smaller than predicted. The share of resources allocated to the public good is inconsistent with the comparative statics of the stationary subgame perfect equilibrium prediction within the mixed region, and this is true whether we ignore the all-public-good offers or we include them.

Our experiment also 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), but, for parameter values where the theory predicts only private goods, there are virtually no public goods provided, nor much of an attempt to provide those goods at any point in an experimental

[7] Throughout the paper we will use the terminology "equilibrium type" proposal to mean a proposal that allocated strictly positive amounts of particularistic goods to the predicted number of subjects although not necessarily at the predicted level.

session, which is inconsistent with the warm glow explanation for public goods provision with a voluntary contribution mechanism. 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 model of Volden and Wiseman (2005).

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[8]

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

where $\alpha \in [0, 1]$ is the relative weight of private goods in the utility function[9] and q represents the absolute value (or return) of spending a dollar in public good production.[10] Each legislator has the same probability of being selected by Nature as the proposer of a division

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

[9] Volden and Wiseman (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 test 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.

[10] 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.

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 Baron and Ferejohn (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 $\alpha \leq q/(1+q)$ 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 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). Thus, starting with low values for the private good (low values of α) the private good share for the proposer is first zero, then once α reaches α_{CM} it jumps up and then decreases within the mixed region, only to jump up again when the value of α becomes so high that no public good is offered anymore. Finally, when α is so high that only private goods are offered, the share going to the proposer remains constant for further increases in α.

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.[11]

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 bargaining rounds conducted simultaneously in each session and a maximum of 4.[12] After each bargaining round, subjects were randomly re-matched. Subject

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

[12] 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	\$9.19[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

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.[13] 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.[14]

A total of 15 sessions, all with inexperienced subjects, were conducted. Table 2 lists the

sessions as a consequence of the number of subjects present.

[13] 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.

[14] 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		Number of	Final Payment in $		
(value of α)	Session	Subjects	Min	Max	Average
0.3	1	10	27.60	30.40	29.30
	2	15	32.50	32.50	32.50
	3	15	32.00	33.00	32.67
0.45	4	15	25.40	27.60	26.61
	5	20	22.00	28.00	25.60
0.55	6	20	19.10	26.10	21.48
	7	25	21.00	25.00	23.20
0.65	8	20	8.00	23.00	16.30
	9	15	16.00	26.00	18.73
	10	20	8.00	29.00	15.85
0.75	11	15	8.90	20.20	15.73
	12	20	8.40	22.30	15.56
	13	15	8.00	27.00	15.47
0.45 to 0.55	14	10	39.30	45.40	42
0.55 to 0.45	15	15	37.40	44.20	40.81

Table 2: Experimental Sessions

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.[15] 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. 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 The 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 and 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 to be investigated with respect to the predictions of the model. (1) Do negotiations stop immediately (as predicted)? (2) Are proposals of "equilibrium type"? (3) Do we observe the predicted relation between α and y? (4) Do proposers exploit their power as predicted?

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

[15] 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.

[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.

results will be organized by first presenting evidence dealing with the question at hand 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 further. 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 Testing the Theory

Most bargaining rounds had only 1 stage. 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]

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.*

The number of subjects included in proposals is reported in Table 3. More specifically, it reports the number of subjects who are offered strictly positive amounts of private goods. When looking at all rounds, the modal offer yields private benefits to as many subjects as the equilibrium predicts with $\alpha = 0.30, 0.55$ and 0.75. The two notable exceptions are $\alpha = 0.45$ and 0.65, at either end of the mixed region. Equilibrium type offers are more frequent for all treatments in rounds 10 and above, indicative of within session learning in all cases.[18]

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

[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 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.

	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

average share of francs allocated to the public good with $\alpha = 0.3$ was 91.4% calculated over all rounds, and 95.3% for rounds 10 and above (see below). Finally, in round 12, these allocations of particularistic goods represent just 2% of the budget.[19]

Conclusion 2 *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 francs allocated to the public good by treatment for all proposals and for equilibrium type proposals.[20] It also lists what the equilibrium prediction is. 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).[21] 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

[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] Average accepted shares are quite similar to proposed shares, see Table 9 in the appendix.

[21] Throughout the paper averages, frequencies, and other descriptive statistics use all the relevant data whereas statistical tests average all the observations for a given subject first, and use the subject average as the unit of observation, except when regressions are estimated.

the theory predicts.[22] 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.[23] 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 to the misallocation (but in the opposite direction) to $\alpha = 0.3$.

The average proposed share of francs allocated to the public good, conditional on the proposal being an equilibrium type offer, decreases between $\alpha = 0.3$ and $\alpha = 0.45$. What is more interesting is the observation that the average share of resources allocated to the public good also decreases going from $\alpha = 0.45$ to $\alpha = 0.55$, and from $\alpha = 0.55$ to $\alpha = 0.65$ as this contradicts one of the key comparative static predictions of the model.

The flip side of this is that if we look at the share of the private good that proposers allocate to themselves, conditional on equilibrium type allocations (public goods with only private goods to themselves), the average private share for accepted offers goes from 0.111 with $\alpha = 0.45$ to 0.135 for $\alpha = 0.55$ to 0.181 for $\alpha = 0.65$. The null hypothesis that the data from these three treatments come from the same population can be rejected using a Kruskal-Wallis test at the 1% level.[24] Focussing on the cross-over sessions, using own subject differences as the unit of observation, the null hypothesis that the data for $\alpha = 0.45$ and $\alpha = 0.55$ come from the same distribution can be rejected (p-value < 0.1 using a Wilcoxon matched-pairs signed-ranks test). These differences seem to be decreasing slightly over time

[22] This is established two ways. One way is using the ranksum test for all rounds except those after round 12. 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.

[23] 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.

[24] Data from period 13 on in the cross-over sessions are not included since the analysis is based on subject data averages which are probably not independent for a given subject before and after cross-over.

α		Budget Share		Payoffs	
		Public Good	Private Allocation	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	\$20.95	\$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	\$9.20
	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

however: looking at bargaining rounds 10 and higher, budget shares proposers allocate to themselves, conditional on equilibrium type allocations, are 0.119, 0.145, and 0.177, but they are still in the wrong direction relative to what the theory predicts (the p-value of the Kruskal-Wallis test is now only significant at the 10% level).

Conclusion 3 *Public good provision decreases monotonically as α increases, contrary to the model's prediction within the mixed public and private region going from $\alpha = 0.45$ to $\alpha = 0.55$ and 0.65.*

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. With this in mind, 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 \$0.00, \$2.47, \$3.47, and \$5.96 for α equal to 0.3, 0.45, 0.55 and 0.65 treatments, and \$3.99 *within* the MWC for $\alpha = 0.75$. Other than for $\alpha = 0.3$, these differences are all statistically significant ($p < 0.01$ Wilcoxon matched-pairs signed-ranks test). Thus, proposer power grows as α increases. However, these differences represent only a fraction of what proposers are predicted to take for themselves: 21%, 30%, 33%, and 31% for the α equal to 0.45, 0.55, 0.65, and 0.75 treatments, respectively (percentages are for the equilibrium type offers).

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

To summarize, the theory performs well in 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. 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 fraction of resources

[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 not using only accepted offers is mainly increased sample size. The reason for the change of focus here to only accepted offer 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.

allocated to public goods decreases as α increases within the mix region.

In the next section we focus on these differences from equilibrium predictions within the mixed region. Of particular interest is the observation that contrary to the theory, the fraction of resources allocated to public goods decreases as α increases within the mix region as it contradicts one of the key comparative static predictions of the VM's extension of the BF 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 of equilibrium models are rarer as well as suggestive of more fundamental deficiencies in the model, 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 lack 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 ($\alpha = 0.45$ to $\alpha = 0.65$) as the theory predicts. 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. This is substantially less than the round one frequency of equilibrium type proposals for $\alpha = 0.30$ or 0.75. Further, as shown in Figure 1, 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 (recall Table 3) is that they have far more ground to make up compared to these other treatments.

Beside initial tendencies, voting patterns of responders place 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). Own payoff is significant in every treatment. However, for the mixed region the payoff to the proposer has a negative impact on the likelihood that a proposal will be accepted, which

	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

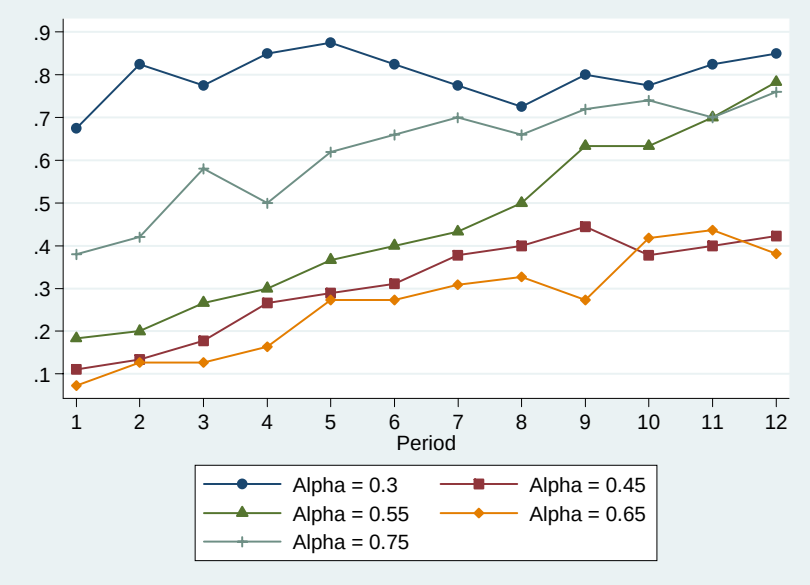

Figure 1: Fraction of Equilibrium Type Offers

	$\alpha = 0.3$	$\alpha = 0.45$	$\alpha = 0.55$	$\alpha = 0.65$	$\alpha = 0.75$
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

limits the ability of proposers to exploit their power. This is especially true for the $\alpha = 0.45$ treatment.

These voting patterns impact the growth of, and the nature of, equilibrium type allocations within 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 for all public good type allocations versus 0.11 to 0.40 for equilibrium type allocations). With $\alpha = 0.45$ the average payoff to proposers for equilibrium type allocations that are passed averaged \$0.26 more than for an all public good allocation (\$19.51 versus \$19.25). This small increase in proposers' payoffs for an equilibrium type allocation comes at a price (and at a minimum with more risk) as 14% of equilibrium type allocations are rejected for $\alpha = 0.45$ as opposed to *no* rejections of all public good type allocations. Thus, for $\alpha = 0.45$, there is little to be gained from an equilibrium type allocation compared to an all public good type allocation, with some risk of rejection with the resulting shrinkage in the budget available to be allocated. In contrast, with $\alpha = 0.55$ proposers earned \$1.42 more than with the all public good allocation,

a stronger incentive to providing equilibrium type proposals as opposed to an all public good type allocation, with essentially no difference in the likelihood of these proposals being rejected (14% rejection rate for $\alpha = 0.45$ versus 13% for $\alpha = 0.55$). (All public good allocations continued to be passed 100% of the time for $\alpha = 0.55$.) For the $\alpha = 0.65$ the main rival in round one to an equilibrium type allocation is one in which private goods are allocated to the proposer and two other players (a MWC type allocation, albeit, one with a reasonably large share of the budget allocated to public goods as well; 24% of the budget in round one for these types of proposals on average). It takes proposers some time to figure out that they can get more on average from equilibrium type allocations than from MWC type allocations, while also having a better chance of their proposal being accepted: \$15.86 versus \$13.86, with 85% of equilibrium type allocations being passed compared to 75% of MWC type allocations passing.[26]

The evolution of equilibrium type proposals over time suggests that they would dominate for $\alpha = 0.55$ and 0.65, if not for $\alpha = 0.45$. However, the same cannot be said for the comparative static prediction that the share of budgets allocated to the public good will increase as α increases in the mixed region. First, as already noted all public good allocations grow even faster than equilibrium type allocations for $\alpha = 0.45$. This implies that the share of the budget devoted to public goods decreases going from $\alpha = 0.45$ to $\alpha = 0.55$ regardless of how many rounds we let them play. (Also recall that we get a decrease in the share of the budget allocated to public goods going from $\alpha = 0.45$ to $\alpha = 0.55$ in the crossover sessions even excluding subjects who always propose all public good allocations with $\alpha = 0.45$). Further, in going from $\alpha = 0.55$ to $\alpha = 0.65$, the share of the budget allocated to to public goods for equilibrium type decreases as well from 0.843 to 0.777. So that unless these shares would change with experience, even with all equilibrium type allocations this comparative static prediction of the model would be violated. This results from the fact that as α increases, proposer power increases: In the mixed region, only considering equilibrium type proposals, proposers share as a fraction of total resources goes from 23.69%, 24.72%, to 30.63% for $\alpha = 0.45$, 0.55, and 0.65 respectively. This is consistent with the estimates from the voting regressions which show that the amount of an equilibrium type offer that

[26] Average payoffs to proposers for proposals that passed are biased downward compared to payoffs for proposals that were voted on - but not by too 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.

would make the median responder indifferent between accepting or rejecting a proposal *decreases* systematically from \$15.17 to \$11.93 to \$8.66 as α increases from 0.45 to 0.55 to 0.65. Thus changes in proposer power, in conjunction with reductions in what constitutes acceptable equilibrium type offers as α increases, generates reductions in the level of public good allocations as α increases in the mixed region.

4.3 Discussion

In the case where $\alpha = 0.75$ the results reported here are similar to results reported in previous experiments investigating the Baron-Ferejohn model. With $\alpha = 0.75$ the theory calls for an all private goods allocation within a minimum winning coalition (two out of five subjects get nothing), and with the proposer getting a significantly larger share than her coalition partners, which is what we observe. Further, the frequency of MWCs is very similar to results from prior experiments on multilateral bargaining with only particularistic goods. For example, FKM (2005c) 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. Also, within the minimum winning coalition proposers obtain significantly more private goods than their coalition partners, which is what the theory predicts, but they obtain much less than the stationary subgame perfect equilibrium predicts. The level of proposer power observed in this region is close to what has been observed in previous legislative bargaining experiments with all particularistic goods. In this study, proposer's take in MWC is about 38% of resources while FKL report proposer power of about 40% in MWC passed the initial 5 rounds for the closed amendment rule treatment and FKM 2005c report also proposer power of 40% for accepted MWC.[27]

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 proposer's share, which is typically greater than shares offered to coalition partners, negatively affects voting has also been observed in one or more treatments in each of our previous studies of the BF model (FKL, FKMa, FKLc).

Our results also have implications for the other regarding preference literature in economics. First, the abundance of MWC offers with $\alpha = 0.75$ (as well as reported in previous

[27] FKL involved legislatures of 5 members with $\delta = 0.8$ whereas FKM(2005c) involved $\delta = 1$.

experiments with only particularistic goods) indicates that subjects do not have maximin preferences. That is, a taste for maximizing the benefits for the least well off (Charness and Rabin, 2002; Englemann and Strobel, 2004).[28] Second, in the region where the model predicts only private goods, subjects had the opportunity to provide a perfectly egalitarian distribution that was also a more efficient allocation (in the sense of providing more total benefits) than the minimum winning coalitions obtained, by making an all public good allocation. Nevertheless, all public good allocations only accounted for 3% of all proposals, even though such proposals were almost certain to be passed. Rather subjects opted overwhelmingly for minimum winning coalitions 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). There are several obvious differences between the present experiment and these other experiments: namely the present experiment involves bargaining and these other studies involved simple dictator games. In a dictator version of our game, presumably the fear of the consequences of a rejection could make proposers opt more often for an all public good proposal, but the results in our bargaining framework show that even if that were the case the interpretation of such a result would not be a taste for efficiency or maximin concerns.

Another type of other regarding preference proposed to explain over provision of public goods in VCM experiments is the "warm glow" effect – the good feeling subjects get for helping others. Although the warm glow might be part of the reason why more than predicted public goods are provided in the mixed region, it is inconsistent with the fact that almost no public goods are provided with $\alpha = 0.75$. That treatment is really the one that comes in sharpest contrast with the warm glow explanation of public goods provision in VCM experiments because it is in many ways similar to it. In both cases the equilibrium prediction is for no public goods to be provided. And in both cases it is more efficient for all the resources to go toward the public good. However, unlike in the VCM experiments there is almost no provision of public good here with $\alpha = 0.75$. And this occurs right from the start in that there is no more public good provision than private good provision with

[28] Further, with respect to games with only particularistic goods Montero (2007) shows that the standard models of other regarding preferences (e.g., Fehr-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.

$\alpha = 0.3$ where it's dominant to provide only public goods.

This is not to say there are no similarities with VCM experiments as there is over provision of public goods in the mixed region, but over provision in the present case does not seem to result primarily from a warm glow effect. Finally the level of public good provision in the mixed region does not go away or decrease systematically over time as in the typical VCM experiment. The latter is most often attributed to learning and/or end game effects in a repeated play game setting. However, in the present case public good provision is an equilibrium prediction within a one-shot game which, if anything tends to increase over time for each treatment within the mixed region (if only because equilibrium type allocations increase).

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 under 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 with its counterintuitive prediction that public good provision will increase as the value of the public good decreases. The model also predicts that in the mixed region, private goods will be allocated only to the proposer, the expression of proposer power within the mixed region.

Many of the predictions of the model find support, while the main deviations are found in the mixed region, where equilibrium behavior is far from intuitive. Within the mixed region we find that (i) overall when private goods are provided, in the majority of cases they go exclusively to proposers, as the theory predicts, (ii) in the lower part of the mixed region there is excess provision of public goods relative to what the theory predicts because of the high frequency of all public good allocations, and the lower then predicted levels of private goods proposers' take with equilibrium type allocations, (iii) while in the upper part of the mixed region there are too many MWC type offers, and (iv) the level of public good provision falls as the value of the public goods decreases, contrary to the model's predictions.

Our results have several implications for the legislative bargaining literature. First, the fact that as the weight legislators place on private goods increases, the share of particularistic goods provided within the mixed region increases, supports the intuition, as well as the empirical literature, that single member districts tend to produce more pork than do legislators elected from national lists. This support for the empirical literature comes without the confounding factors associated with comparing outcomes between nation states with their different cultures, histories, and other potential confounding factors. Second, the reduction in the supply of public goods as the weight placed on private goods (α) increases within the mixed region directly contradicts the comparative static prediction of the Volden-Wiseman model under the SSPE refinement, the standard refinement for games of this sort. Rather this outcome can be rationalized by agents' voting patterns, and the actual proposals made in response to (or in anticipation of) these voting patterns.

References

Austen-Smith, D. and Banks, J. S.: 1988, Social choice theory, game theory, and positive political theory, *Annual Review of Political Science* **1**, 259–287.

Banks, J. S. and Duggan, J.: 2000, A bargaining model of collective choice, *American Political Science Review* **94**(1), 73–88.

Baron, D. P. and Diermeier, D.: 2001, Elections, governments, and parliaments under proportional representation, *Quarterly Journal of Economics* **116**(3), 933–967.

Baron, D. P. and Ferejohn, J. A.: 1989, Bargaining in legislatures, *American Political Science Review* **83**(4), 1181–1206.

Battaglini, M. and Coate, S.: 2006, A dynamic theory of public spending, taxation and debt. mimeo.

Charness, G. and Rabin, M.: 2002, Understanding social preferences with simple tests, *The Quarterly Journal of Economics* **17**(3), 817–869.

Crombez, C.: 1996, Minority governments, minimal winning coalitions and surplus majorities in parliamentary systems, *European Journal of Political Research* **29**(1), 1–29.

Engelmann, D. and Strobel, M.: 2004, Inequality aversion, efficiency and maximin preferences in simple distribution experiments.

Fischbacher, U.: 2006, z-tree: Zurich toolbox for readymade economic experiments, *Experimental Economics* . forthcoming.

Fréchette, G. R., Kagel, J. H. and Lehrer, S. F.: 2003, Bargaining in legislatures: An experimental investigation of open versus closed amendment rules, *American Political Science Review* **97**(2), 221–232.

Fréchette, G. R., Kagel, J. H. and Morelli, M.: 2005a, Behavioral identification in coalitional bargaining: An experimental analysis of demand bargaining and alternating offers, *Econometrica* **73**(6), 1893–1938.

Fréchette, G. R., Kagel, J. H. and Morelli, M.: 2005b, Nominal bargaining power, selection protocol and discounting in legislative bargaining, *Journal of Public Economics* **89**(8), 1497–1517.

Goertz, J. M. M.: 2006, Sequential demands in multi-issue legislative bargaining. mimeo.

Harrington, J. E.: 1990, The power of a proposal maker in a model of endogenous agenda formation, *Public Choice* **64**(1), 1–20.

Jackson, M. and Moselle, B.: 2002, Coalition and party formation in a legislative voting game, *Journal of Economic Theory* **103**, 49–87.

Kahneman, D. and Tversky, A.: 1979, Prospect theory: An analysis of decision under risk, *Econometrica* **47**, 263–92.

Leblanc, W., Snyder, J. and Tripathi, M.: 2000, Majority-rule bargaining and the under provision of public investment goods, *Journal of Public Economics* **75**(1), 21–47.

Lizzeri, A. and Persico, N.: 2001, The provision of public goods under alternative electoral incentives, *American Economic Review* .

Montero, M.: 2006, Inequity aversion may increase inequity, *Economic Journal* . Forthcoming.

Morelli, M.: 1999, Demand competition and policy compromise in legislative bargaining, *American Political Science Review* **93**, 809–820.

Owens, M. F. and Kagel, J. H.: 2007, Minimum wage restrictions and employee effort in labor markets with gift exchange present. mimeo.

Persson, T. and Tabellini, G.: 2006. "Electoral systems and economic policy" in *Handbook of Political Economy*, ed. Weingast, B. and D. Wittman. Oxford.

Roth, A. E.: 1995. "Bargaining Experiments" in *Handbook of Experimental Economics*, ed. by John H. Kagel and Alvin E. Roth. Princeton: Princeton University Press, 253-348.

Shafir, E., Diamond, P. and Tversky, A.: 1997, Money illusion, *The Quarterly Journal of Economics* **112**, 341–374.

Volden, C. and Wiseman, A. E.: 2005, Bargaining in legislatures over particularistic and collective goods. Paper Presented at the 76th Annual Meetings of the Southern Political Science Association, January 5-9, New Orleans, Louisiana.

Volden, C. and Wiseman, A. E.: 2006, Bargaining in legislatures over particularistic and collective goods, *American Political Science Review* **101**(1), 79–92.

A Additional Results

Both tables in the appendix need to be redone.

	Number of Subjects Offered Private Allocations					
	0	1	2	3	4	5
$\alpha = 0.3$	**0.86**	0.02	0.00	0.05	0.2	0.05
$\alpha = 0.45$	0.57	**0.24**	0.00	0.07	0.01	0.10
$\alpha = 0.55$	0.40	**0.43**	0.01	0.08	0.01	0.06
$\alpha = 0.75$	0.01	0.00	0.00	**0.66**	0.03	0.30
Rounds 10 and Above						
$\alpha = 0.3$	**0.80**	0.07	0.00	0.07	0.00	0.07
$\alpha = 0.45$	0.62	**0.27**	0.00	0.03	0.00	0.08
$\alpha = 0.55$	0.30	**0.64**	0.00	0.03	0.00	0.03
$\alpha = 0.75$	0.06	0.00	0.00	**0.67**	0.00	0.28

Equilibrium Type Offers are in Bold.

Table 8: 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 9: Average Provision of Public Good for Accepted Proposals