Online Appendix: A Model of Bargaining with Shared Interests

To understand how the presence of a common interest policy alters the ability of society to hold the state to account, this appendix adapts the canonical Rubinstein (1982) bargaining model. We first demonstrate the baseline that in the Rubinstein model where society has no power to block policy it cannot make any claims on the government. We subsequently show how the introduction of a shared-interest policy from which society is able to withhold consent increases the share of other public resources that society is able to demand. It should be stressed that this is not a model that predicts individual acts of non-compliance but one that predicts differences in citizen bargaining power against the state. Like all bargaining models with perfect information, the credibility of threats are fully understood by both players so bargaining is resolved in the first round and the execution of those threats is always off the equilibrium path. Observed outcomes of resistance can therefore be attributed to imperfections in the bargaining environment, for example imperfect information about the other player's preferences and discount rate.

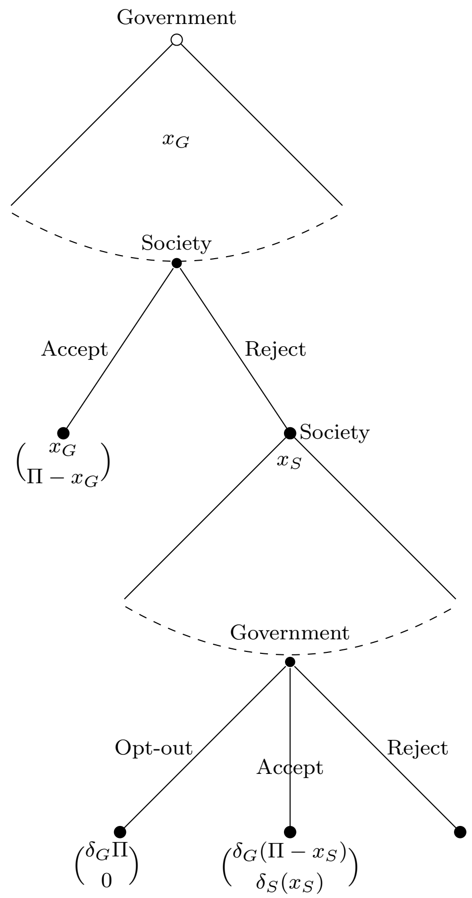
State-Society Bargaining in the Absence of a Shared-Interest Policy

To begin, consider the Rubinstein bargaining framework. Two actors have a direct conflict of interest over a single public policy, for example how a fixed budget (Π) is expended. The government (G) prefers to keep the budget as rents, while society (S) prefers those benefits be given to society as public goods. In the classic version of the model both actors have an effective veto over the budget so that the agreement of both is required before any payoffs are received.[1] The Rubinstein model is characterized by an indefinitely-repeated game with alternating offers by each actor. Each actor's action space therefore consists of a proposal for how to divide the budget in alternating rounds (x_G is the government's offer and x_S is society's offer, where $0 \leq x_G \leq \Pi$, $0 \leq x_S \leq \Pi$) and a decision to accept or reject the opponent's offer in the opposite rounds. Payoffs are written as $\binom{Government}{Society}$ in the game tree (Figure 1) and are the value of the budget Π that both sides receive, discounted to the time period t when agreement is reached, where $t = 0$ is the first period. The government and society each have a specific discount factor on payoffs, $0 < \delta_G < 1$ and $0 < \delta_S < 1$, respectively. Therefore, when society's proposal x_S is accepted by the government in period t, society receives $\delta_S^t x_S$ and the government receives $\delta_G^t(\Pi - x_S)$. Symmetrically, when the government makes a proposal x_G that society agrees to, the government receives $\delta_G^t x_G$ and society receives $\delta_S^t(\Pi - x_G)$.

There is one feature of the classic Rubinstein model which is a particularly inaccurate representation of

[1] For simplicity, we assume that both are unitary actors, which means that society has overcome any collective action problem.

Figure 1: Game Tree for State-Society Bargaining Game in the Absence of a Shared-Interest Policy



the relationship between state and society we seek to understand: society typically has no direct veto over the budget.[2] The government could therefore simply walk away from negotiations and retain the budget for itself. To accommodate this reality we follow Muthoo (1999) in adapting the model to give government an additional 'opt-out' action. Following an offer by society, the government can now simply walk away and receive the full (discounted) budget $\delta_G^t \Pi$.

The sequence of the game is illustrated in Figure 1. The government moves first,[3] making an offer to divide the budget. If society accepts that offer, payoffs are allocated, but if society does not accept it makes a counter-offer. At this point, the government can either accept society's offer and receive its payoff, reject the offer and make a counter-offer, or – unlike society – opt-out and receive the outside option payoff.

The appropriate equilibrium concept is a subgame-perfect Nash equilibrium. The government's strategy

[2]The model assumes no other accountability mechanisms such as elections, and an exogenous budget without taxation. It is in this context that the direct effect of a shared-interest policy on bargaining outcomes can be isolated and made visible.

[3]The choice of which actor moves first makes a material difference to the payoffs but is also arbitrary and does not alter the conclusions of introducing a shared-interest policy.

involves an offer x_G and minimum levels at which they would accept society's offer. Society's strategy involves the offer x_S and a minimum level at which they would accept the government's offer. Rubinstein's solution demonstrated that the equilibrium requires each actor to be indifferent between accepting and rejecting the other's offer in any period. For society, the payoff from rejecting the government's offer is the value of their counter-offer (discounted by one additional period), which in equilibrium will be accepted. Therefore, in equilibrium, the following equality must hold to ensure society is indifferent between accepting and rejecting the government's offer:

$$\delta_S^t(\Pi - x_G) = \delta_S^{t+1} x_S \tag{1}$$

$$\Pi - x_G = \delta_S x_S \tag{2}$$

For the government, rejection may provide either the counter-offer payoff or the payoff from opting-out. The indifference condition depends on which alternative action is most valuable:

$$\delta_G^t(\Pi - x_S) = \max\{\delta_G^{t+1}(x_G), \delta_G^t \Pi\} \tag{3}$$

$$\Pi - x_S = \max\{\delta_G x_G, \Pi\} \tag{4}$$

There are, then, two potential solutions depending on whether the government's outside option improves its equilibrium bargaining payoff (Muthoo, 1999). Where the outside option is less valuable, so that the classic Rubinstein solution holds, the equilibrium bargaining offers are:

$$x_G^* = \frac{\Pi(1-\delta_S)}{(1-\delta_S\delta_G)} \tag{5}$$

$$x_S^* = \frac{\Pi(1-\delta_G)}{(1-\delta_S\delta_G)} \tag{6}$$

However, where the outside option is more valuable than the Rubinstein bargaining payoff, the equilibrium offers are:

$$x_G^{**} = \Pi \tag{7}$$

$$x_S^{**} = 0 \tag{8}$$

The high value of the government's outside option – walking away and keeping the total budget – provides so much bargaining power that society receives nothing. Given this option to opt-out, this outcome is also guaranteed – the outside option is always greater than the equilibrium bargaining payoff. Substituting in the equilibrium bargaining share x_G^* and comparing the payoff to the outside option confirms this:

$$\Pi > \delta_G\Big(\frac{\Pi(1-\delta_S)}{(1-\delta_S\delta_G)}\Big) \tag{9}$$

$$1 > \delta_G \tag{10}$$

Therefore, the equilibrium offers are x_G^{**} and x_S^{**}. Unsurprisingly, accountability is completely absent where society has no ability to veto government policy.

Bargaining in the Presence of a Shared-Interest Policy

To improve society's weak bargaining position, accountability mechanisms typically introduce a second policy dimension over which society can effectively withhold consent, for example taxation. The innovation in our model is that this second policy dimension involves no conflict of interest, but rather a common interest between society and the government. Our goal is to assess whether this shared policy is capable of raising the equilibrium value of society's budget share, which is zero in the absence of the shared-interest policy.

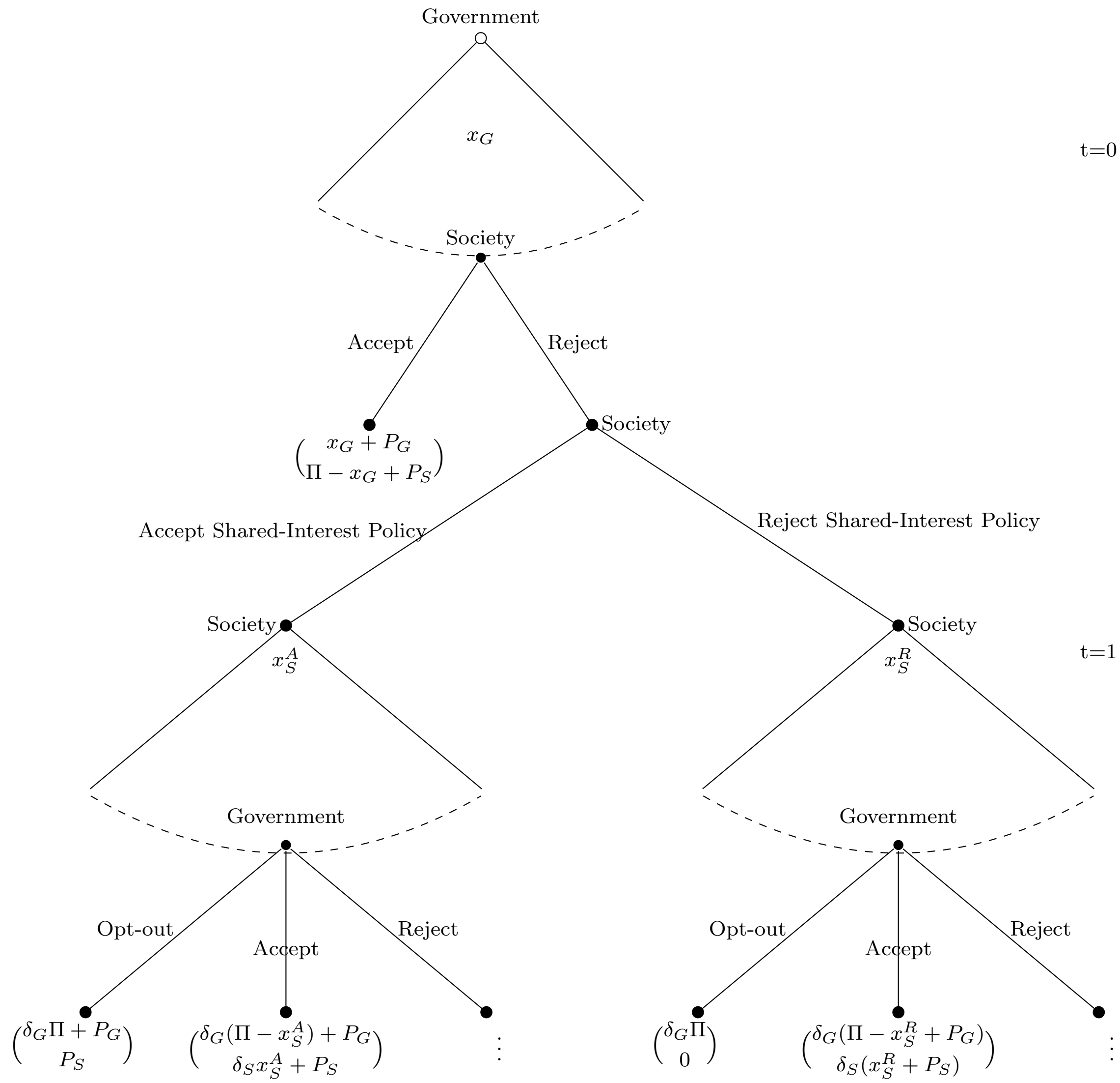
To incorporate society's capacity to block a second policy, Figure 2 introduces an additional action into the game tree where society can choose to accept or reject the shared-interest policy. This decision enables society to differentiate its offers for the budget depending on whether it has accepted (x_S^A) or rejected (x_S^R) the shared-interest policy. The final alteration is to incorporate the payoffs from the shared-interest policy. For simplicity, we assume that the value of implementation of the shared-interest policy is a fixed net present value for each actor (P_G and P_S) that declines over time according to each actor's discount rate until an agreement is reached. In period t the shared-interest policy is valued at $\delta_G^t P_G$ and $\delta_S^t P_S$ by the government and society, respectively. The policy is implemented whenever society accepts it.[4] The shared-interest assumption requires that $P_S \geq 0$ and $P_G \geq 0$. Unlike the conflict-of-interest policy, this covers situations where the government gains more from implementing the policy than from stealing the policy's resources.[5] Note also that for simplicity the game tree only displays the option to reject the shared-interest policy following a rejection of the government's budget offer. Where the budget is accepted there are no potential future bargaining gains available to motivate rejecting the shared-interest policy and it is a dominant strategy

[4]For simplicity we omit modelling of the government's implementation decision, relying on its positive valuation of the policy and its existing ability to veto the budget to subsume its bargaining power.

[5]This may be because of large political benefits to implementation, high costs to resource diversion from this particular policy, for example from donor funds, or - as we have argued in the main paper - future career and reputational rewards for elites that successfully implement policy.

for society to accept the shared-interest policy.

Figure 2: Game Tree for State-Society Bargaining Game in the Presence of a Shared-Interest Policy



The solution is found using the same methodology as in the basic model, but now we must solve the Rubinstein bargaining equilibrium for each of the two branches separately. First, focus on the left-hand side of the game tree where society accepts the shared-interest policy. The government's payoff from opting-out is always higher than accepting society's offer ($\delta_G\Pi + P_G \geq \delta_G(\Pi - x_S^A) + P_G$) so opt-out is a weakly dominant strategy. This leaves society with a payoff of P_S.

Now focus on the right-hand side of the game tree where society rejects the shared-interest policy. Here, the government can potentially do better by agreeing to society's budget offer instead of opting-out. The

Rubinstein bargaining equilibrium is then:

$$\Pi - x_G^R + P_S = \delta_S(x_S^R + P_S) \tag{11}$$

$$\Pi - x_S^R + P_G = \delta_G(x_G^R + P_G) \tag{12}$$

Solving these simultaneous equations, the equilibrium offers when the shared-interest policy is rejected are:

$$x_S^{R*} = \frac{(\Pi + P_G)(1-\delta_G) - \delta_G P_S(1-\delta_S)}{(1-\delta_G\delta_S)} \tag{13}$$

$$x_G^{R*} = \frac{(\Pi + P_S)(1-\delta_S) - \delta_S P_G(1-\delta_G)}{(1-\delta_G\delta_S)} \tag{14}$$

We must still check if this bargaining outcome is feasible, or if the government will simply prefer to opt-out of bargaining. The opt-out is irrelevant where the equilibrium bargaining outcome guarantees a better payoff:

$$\delta_G(\Pi - x_S^{R*} + P_G) > \delta_G \Pi \tag{15}$$

$$P_G > \frac{(\Pi + P_G)(1-\delta_G) - \delta_G P_S(1-\delta_S)}{(1-\delta_G\delta_S)} \tag{16}$$

$$P_G + P_S > \frac{\Pi(1-\delta_G)}{\delta_G(1-\delta_S)} \tag{17}$$

The government can no longer benefit from the opt-out option where the overall valuation of the shared-interest policy by both parties is high relative to the value of the budget. Providing this opt-out-irrelevance condition is met, society can now credibly threaten to reject the shared-interest policy where the payoff from the bargaining outcome on the right-hand side of the tree exceeds the payoff of the left-hand side: $\delta_S(x_S^{R*} + P_S) > P_S$. Substituting in the equilibrium bargaining result above, this simplifies to:

$$\delta_S(x_S^{R*} + P_S) > P_S \tag{18}$$

$$\delta_S\Big(\frac{(\Pi + P_G)(1-\delta_G) - \delta_G P_S(1-\delta_S)}{(1-\delta_G\delta_S)} + P_S\Big) > P_S \tag{19}$$

$$\frac{P_G}{P_S} > \frac{(1-\delta_S)}{\delta_S(1-\delta_G)} - \Pi \tag{20}$$

Credibility is achieved where P_G is high relative to P_S, so that the government values the shared-interest policy relatively more than society, where δ_G is small so that the government is impatient, and where δ_S is large so society is patient.

Equilibrium Bargaining Payoffs with a Shared-Interest Policy

Where society's rejection of the shared-interest policy is credible, the unique subgame perfect equilibrium is for the government to offer just enough for society to accept in the first round of bargaining:

$$\begin{aligned}\Pi - x_G^* + P_S &= \delta_S\Big(\frac{(\Pi+P_G)(1-\delta_G)-\delta_G P_S(1-\delta_S)}{(1-\delta_G\delta_S)} + P_S\Big) && (21)\\ x_G^* &= \Pi + P_S(1-\delta_S) - \delta_S\Big(\frac{(\Pi+P_G)(1-\delta_G)-\delta_G P_S(1-\delta_S)}{(1-\delta_G\delta_S)}\Big) && (22)\end{aligned}$$

This in turn defines society's equilibrium portion of the budget:

$$\begin{aligned}x_S^* &= \Pi - x_G^* && (23)\\ &= \delta_S\Big(\frac{(\Pi+P_G)(1-\delta_G)-\delta_G P_S(1-\delta_S)}{(1-\delta_G\delta_S)}\Big) - P_S(1-\delta_S) && (24)\\ &= \frac{\delta_S(1-\delta_G)(\Pi+P_G)-(1-\delta_S)P_S}{(1-\delta_S\delta_G)} && (25)\end{aligned}$$

Since this value is greater than zero we have demonstrated that a shared-interest policy has the potential to boost accountability. By calculating the derivatives with respect to the parameters we can observe when the equilibrium share of the budget gained by society is larger:

$$\begin{aligned}\frac{\partial x_S^*}{\partial P_G} &= \frac{\delta_S(1-\delta_G)}{(1-\delta_S\delta_G)} > 0 && (26)\\ \frac{\partial x_S^*}{\partial P_S} &= \frac{-(1-\delta_S)}{(1-\delta_S\delta_G)} < 0 && (27)\\ \frac{\partial x_S^*}{\partial \delta_G} &= \frac{(\Pi+P_G+P_S)(\delta_S^2-\delta_S)}{(1-\delta_S\delta_G)^2} < 0 && (28)\\ \frac{\partial x_S^*}{\partial \delta_S} &= \frac{(\Pi+P_G+P_S)(1-\delta_G)}{(1-\delta_S\delta_G)^2} > 0 && (29)\end{aligned}$$

A larger share of the budget can be claimed where: (i) the government values the shared-interest policy relatively more than society (P_G is large and P_S is small); and (ii) the government is more impatient than society (δ_G is low and δ_S is high).

There is of course no guarantee that a shared-interest policy can create accountability. This depends on meeting the two conditions (Equations 17 and 20) supporting the credible-rejection equilibrium:

$$\begin{aligned} P_G + P_S &> \frac{\Pi(1-\delta_G)}{\delta_G(1-\delta_S)} \\ \frac{P_G}{P_S} &> \frac{(1-\delta_S)}{\delta_S(1-\delta_G)} - \Pi \end{aligned}$$

Crucially, these conditions respond to the parameters in a similar way as the bargaining division in Equation 25. Provided the overall valuation of the shared-interest policy is not too small relative to the budget, and provided the government's relative valuation of the shared-interest policy and impatience is higher than society's, then the conditions are met. Moreover, a shift on the extensive margin that helps assure an interior bargaining solution also helps improve the intensive margin of society's share of the budget. Where society can make a credible threat of rejection, it should also be able to claim a meaningful portion of the budget.

We can therefore disaggregate the effect of relatively intense government preferences for the shared-interest policy into three mechanisms: First, it prevents the government from walking away from negotiations and using its opt-out to unilaterally decide the budget (Equation 17). Second, this in turn gives society the chance to impose costs - foregone benefits from the policy - on the government, which enables society to raise the offer it can make if it rejects the shared-interest policy. This can make the threat of rejecting the shared-interest policy credible through the endogenous bargaining gains (Equation 20). Third, as the gap between the government's and society's valuation continues to widen, the amount of the budget society can claim continues to rise (Equation 25). These three mechanisms work in concert to improve accountability between citizens and the state.

References

Muthoo, A. (1999). *Bargaining theory with applications.* Cambridge University Press.

Rubinstein, A. (1982). Perfect equilibrium in a bargaining model. *Econometrica: Journal of the Econometric Society*, 97–109.