FOR ONLINE PUBLICATION
PERSISTENCE OF POWER: REPEATED MULTILATERAL BARGAINING

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In this Online Appendix, we provide additional material for the main manuscript. There are three main sections in the Appendix. The first section contains mathematical derivations and proofs for the results presented in the manuscript. The second section is the instructions for the Endogenous Power treatment, which were distributed to the subjects participating in the experiment and read out loud by the experimenter. The third section contains robustness checks of experimental results and some additional empirical analysis. Specifically,

(1) Mathematical proofs for theoretical results
   - Section 1.1 discusses predictions of SSPE without the symmetry assumption.
   - Section 1.2 investigates what happens when subjects are risk averse.
   - Section 1.3 introduces other regarding preferences in our framework.

(2) Section 2 contains instructions for Endogenous Power treatment and the walk-through the screenshots that the experimenter conducted prior to the beginning of the session (and after reading the instructions) in order to familiarize subjects with the interface.

(3) Section 3 contains robustness tests of experimental results reported in the manuscript.
   - In Section 3.1, we replicate the results using first four rounds of *all* matches rather than the last 4 matches in each experimental section
   - In Section 3.2, we use an alternative definition of coalition types and non-trivial shares.
   - Finally, in Section 3.3, we discuss learning across matches.

1. MATHEMATICAL APPENDIX

In this Online Appendix, we consider whether reasonable alternative assumptions regarding equilibrium structure or preferences can lead to theoretical predictions that are more in line with the experimental evidence, especially in the case with endogenous proposer power. In doing so, we consider several alternative assumptions within the theoretical analysis, while continuing to focus on stationary equilibrium refinements. We show that although the alternative assumptions improve the ability of the theory to match some dimensions of observed behavior, their ability to do so is limited, and can lead to a worse fit with observed behavior on other dimensions. None of the alternative assumptions eliminate our concerns about the predictive power of stationary equilibrium refinements when proposer power is endogenous.

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The following subsections walk through the analysis of the alternative theoretical models. These alternative models are unable to reconcile the disconnect between theory and observed behavior while maintaining the stationarity assumption.

1.1. **SSPE without symmetry.** The main analysis follows Baron and Ferejohn (1989) and much of the literature by focusing on the symmetric SSPE. However, one can alternatively consider the asymmetric SSPE in which players still use stationary strategies but can treat other players asymmetrically, particularly when the agenda setter chooses which player to include in her minimum-winning coalition in each period. In the Random Power game, the switch from symmetric to asymmetric strategies does not change players' incentives to accept or reject proposals in each cycle. Thus the situation is similar to the symmetric case. In the Endogenous Power game, one needs to consider two cases: the asymmetric SSPE with high persistence of power and the asymmetric SSPE with low persistence of power. The restriction that $\gamma \in (0,1)$ rules out the possibility of an asymmetric SSPE with high persistence of AS power, which leaves the low persistence equilibrium as the only viable option. In this case, the incentives to vote for and against a given proposal are the same as in the Random Power game, and so we are back to the same prediction of non-stable coalitions. The asymmetric SSPE does no better than the symmetric SSPE in explaining the data.

We begin by relaxing the symmetry requirement of SSPE. Rather than require that the players' strategies are independent of other player's identities, as is the standard assumption, we allow for stationary strategies which treat other players asymmetrically, specifically when the AS each period chooses which players to include in her MWC. We focus on pure strategy equilibria in this environment.

Let $\mathbf{x}^j = (x_1^j, ..., x_n^j)$ denote player j's equilibrium proposal strategy, which she makes in every period that she serves as AS. Let $\bar{a}_i^j$ denote player i's voting strategy, where i votes for a proposal made by player j in any period t that i serves as AS if and only if $x_i^t \geq \bar{a}_i^j$.

Consider the following stationary, but asymmetric, strategy profile:

- Each player j chooses a MWC K_j made up on m other players. Player j's proposal gives $x_i^j = X$ for each $i \in K_j$, and $x_i^j = 0$ for each $i \notin \{K_j, j\}$.
- Each player i is included in the MWC of exactly m other players.
- Each player i votes in favor of proposal $\mathbf{x}^t$ if and only if $x_i^t \geq X$ when $i \in K_{AS_t}$ and if and only if $x_i^t \geq Y$ when $i \notin K_{AS_t}$.

We determine the values of X and Y such that the above constitutes an asymmetric SSPE.

First, consider such strategies in the context of *Baseline*. Here, the switch from symmetric to asymmetric strategies does not change the incentives that players have to accept or reject proposals each period. A player who is offered $\hat{x}_j$ can accept the proposal and expect a NPV of

$$\hat{x}_j + \left(\frac{1}{n}(1 - mX) + \frac{m}{n}X\right)\frac{\gamma}{1-\gamma} = \hat{x} + \frac{1}{n}\frac{\gamma}{1-\gamma}$$

or he can reject the proposal and expect a NPV of

$$\left(\frac{1}{n}(1-mX)+\frac{m}{n}X\right)\left(\delta+\frac{\gamma}{1-\gamma}\right)=\frac{1}{n}\left(\delta+\frac{\gamma}{1-\gamma}\right).$$

In equilibrium, $\hat{x}_j = X = Y$, and such an offer leaves a MWC member indifferent between accepting and rejecting the proposal each period. Thus, $X = Y = \frac{\delta}{n}$.

Second, consider such strategies in the context of *Majority Support*. For this game, we must also describe the voting strategies for the players when deciding whether to keep or replace the current period AS. There are two possibilities: either the members of K_j will reelect j, or they will not. Those not in K_j have no incentive to reelect player j as AS.

Suppose that we are in an equilibrium of *Majority Support* with high persistence of AS power. Thus, for every AS j, players in K_j vote in favor of player j retaining power whenever j is AS.

In this case, we consider the incentives to vote for or against a given proposal. Here, an asymmetric proposal strategy means that players expect to continue to be included in the MWC of an AS who includes them in her proposal strategy. This means that if player j votes in favor of a proposal giving him $\hat{x}_j$ that is made by an AS such that $j \in K_{AS}$, then j expects a NPV of

$$\hat{x}_j + X\frac{\gamma}{1-\gamma}.$$

Accepting the same proposal made by an AS such that $j \notin K_{AS}$ returns a NPV of only $\hat{x}_j$ to player j, as j does not expect to be included in the future MWCs of that AS. In either case, if j votes against the proposal, he again expects

$$\frac{1}{n}\left(\delta+\frac{\gamma}{1-\gamma}\right).$$

In equilibrium, for proposals made by an AS such that $j \in K_{AS}$, $\hat{x}_j = X$ and this leaves player j indifferent between accepting and rejecting. Thus,

$$X + X\frac{\gamma}{1-\gamma} = \frac{1}{n}\left(\delta+\frac{\gamma}{1-\gamma}\right) \rightarrow X = \frac{1}{n}(\delta+\gamma-\delta\gamma)$$

For proposals made by an AS such that $j \notin K_{AS}$, $\hat{x}_j = Y$ and Y leaves player j indifferent between accepting and rejecting. Thus,

$$Y = \frac{1}{n}\frac{\delta+\gamma-\delta\gamma}{1-\gamma}.$$

Given the parameter values, $X < Y$. This means that it is less expensive for an AS to include a player in K_{AS} in her MWC than a non member. Therefore, the AS does not want to deviate to include others in her MWC.

For this case, it remains to determine when the members of K_j prefer to reelect the AS rather than to draw a new AS the next period. At the time the players vote for the AS, they are choosing between a favorable vote, which returns NPV of expected future payoffs equal to

$$X\frac{\gamma}{1-\gamma},$$

and an unfavorable vote which returns NPV of expected future payoffs equal to

$$\frac{1}{n}\frac{\gamma}{1-\gamma}.$$

Thus, players in K_j prefer to retain j as AS as long as $X \geq 1/n$. Plugging in for the value of X determined previously, this gives

$$\frac{1}{n}(\delta+\gamma-\delta\gamma) \geq \frac{1}{n} \rightarrow \gamma \geq 1.$$

This is a contradiction, as $\gamma \in (0,1)$, ruling out the possibility that such an asymmetric SSPE with high persistence of AS power in *Majority Support* exists.

Next, suppose that we are in an equilibrium of *Majority Support* with low persistence of AS power. Thus, players vote against the AS in each period. In this case, the incentives to vote for or against a given proposal are the same as in *Baseline*, as there is a new draw of AS power each period. As such X and Y are the same as in *Baseline*, with $X = Y = \delta/n$.

For this case, it remains to determine when the members of K_j prefer to draw a new AS the next period, rather than reelect the current AS. Our assumption that players ignore weakly dominated strategies means that the players vote as if they were casting the deciding vote. We need the players in K_j to each prefer to vote against the AS. The calculations are the same as in the case with AS retention, except with a reversed sign of the inequality. Thus, players in K_j prefer to replace j as AS as long as $X \leq 1/n$. Plugging in for X from *Baseline*gives

$$\frac{\delta}{n} \leq \frac{1}{n} \rightarrow \delta \leq 1.$$

This condition always holds. Thus, in the asymmetric SSPE of *Majority Support*, the equilibrium resembles that of *Baseline*, with low persistence of AS power.

1.2. **Risk aversion.** Another natural way to extend the theory is to consider outcomes that emerge when bargainers are risk-averse. The introduction of risk-averse preferences leads to a more-unequal split of resources in favor of the agenda setter compared with the risk-neutral case. This pattern is the opposite of what we observe in our data. Intuitively, as risk aversion increases, a coalition partner becomes willing to accept a lower share rather than reject a proposal and risk not being included in the next minimum-winning coalition. Moreover, there is no symmetric SSPE in which there is persistence of power in the Endogenous Power game. We show that combining risk-averse bargainers doesn't help reconcile theory and data either, as persistence of power in the Endogenous Power game with asymmetric stationary strategies. Therefore, incorporating risk aversion moves the stationary equilibrium predictions even further away from observed behavior.

In the symmetric SSPE of both dynamic games, a player i that votes against a proposed allocation obtains expected net present value of

$$\left(\frac{1}{n}\cdot u_i(1-ma^{\text{Game}})+\frac{m}{n}u_i(a^{\text{Game}})+\frac{n-1-m}{n}u_i(0)\right)\left(\delta+\frac{\gamma}{1-\gamma}\right)$$

where a^{Game} denotes equilibrium share of the coalition partner in a specific game. If, on the contrary, i supports the proposed allocation at time t, she gets

$$u_i(x_i^t) + \frac{\gamma}{1-\gamma}\left[\frac{1}{n}u_i(1-ma^{\text{Game}}) + \frac{m}{n}u_i(a^{\text{Game}}) + \frac{n-1-m}{n}u_i(0)\right]$$

in the *Baseline* and *Majority Support* games.

We assume that players have identical CARA utility functions, with

$$u_i(x) = u(x) = 1 - e^{-r\cdot x} \quad \text{for all } i.$$

In the SSPE of Random Power and Endogenous Power, the minimum acceptable offer $\bar{a}$ solves

$$u(\bar{a}) + \tfrac{\gamma}{1-\gamma}\left[\tfrac{1}{n}u(1-m\bar{a}) + \tfrac{m}{n}u(\bar{a}) + \tfrac{n-1-m}{n}u(0)\right] =$$
$$\left(\tfrac{1}{n}\cdot u(1-m\bar{a}) + \tfrac{m}{n}u(\bar{a}) + \tfrac{n-1-m}{n}u(0)\right)\left(\delta + \tfrac{\gamma}{1-\gamma}\right)$$

This simplifies to

$$1 - e^{-r\cdot\bar{a}} = \left(\frac{1}{n}\cdot(1-e^{-r\cdot(1-m\bar{a})}) + \frac{m}{n}(1-e^{-r\cdot\bar{a}}) + \frac{n-1-m}{n}(1-e^{0})\right)\delta.$$

Plugging in the parameters from the experiment (i.e. m, n, δ) gives

$$7 = 11e^{-r\cdot\bar{a}} - 4e^{-r\cdot(1-\bar{a})}.$$

Solving for $\bar{a}$ gives

$$\bar{a} = \frac{1}{r}\ln\left(-\frac{7}{8}e^{r} + \frac{1}{8}e^{r/2}\sqrt{49e^{r} + 176}\right)$$

Using a numerical analysis in Mathematica, we show that this expression for $\bar{a}$ are strictly decreasing in r. Thus, as risk aversion increases, the share allocated to the MWC player decreases. Risk aversion leads to even more inequality.

1.3. **Preferences for fair behavior.** Finally, another possibility is that players care about fairness.[1] To allow for this, we incorporate other-regarding preferences in line with the model of **?**. As one may expect, if fairness concerns are large and players find it sufficiently costly to provide unequal allocations, then there exists a SSPE of the game in which all players receive an equal share of the allocation in each cycle. Alternatively, when other-regarding preferences are weak, the SSPE allocations resemble those with standard utility functions except that a minimum-winning coalition member needs to be offered a higher allocation to offset the costs of inequality. However, incorporating fairness concerns does not explain other observed behavior. Specifically, we show that in our experimental game, we should never observe equal division within a minimum-winning coalition. This is because any agenda setter who prefers to split equally with her minimum-winning coalition partner will believe it is even better to split equally with *all* committee members. That is, an agenda setter who would consider an even division within a minimum-winning coalition would instead deviate to proposing an equal split in a grand coalition instead. This is the case in all of our games, given the parameter values of our experiments. Thus, fairness concerns may explain some, but not all, of our data. The main feature that the SSPE coupled with fairness concerns cannot

[1] For the study investigating fairness concerns in the one-shot bargaining games see **?**.

explain is the equal splits among coalition partners within minimum-winning coalitions, a behavior that is very common in both our games.

Here, we incorporate other regarding preferences, as proposed by Fehr and Schmidt (1999). In each period, a player i's period utility is

$$u_i(\mathbf{a}) = a_i - \alpha \frac{1}{n-1} \sum_{j \neq i} \max\{x_i - x_j, 0\} - \beta \frac{1}{n-1} \sum_{j \neq i} \min\{x_j - x_i, 0\},$$

where $\alpha \in (0,1)$ is a cost incurred from others being treated "unfairly" relative to oneself, and $\beta \in [\alpha, 1)$ is a cost incurred by being treated "unfairly" oneself. We focus on the case from the experiment where $n = 3$ and $m = 1$.

Equal division in a grand coalition. First, we determine conditions under which there exists a SSPE in which an equal share is allocated to all players.

Suppose that allocation $\mathbf{a}$ assigns $a_i = 1/3$ for each i. In equilibrium, entering a new period of bargaining gives any player an expected payoff of 1/3. Fairness concerns do not affect payoffs in the case of equal division.

Anticipating a payoff of 1/3 in the next period, if the current period proposal does not pass, a player requires utility of at least $\delta/3$ to vote for the current period proposal. Therefore, if the AS in any given period deviates from equal division, she must offer a MWC player at least $\bar{a}$ for the proposal to pass, where $\bar{a}$ solves

$$\bar{a} - \alpha\bar{a} - \beta(1 - 2\bar{a}) = \delta/3.$$

Thus,

$$\bar{a} = \frac{3\beta + \delta}{3(1 - \alpha + 2\beta)}.$$

For equal division to be an equilibrium, the AS must prefer to allocate evenly, earning 1/3 in any period, than to allocate $\bar{a}$ to a single MWC player. This will be the case if

$$1 - \bar{a} - \alpha(2(1 - \bar{a}) - \bar{a}) \leq 1/3.$$

Plugging in for $\bar{a}$ and simplifying the expression gives the required parameter condition

$$\alpha \geq 1/3.$$

Therefore, as long as α is sufficiently large, there exists an equilibrium in which the players allocate evenly each period.

Equal split with MWC. Next, we consider the possibility that there exists a SSPE in which an AS and a MWC partner split the allocation evenly each period, excluding another player.

In equilibrium, each period the AS and MWC partner receive

$$\frac{1}{2} - \alpha\frac{1}{2}\frac{1}{2} = \frac{2 - \alpha}{4},$$

and the excluded player receives

$$-\beta\frac{1}{2}\frac{1}{2} = -\frac{\beta}{4}.$$

From an ex ante perspective, the expected per period utility for each player is

$$\frac{1}{3} - \frac{2}{3}\alpha\frac{1}{2}\frac{1}{2} - \frac{1}{3}\beta\frac{1}{2}2\frac{1}{2} = \frac{2 - \alpha - \beta}{6}.$$

Consider the baseline model, where the AS is randomly selected each period. For equal division between an AS and MWC to be an equilibrium, the AS must prefer such an allocation to any alternative.

It is straightforward to show that an AS prefers equal division with a MWC to any success allocation that gives more than 1/2 to a MWC:

$$\frac{2-\alpha}{4} + V_{AS} \geq 1 - a_m - \frac{1}{2}\alpha(1-a_m) - \frac{1}{2}\beta(a_m - (1-a_m)) + V_{AS},$$

where V_{AS} is the expected payoff to the current period AS from future periods, if the current period proposal passes. V_{AS} depends on which one of the games is being played. This inequality simplifies to

$$2a_m(2-\alpha+2\beta) \geq 2-\alpha+2\beta.$$

Given that $\alpha, \beta < 1$, this further simplifies to

$$a_m \geq 1/2.$$

Thus, the AS always prefers $a_m = 1/2$ to $a_m > 1/2$ when splitting only with a MWC.

She must also prefer such an allocation to any allocation that gives $a_m < 1/2$ to a MWC partner if

$$\frac{1}{2} - \frac{1}{2}\alpha\frac{1}{2} + V_{AS} \geq 1 - a_m - \frac{1}{2}\alpha(2(1-a_m) - a_m) + V_{AS}.$$

This condition simplifies to

$$2a_m(2-3\alpha) \geq 2-3\alpha,$$

and given that $a_m < 1/2$, it further simplifies to the required condition that

$$\alpha \geq 2/3.$$

The AS must also prefer to allocate evenly with only a MWC rather than to allocate evenly amongst the grand coalition. This is the case if

$$\frac{1}{2} - \frac{1}{2}\alpha\frac{1}{2} + V_{AS} \geq 1/3 + V_{AS} \rightarrow \alpha \leq 2/3.$$

This implies that, except for a knife edge case where α is exactly 2/3, the two conditions cannot be simultaneously satisfied. It is unreasonable to believe that the knife edge condition is satisfied.[2] Therefore, we conclude that incorporating other regarding preferences a la Fehr and Schmidt (1999) cannot lead to equal division with a MWC being consistent with SSPE in the baseline game.

Finally, we must establish that the other players would accept an allocation of equal division amongst a grand coalition, if the AS were to deviate from equal division with a MWC to make such a proposal. (Otherwise the AS's preference for such an allocation over equal division with a MWC is not an acceptable deviation.)

A player votes in favor of equal division if

$$1/3 + V_i \geq \left(\frac{2-\alpha-\beta}{6}\right)\left(\delta + \frac{1}{1-\gamma}\right),$$

[2]Assuming that the common α is the realization of any continuous distribution with no mass points implies that $\alpha = 2/3$ is a zero probability event.

where V_i is the player's expected future payoff from the proposal passing. V_i depends on the game, and whether we are considering symmetric or asymmetric SSPE.

In the baseline game and the symmetric SSPE of the Endogenous Power game (where reelection does not occur as part of equilibrium for the same reasons it did not occur originally), $V_i = (2 - \alpha - \beta)/6$ and the required inequality simplifies to

$$1/3 \geq \frac{2-\alpha-\beta}{6}\delta \rightarrow 2(1-\delta) + (\alpha+\beta)\delta \geq 0\delta,$$

which is clearly satisfied given $0 < \alpha, \beta, \delta < 1$.

In the asymmetric SSPE of the Endogenous Power game (where the equilibria are of the structure considered in the earlier subsection on asymmetric equilibria), $V_i = (1/2)\gamma/(1-\gamma)$ for the player that is included in the AS's MWC strategy, and $V_i = 0$ for the player that is excluded. The included player will clearly support the equal division within a grand coalition deviation, rather than risk a player that excludes him being selected as AS in the future.

The above analysis rules out SSPE with equal shares to the AS and a MWC for the Random Power and Endogenous Power games.

2. Instructions and the walk-through screenshots for Endogenous Power treatment

2.1. **Instructions.** This is an experiment in the economics of decision making. The instructions are simple. If you follow them carefully and make good decisions you may earn a considerable amount of money which will be paid to you at the end of the experiment. The currency in this experiment is called tokens. The total amount of tokens you earn in the experiment will be converted into US dollars: 10 Tokens = $1. You will also get a participation fee upon completion of the experiment.

General Instructions

(1) In this experiment you will be playing 8 Matches. During each Match, you will be randomly assigned an ID and you will be asked to make decisions over a sequence of Rounds.

(2) The number of Rounds in a Match is randomly determined as follows:

You will play every Match in blocks of 4 Rounds. Even though you will complete all 4 Rounds in each block you play, not all Rounds in a block will necessarily count towards your earnings for the Match.

The *first* Round in a Match will always count towards your earnings for that Match. Whether any of the following ones will count will be randomly determined according to the **"70% rule:"** after each Round that counts towards your earnings in a match, there is a 70% chance that the next Round will also count towards your earnings in a Match. The computer will determine this by randomly choosing a number between 1 and 100. If the number is less or equal to 70 then the next Round will also count towards your earnings for this Match.

Note however, that this random draw is done **"silently."** That is, you will play all four Rounds in a block but you will only find out at the end of the block which Rounds actually count towards your earnings for this Match. If each random draw the computer makes in a block is less or equal to 70, then you will move to the next block of 4 Rounds and so on. **Your earnings for a Match consist of the sum of all your earning over all the Rounds up until the computer drew a number above 70 for the first time in the Match.** The Match ends after the last Round of the block in which the computer drew a number above 70 for the first time.

(3) Once a Match ends, you will be randomly and anonymously rematched with two other people in this room to start a new Match. Each member in the group will again be randomly assigned an ID number. Thus, while your ID remains the same over Rounds *within* a Match, it is very likely to vary from Match to Match and you will not be able to identify who you've interacted with in previous or future Matches.

(4) **What Happens in Each Match**

- At the start of each Match, one of the three members in your group will be randomly chosen to be the Proposer.
- Step 1: The Proposer's task is to propose how to split a budget of 200 tokens between himself and the two other members of his/her group.
- Step 2: Once the Proposer has submitted a budget proposal, all members of your group will observe the budget proposal and will vote on it.
  - (a) If a proposal receives a **simple majority of votes** (i.e. two or more members in your group vote in favor of the proposal), then the proposal passes and for this Round the earnings for each of you in the group will correspond to the number of tokens offered to them in that proposal.
  - (b) If a proposal receives **fewer than 2 votes** then it is defeated. If a proposal is defeated, you will remain in the same Round, but the computer will then randomly choose one of the three members of your group to be the "new" Proposer. Each member of your group (including the previous proposer) has the same chance of being chosen (1 in 3). Whoever is chosen will submit a new proposal. However, the number of tokens to be divided will be reduced by 20% relative to the preceding proposal and rounded to the nearest integer. Thus, if the first proposal is rejected, then after a "new" Proposer is randomly selected, his/her proposal will involve splitting 160 tokens. If this proposal is rejected, again a "new" proposer will be chosen and his/her proposal will involve splitting 128 tokens, etc... This goes on until a proposed allocation gets 2 or more votes and passes.

Once a proposal receives two or more votes (whether right away or after a delay), you will then vote on whether or not you wish to keep the Proposer who submitted the successful proposal in place for the next Round, which you will play with the same groups of 3. If a simple majority of members vote in favor of the Proposer (i.e. at least 2 of the three members), then he/she remains Proposer for the next Round. If the Proposer was defeated, then a new Proposer is drawn (each member has a 1 in 3 chance of being selected) for the next Round. **After the vote on the Proposer, the budget restarts at 200 tokens and you return to Step 1. This process repeats itself until a Match ends, which is determined by the 70% rule described above.** Once a Match ends, you will start a new Match and will be randomly re-matched to form new groups of three. Remember: while your ID remains the same over Rounds *within* a Match, it is very likely to vary from Match to Match.

(5) **Communication:** In each Round, before the Proposer submits his/her proposal, members of your group will have the opportunity to communicate with each other using a chat box. The communication is structured as follows. On the top of the screen, each member of the group will be told her ID number. You will also know the ID number of the Proposer. Below you will see a box, in which you will see all messages sent to either all members of your group or to you personally. You will not see the chat messages that are sent privately to other members of your group. You can type your own message and send it to one or both members of your group, and only the person(s) you select as recipient(s) will receive your message. The chat option will be available until the Proposer submits his/her proposal. At this moment the chat option will be disabled.

(6) Remember that in each Match subjects are randomly matched into groups and the ID numbers of the group-members are randomly assigned. Thus, while your ID remains the same over Rounds *within* a Match, it is very likely to vary from Match to Match.

(7) **Your Payment:** You will each receive a show-up fee. In addition, at the end of the experiment, the computer will randomly choose one out of 8 Matches that you played. You will be paid for ***all the Rounds that actually counted towards your payment within that Match*** (determined according to the 70% rule).

(8) **Screenshots:** We will now slowly go through different screenshots so you can familiarize yourself with the types of screens you'll be seeing. The examples we are about to go through are not meant to show you what you ought to do in this experiment but are just there to show you on screen the different possible stages of a Match. Please raise your hand if you have any questions about the experiment and/or interface.

2.2. **Walk through screenshots in Endogenout Power treatment.** We are now going to go through what a Match may look like. These screenshots were generated by us and were not the result of actual lab participants. We chose these randomly and nothing you see here is an indication of what you ought to do in this experiment.

We will start by showing you what the screens look like and at the end show you what chat messages may look like.

PICTURE 1 HERE

This screen is the screen that each proposer sees. On the top center you will be able to see which Round and Match you are in. You will also be able to see what your member number is.

The large box top left is the "Message Window." In this message window you will be able to see all the messages that you wrote to someone and all the messages for which you were at least one of the recipients. You will not see the messages that were not sent to you. That is, you will not see the messages that were sent privately between the two other members in your group.

Below the “Message Window" are a number of other windows. These are the windows you will use if you want to send messages of your own. You will select who to send the message to, whether it is one or both other people you are paired with. You select who to send a message to by clicking on the ID number corresponding to that member and then selecting “Add." If you chose to write to both members you can simply click “Add All." You can type your message in the “Send Message" box. When you are ready you can send the message by clicking “send." The person or people you send the message to will then see it appear on his/her/their screens. Only the member(s) you send the message to will see it. The other will not know that a message was even sent.

On the right-hand side of the screen, the proposer will be reminded of the number of tokens he/she has to divide. In this case it is 200. The proposer will choose how much to allocate to each member of the group. Proposers can directly type their allocations in each box under A1 (amount allocated to member 1), A2 (amount allocated to member 2) and A3 (amount allocated to member3). Proposers can clearly see how much theyâĂŹve allocated to themselves because their box is highlighted in RED. Here the Proposer is Member 3 and so the third box is highlighted in red.

If you are the proposer, when you are done communicating and have decided on a budget allocation you can click on the “submit" button. Once you click the “submit" button, all communication stops and all members of the group move onto the voting stage.

Finally, at the bottom of the screen you will see your entire history of successful proposals. You can return to the history of earlier matches by simply clicking on the tab corresponding to that Match.

We are now going to show you the screen that non-proposers face.

PICTURE 2 HERE

This screen is the screen that each non-proposer sees. Just like the screen for proposers, each non-proposer can send messages either to both or only one of the members in his/her group. Just as is the case for proposers, each non-proposer will only see the messages for which he was either the sender or a recipient. Similarly, if a non-proposer sends a message, only the member(s) that he selected as recipient(s) will see the message. At the bottom of their screens, proposers can also see the history of successful past proposals.

Notice that you will know who the proposer is from this part of the screen because “Proposer" will be written in parenthesis next to the ID number of the proposer.

PICTURE 3 HERE

When the proposer has submitted his/her proposal, each member of the group will see a screen like this one. You will be shown how much each member was offered.

Note that for each of you the box highlighted in RED is the box that corresponds to the allocation to you.

Click on Yes to vote in favor of the allocation and No to vote against.

PICTURE 4 HERE

If a budget proposal fails, you will see a screen like this one in which you are told that the proposal failed. The computer will draw one member of your group to be the new proposer with each of you having 1/3 chance.

PICTURE 5 HERE

The new proposer faces a similar screen as the one described before, but this time he/she has 20% fewer token to be distributed, as shown on the top right part of the screen. Again members can communicate up until the new proposer submits his or her proposal.

PICTURE 6 HERE

If the proposal passes you will then see a screen that shows you the result of the vote and asks you whether you wish to keep the same proposer in place. Click Yes to vote in favor of keeping the same proposer in place for the next Round, click No to have a new random draw for the next proposer with each person in your group having the same chances of being selected (1 in 3). You will then move onto the next Round and the budget will restart at 200 tokens with either the same or a different proposer depending on the outcome of the vote on keeping the proposer in place and on the random draw for a new proposer if the original proposer was voted down.

PICTURE 7 HERE

When a block of 4 Rounds is over, if you are to continue for another block of 4 Rounds you will see something similar to this screen. In this case the Match is to continue for another block of 4 Rounds. You can see the history of play.

The next block of 4 Rounds will automatically start shortly after you see this screen. You will play several Rounds until a Match is over, as determined by the 70% rule.

This process repeats itself until all 10 matches are complete.

We will now show you what chats can look like on your screen.

PICTURE 8 HERE

Recall that you only see a chat message if (1) you sent it or (2) you were at least one of the recipients. You will be able to see who sent you a message and you will be able to see who was listed as a recipient. If you send a message to someone else, it will also appear in this window.

In other words, each player in this game will see the messages that he/she sent and also the messages that he or she received. You will not see the messages exchanged privately between the other members of your group.

Are there any questions?

3. Additional Empirical Analysis

3.1. **Analysis using all matches.** In this section we present empirical analysis of our data using first four cycles of all matches, rather than the last four matches. Qualitative results reported in the paper remain the same with slightly higher noise due to the learning in the first four matches of the experimental sessions.

3.1.1. *Behavior and bargaining outcomes across cycles.* We start by documenting persistence of power across cycles in the Endogenous Power game. Our data show that the vast majority of committees in the Endogenous Power treatment operate with the same agenda setter in all four cycles of the first block in all matches: this happens in 88.2% of all cases. In contrast, in the Random Power treatment, this happens only in 8.8% of the time. The number of cycles in which the same agenda setter holds onto power directly affects his/her long-run payoff in the game. In the Endogenous Power treatment, the first agenda setter in a match earns, on average, 417.7 tokens compared with 355.6 tokens for the first agenda setter in the Random Power treatment (these are significantly different, $p < 0.001$).

We next turn to evolution of coalitions across cycles. The persistence of coalition types is also something that is unchanged when expanding the sample to include all matches, as the table 5 below shows.

Our data show that when an agenda setter retains her seat in two consecutive cycles, the chances that she will re-invite the same non-proposer in her coalition are 76.7% and 87.6% in the Random Power and Majority Support treatments. A series of tests of probability show that these percentages are significantly higher than 50%, which means that agenda setters who are forming minimum winning coalitions are not choosing their coalition partners randomly.[3] That is, minimum winning coalitions tend to be stable across cycles. Additionally, our data indicate that the shares of those coalition partners stay the same across cycles in 95.6% and 89.3% of the cases in the Random Power and Endogenous Power treatments, respectively. Thus, not only are coalitions stable regarding the identity of coalition members, but when that is the case, the shares given to the coalition partners also are largely constant. In other words, agenda setters seek stability.

Table 1. Transition of coalition types across cycles using all matches

	Cycle $c+1$			
	Random Power		Endogenous Power	
	MWC	Grand	MWC	Grand
Cycle c				
MWC	0.84	0.16	0.94	0.06
Grand	0.08	0.92	0.08	0.91

3.1.2. *Bargaining outcomes within a cycle.* Using all matches we document that 96.7% and 99.5% of proposals pass without delay in the Random Power and the Endogenous Power treatments, respectively.

[3] In both the Random Power and Endogenous Power treatments we obtain $p < 0.001$.

TABLE 2. Coalition types for proposals that passed without delay using data from all matches, by treatment

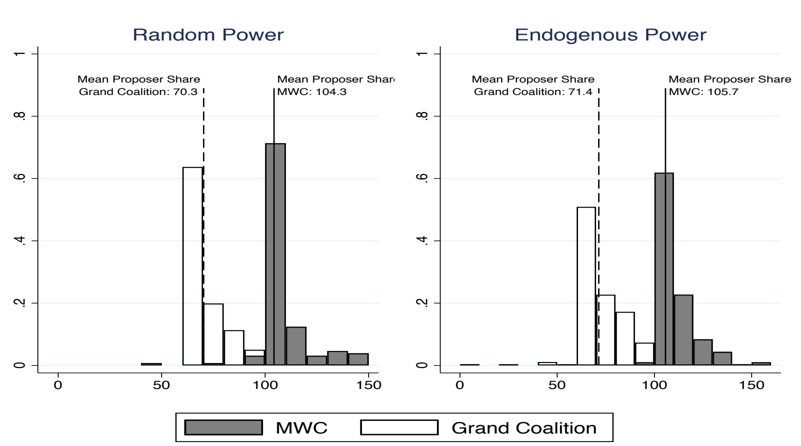
	Random Power	Endogenous Power
Coalition type		
Dictator (1-person coalition)	0.0%	0.0%
MWC (2-person coalition)	24.5%	52.2%
Grand (3-person coalition)	75.5%	46.6%
Allocations within coalitions		
Equal split (% among MWC)	74.4%	62.2%
Equal split (% among Grand coalitions)	78.6%	63.0%

As is the case when restricting to the last four matches, the fraction of grand coalitions in the Random Power treatment is higher than in the Endogenous Power one ($p = 0.025$). Also similarly to the restricted sample, proposers in grand coalitions appropriate a smaller share of resources than those that form minimum winning coalitions ($p < 0.001$ within each treatment).

Comparing across treatments, unlike in the restricted sample, the shares of the agenda setters in the Random Power treatment are no different than in the Endogenous Power treatment ($p = 0.339$ for MWCs and $p = 0.207$ for grand coalitions). This suggests that agenda setters' behavior evolves over the course of the game, and that it is over the course of time that they become more aggressive in how much they request for themselves.

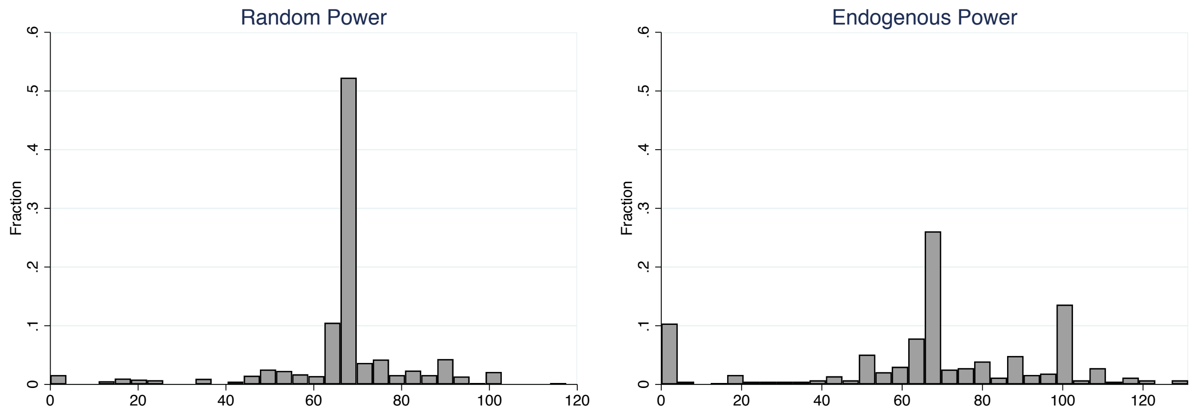
Figure 1 shows the histograms of shares received by agenda setters conditional on coalition type in each of our treatments.

FIGURE 1. Agenda Setters' shares in proposals that passed without delay



3.1.3. *Long-run payoffs.* There are no differences when comparing the long run payoffs of committee members in the entire and restricted sample. In both samples, average long-run shares in the Random Power treatment are concentrated at 66.7, while they are tri-modal in the Endogenous Power treatment.

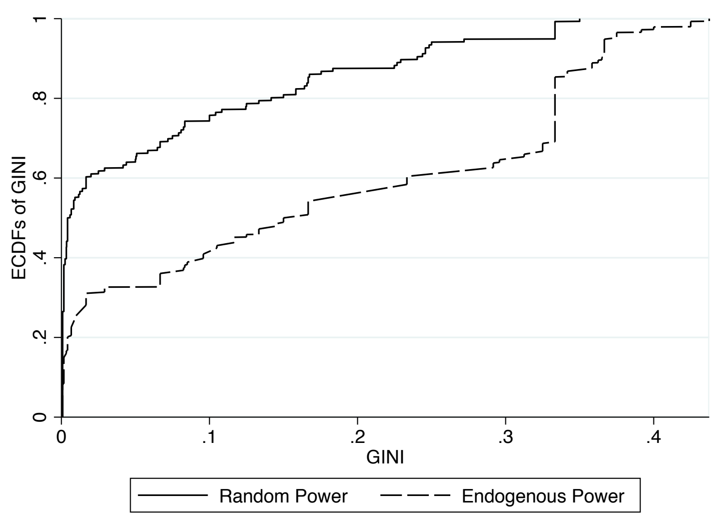
FIGURE 2. Long-run payoffs of committee members using all the data, by treatment



A Kolmogorov Smirnov test shows that the distributions are different ($p = 0.072$).

As evident from Figure 6, the Random Power treatment features a much more equal distribution of long-run payoffs compared to the Endogenous Power treatment ($p < 0.001$ for a Kolmogorov-Smirnov test).

FIGURE 3. Empirical cumulative distribution functions of the GINI coefficients by treatment



3.1.4. *Effects of communication on equilibrium selection.* In the extended sample, as in the restricted one, our subjects use the communication tool very often: in the Random Power treatment, 86% of groups (117 out of 136) engage in conversations with each other before budget proposals are submitted during the first block of interactions in experienced cycles. In the Endogenous Power treatment, this fraction is 94% (136 out of 144 groups).

Figure 4 in the main text as well as the discussion pertaining to it already contain information on the first matches in addition to the experienced cycles. However we redo the GLS regressions showing how conversations between members of a group affect the size of the coalition that the proposer forms. The dependent variable is an indicator of proposing a minimum winning coalition in the first cycle of the first block. The right-hand side variables include the match number to capture learning effects as well as indicators of the four types of messages described above. The likelihood of forming a minimum-winning coalition increases substantially in both games when proposers receive private communication from one of the members with a message containing a "selfish" motive. Moreover, in both treatments, proposers are less likely to form minimum winning coalitions when some group members talk about fairness and equality using a public chat message.

TABLE 3. Effect of Conversations on Coalition Size

	Random Power	Endogenous Power
Indicator for Fair Public message this Cycle	$-.11^{**}$ (0.05)	-0.17^{***} (0.03)
Indicator for Fair Private message this Cycle	-0.00 (0.10)	-0.20^{**} (0.09)
Indicator for Selfish Public message this Cycle	omitted	-0.01 (0.34)
Indicator for Selfish Private message this Cycle	0.41^{***} (0.15)	0.51^{***} (0.07)
Match	0.01 (0.01)	0.03 (0.03)
Constant	0.13^{*} (0.08)	0.16^{***} (0.05)
# of observations	136	144
# of subjects	47	49
R-square overall	0.38	0.349

Notes: Errors are clustered at the session level. ***, **, * show significance at 1%, 5% and 10% levels.

Conversations between members of a group also affect the likelihood of proposing a coalition with equal shares to coalition members conditional on the coalition size. In particular, in the Random Power game, we observe a 25% increase in the fraction of coalitions in which resources are divided equally between all members of the coalition (be that MWC or grand coalition) in response to group conversations that discuss fairness and equality. Similarly, this increase is equal to 26% in the Endogenous Power game.[4]

Overall, analyses of the chats suggest that communication serves as a coordination device for equilibrium selection between group members. Proposers take these conversations seriously (despite chats being cheap talk) and respond to them regarding both coalition size and the division of resources within a coalition.

[4]Specifically, in Random Power game, the probability of proposing allocation with equal shares to all coalition members is 86.4% when group conversations involved discussing fairness and equality, while such fraction is only 61.8% absent such discussions. This difference is significant at the 1% level ($p < 0.001$). Similarly, in Endogenous Power game, the probability of proposing allocation with equal shares to all coalition members is 75.4% when group conversations involved discussing fairness and equality, while such fraction is only 49.4% absent such discussions. These differences are significant ($p = 0.002$).

3.2. **Robustness check on definition of "trivial" share.** In the main text we consider a share non-trivial if it is greater than 5 tokens. Here we reproduce the tables and graphs in our analyses when we define non-trivial as shares that are greater than 2 tokens instead (since 200 tokens cannot be truly equally split we cannot repeat the analysis with a stricter definition that would use 0 as trivial since that would automatically imply no equal splits in grand coalitions).

We note that empirically, coalition type is unchanged by lowering the cutoff for "trivial" share. In other words, coalitions in our main text that are identified as minimum winning or grand are equally identified as minimum winning or grand when we vary the cutoff for what constitutes a trivial amount. The only result that changes (qualitatively) is the fraction of equal splits within a coalition type. However, the message is unchanged. We present the new statistics below.

In Table 4 we present the distribution of coalition types for proposals that passed without delay when a non-trivial share is defined as greater than 1 token.

As is the case in the main text, equal-split allocations within coalition types are very prevalent.

TABLE 4. Coalition types for proposals that passed without delay, by treatment

	Random Power	Endogenous Power
Coalition type		
Dictator (1-person coalition)	0.0%	0.3%
MWC (2-person coalition)	27.9%	57.8%
Grand (3-person coalition)	72.1%	41.8%
Allocations within coalitions		
Equal split (% among MWC)	80.8%	56.0%
Equal split (% among Grand coalitions)	68.8%	46.7%

3.3. **Analysis for early matches.** In this section we present empirical analysis of the behavior and outcomes in the early matches and discuss the learning effect.

3.3.1. *Behavior and bargaining outcomes across cycles.* We start by documenting persistence of power across early matches in the Endogenous Power game. Our data show that the vast majority of committees in the Endogenous Power treatment operate with the same agenda setter in the first block of four cycles in the early matches just like in the last four (or all) matches: this happens in 84.7% of all cases. In contrast, in the Random Power treatment, this happens only in 8.8% of the time. The number of cycles in which the same agenda setter holds onto power directly affects his/her long-run payoff in the game. In the Endogenous Power treatment, the first agenda setter in a cycle earns, on average, 319.0 tokens compared with 285.5 tokens for the first agenda setter in the Random Power treatment (these are significantly different, $p < 0.001$).

We next turn to evolution of coalitions across cycles. The persistence of coalition types remains present even in the very early matches, as the table below shows.

Our data show that when an agenda setter retains her seat in two consecutive cycles, the chances that she will re-invite the same non-proposer in her coalition are 73.3% and 85.1% in the Random Power and Endogenous Power treatments. A series of tests of probability show that these percentages are significantly higher than 50%, which means that agenda setters who are forming minimum winning coalitions are not choosing their coalition partners randomly.[5] That is, minimum winning coalitions tend to be stable across cycles. Additionally, our data indicate that the shares of those coalition partners stay the same across cycles in 94.6% and 90.9% of the cases in the Random Power and Endogenous Power treatments, respectively. Thus, not only are coalitions stable regarding the identity of coalition members, but when that is the case, the shares given to the coalition partners also are largely constant. In other words, agenda setters seek stability.

We note some differences when comparing the early and later matches. These differences exist in the Endogenous Power treatment: in the experienced cycles the shares of the coalition partners are less likely to be identical to the previous cycle (94.6% in the early cycles, and 85.4% in the experienced cycles.)

TABLE 5. Transition of coalition types across cycles using early matches only

	Cycle $c+1$			
	Random Power		Endogenous Power	
	MWC	Grand	MWC	Grand
Cycle c				
MWC	0.80	0.20	0.93	0.07
Grand	0.06	0.94	0.10	0.90

3.3.2. *Bargaining Outcomes within a cycle.* Using the first four matches we document that 97.1% and 99.3% of proposals pass without delay in the Random Power and the Endogenous Power treatments, respectively. These numbers are statistically no different than during experienced cycles (the p-values on tests of probability are greater than 0.10 in both cases).

There are statistical differences when we compare the types of proposals that pass in the early cycles and the experienced cycles. Over time, proposals in both treatments become shift towards MWCs and away from Grand coalitions (the highest pvalue is 0.076). In addition, in all cases aside from the Endogenous Power treatment in the Grand coalitions, among MWCs and Grand coalitions there are fewer equal splits as the game progresses (the highest pvalue is 0.057).

Figure 1 shows the histograms of shares received by agenda setters conditional on coalition type in each of our treatments in the first four cycles.

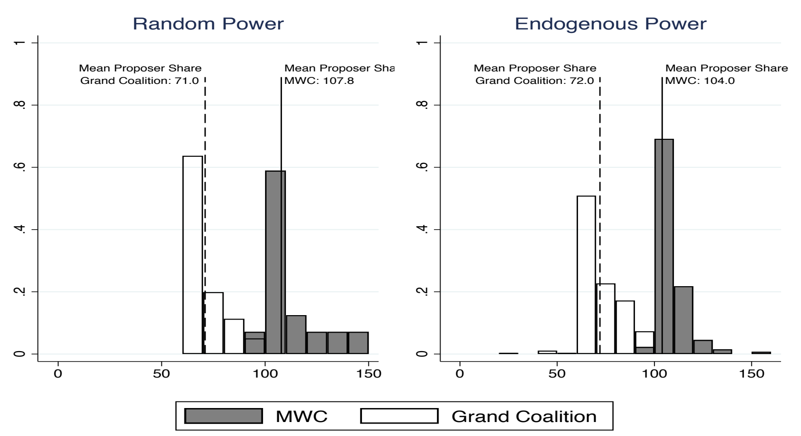
3.3.3. *Long-run payoffs.* There are no differences when comparing the long run payoffs of committee members between the early and experienced matches ($p > 0.10$ in both cases for a Kolmogorov-Smirnov test). In both cases, average long-run shares in the Random

[5]In both the Random Power and Endogenous Power treatments we obtain $p < 0.001$.

TABLE 6. Coalition types for proposals that passed without delay using data from the first four matches, by treatment

	Random Power	Endogenous Power
Coalition type		
Dictator (1-person coalition)	0.0%	0.0%
MWC (2-person coalition)	21.2%	46.5%
Grand (3-person coalition)	78.8%	53.5%
Allocations within coalitions		
Equal split (% among MWC)	66.1%	69.9%
Equal split (% among Grand coalitions)	74.5%	61.4%

FIGURE 4. Agenda Setters' shares in proposals that passed without delay



Power treatment are concentrated at 66.7, while they are tri-modal in the Endogenous Power treatment.

A Kolmogorov Smirnov test shows that the distributions are different ($p = 0.014$)

As evident from Figure 6, in the early matches as well the Random Power treatment features a much more equal distribution of long-run payoffs compared to the Endogenous Power treatment ($p < 0.001$ for a Kolmogorov-Smirnov test). There are no differences in the distributions within treatment whether one looks at the first four or last four cycles ($p > 0.10$ for a Kolmogorov-Smirnov test in both cases).

Figure 5. Long-run payoffs of committee members in the early cycles, by treatment

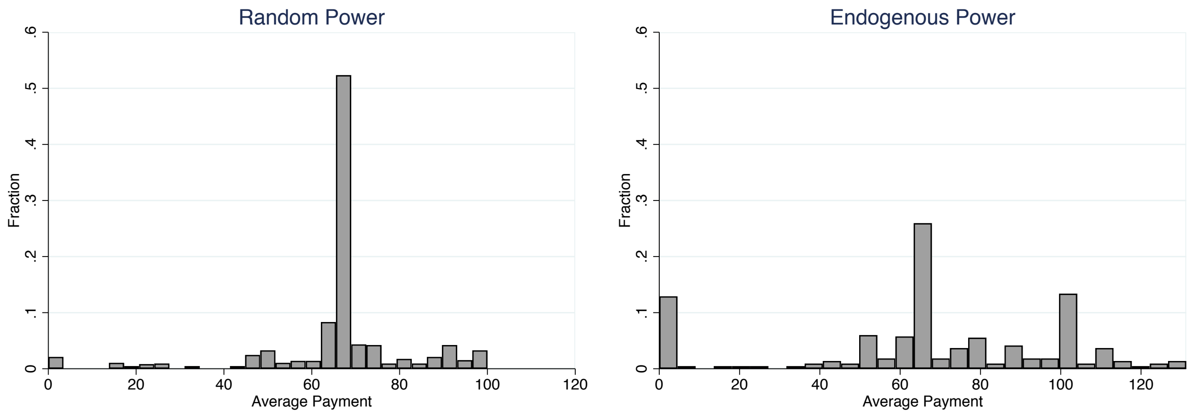


Figure 6. Empirical cumulative distribution functions of the GINI coefficients by treatment