Recognition for Sale

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Abstract

I examine the consequences of letting players lobby for bargaining power in a multilateral bargaining game. In each period, players lobby for the right to propose an offer. All players incur the cost of their lobbying, but only the player with the highest score is chosen to be the proposer. If other players vote according to a majority or supermajority voting rule that falls short of unanimity, then the first proposer captures the entire surplus regardless of lobbying costs and patience. If a full consensus is needed for an offer to be accepted, then the first proposer shares the surplus with at most one other player, but as the period length between offers vanishes, one player captures virtually the entire surplus. Selling bargaining power adversely affects equity and may generate inefficiency.

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1 Introduction

Motivating Question: Consider a group of players that is deciding how to divide resources. This group may be a legislature choosing which projects should be funded and how to divide pork, political parties choosing how to form a government in a parliamentary system, countries choosing the terms of international treaties, or divisions of a company choosing the path forward in corporate restructuring. Members of this group negotiate over time and the agreement that they reach reflects their balance of bargaining power and influence. Individuals influence the process in a number of ways; for some players, their influence may involve being able to vote on or veto proposals on the table. But a more direct, important, and immediate way to influence negotiations is controlling which proposals are put to a vote in the first place. This is the core of *agenda-setting* power: by deciding which proposals are considered, an agenda-setter can steer negotiations to her advantage.

How is agenda-setting power determined? In practice, one sees a range of procedures across groups and organizations, but one process that appears prevalent is that of proposers being nominated or backed by the chair, CEO, or leader of the organization. In an ideal world with strong institutions, the leader screens proposals and proposers on the basis of their equity and efficacy. But this process may be corrupted: conceivably, the leader may respond to the lobbying efforts of individuals, and nominate people who have lobbied most effectively for bargaining power. More starkly in some settings, the leader may even sell agenda setting power in exchange for favors or payments to the highest bidder. If agenda-setting power can be auctioned off, then some may be advantaged in the financial and social resources that they can levy towards bargaining power. These advantages influence who has power today and who is likely to have it in the future. The aim of this paper is to understand how the ability to buy or compete for agenda-setting power influences which agreements are reached and the fraction of resources that are devoted towards this race.

Framework and Results: I study this issue using non-cooperative bargaining models in the spirit of Rubinstein (1982). Agenda-setting power in this literature is connected to "recognition": being the proposer confers a player with a *temporal monopoly* to make a proposal and credibly convey to others that they should accept the current offer or bear the cost of delay. In studies of both bilateral and multilateral bargaining, this recognition rule is a primitive of the framework: whereas some studies focus on deterministic protocols—for example, Rubinstein's alternating-offer protocol—others treat it as a stochastic process.[1] Importantly, recognition cannot be influenced by

[1] For example, in the canonical framework of Baron and Ferejohn (1989), in every period, each player i is recognized with probability p_i (typically $1/n$), independently of the past history. Several papers, including Merlo and Wilson (1995), Simsek and Yildiz (2009), Ortner (2013), and Ali, Bernheim, and Fan (2014) consider a more general stochastic process for recognition in which the probability of recognition may be serially correlated.

the actions of players engaged in negotiations.

In contrast, I study a setting where in each period, three or more players lobby for recognition in an all-pay auction, and the winner of the auction is recognized to be the proposer for that period. This proposer proposes a division of the surplus, and for her proposal to pass, some coalition (e.g. simple majority) of players must agree to the proposal. All players anticipate future bidding behavior and future agreements that may be reached in deciding what to propose, accept, or reject.

Naturally, one anticipates that selling bargaining power would only foster inequality, especially if players are heterogeneous. The implications for equilibria are severe:- the first proposer captures the *entire surplus* for every voting rule in which no player has veto power. This degenerate bargaining outcome is invariant to heterogeneity in patience, head-starts, and costs of lobbying. When players are heterogeneous in their ability to lobby the chair, or in their budgets, then only the richest or most powerful player expects a strictly positive surplus, and all other players dissipate their rents in the race for recognition. Selling bargaining power discourages players from sharing resources with others, and fosters "winner-take-all" behavior in negotiations.

This result emerges cleanly from combining the effects of competition in all-pay auctions with the dynamics of bargaining. From the study of all-pay auctions (particularly Siegel 2009), we know that not more than a single player anticipates having a positive surplus after the race for a prize. From models of dynamic bargaining with a non-unanimous voting rule (e.g. Baron and Ferejohn 1989), we know that a proposer forms a minimal winning coalition and excludes those who have a stronger motive to delay agreement. Combining these forces, a proposer forms a winning coalition with players who anticipate that in the event of disagreement, they dissipate their future surplus entirely in future competition.

That the proposer captures the entire surplus intensifies the competition for recognition, and increases the surplus that the leader extracts as an auctioneer of recognition rights. This result has several implications:

1. It makes no difference as to whether the recognition rights being sold are *transitory* (for one period alone) or *permanent*, since both result in the same outcome.

2. If an individual's benefits from her share of the surplus are concave, the unequal division of resources may be inefficient from a utilitarian standpoint.

3. Imposing hard constraints on how much players can bid or lobby for recognition may reduce inequality (and thus enhance efficiency).

4. Institutional restrictions that limit how much recognition can be sold reduces inequality: the more bargaining power that can be sold, the more unequal is the division of surplus.

Above I discussed the implications of lobbying when no player has veto power, as is the case with a simple majority voting rule. A unanimous voting rule improves sharing by only a limited degree: the proposer shares the surplus with at most one other player. Interestingly, as negotiations proceed frequently (i.e. as the period length converges to 0), the player who finds it least costly to lobby captures the entire prize, even if she is not the first proposer. Thus, the results on how lobbying for power can engender inequality are more general than non-unanimous voting rules.

These results pertain to an extreme case in which the leader can sell or influence bargaining power in its entirety. In many settings, one envisions institutions, norms, or the rules of the game that restrict the leader to be able to influence only a fraction of bargaining power. Based on this idea, I consider a setting that bridges the standard legislative bargaining framework (Baron and Ferejohn 1989) and the all-pay auction: I assume that the leader can only influence a fraction λ of bargaining power, and the winner of the lobbying in a particular round gains this advantage. At $\lambda = 0$, the game corresponds to that of Baron and Ferejohn (1989) in which recognition is symmetric and i.i.d., and at $\lambda = 1$, the game corresponds to the all-pay auction described above. I find that the inequality of the final distribution strictly increases in λ and that there is more rent dissipated in lobbying for power. Although increases in patience and the voting threshold have no impact on inequality or rent dissipation at $\lambda = 1$, these primitives do have a moderating effect once the leader is restricted in how much he can influence the distribution of bargaining power.

These results on the deleterious effects of selling bargaining power in groups are useful for two reasons. First, these results help identify the challenges that groups and organizations face when they lack institutions, mechanisms, and transparency to prevent power being allotted in this way. Second, these results enhance our understanding of what might hypothetically happen were agenda-setting power sold in this fashion, and appreciate institutions, procedures, and social conventions that impede it from being sold. Institutions of transparency and accountability coupled with the stigma of selling bargaining power make it difficult for a leader to do so, and my results may help us understand how such institutions promote equity and efficiency.

I illustrate these results using a two period model with three individuals in Section 2. Section 3 offers a general analysis with non-unanimous and unanimous voting rules, and discusses the implications of these results. Section 4 offers a framework that bridges Baron and Ferejohn (1989) and the model of Section 3 and delivers comparative statics on the implications of restricting how much proposer power can be sold. Section 5 extends the results to the case of bidding caps, history-dependent lobbying costs, and first-price auctions. All omitted proofs are in Appendix A.

Related Literature: In understanding the impact of lobbying on bargaining power, my work relates to a literature on how the legislative process may be influenced by special interest groups.[2] Typically, in this literature, lobbyists offer bribes to legislatures to vote or to propose legislation in favor of the lobbyist. My paper shares the same motive in understanding the implications of lobbying, but studies a different domain for influence.

I build directly on Baron and Ferejohn (1989), in which each player is recognized to be the proposer with a constant probability in each period. This paper has served as a "work-horse" model for political economy, being extended and applied in many directions.[3] The most closely related paper is Yildirim (2007), which develops a framework for multilateral bargaining in which players can exert costly effort, and the proposer is determined stochastically according to a "contest success function," following the rent-seeking literature.[4] In this setting, he studies how players with the same cost of effort compete if they have different time preferences, and analyzes which voting rules induce the greatest rent dissipation. Also related, Yildirim (2010) studies under an unanimity voting role as to how *transitory recognition*—in which players compete for recognition in each period (as in this paper)—compares to *persistent recognition*—in which there is a single lobbying stage that determines recognition probabilities throughout the bargaining game.

My approach is complementary to his work as I model the race for recognition differently. Instead of using a stochastic contest success function, I model lobbying through an all-pay auction, which conditional on the lobbying efforts selects a winner deterministically so long as there are no ties. The auction format generates very different implications for equity, in terms of the first proposer capturing the entire surplus regardless of patience for every non-unanimous voting rule. How recognition is awarded also has different implications for rent dissipation, and implies that in this setting, there is no difference between selling transitory and permanent recognition. Closer to his work is the setting in Section 4 in which limits are imposed as to how much bargaining power can be sold; therein, I find similar results on how patience or the voting rule influences rent dissipation.

Also closely related is Board and Zweibel (2012), who analyze a finite-horizon bilateral bargaining framework in which players are budget-constrained, and recognition in each period is awarded according to a first-price auction. The key distinctions are that I focus on multilateral bargaining games with non-unanimous rules, whereas they are studying tradeoffs that players face when they have an intertemporal budget and an unanimity rule. To facilitate comparison to their work, I discuss the implications of having a first-price auction with and without budget constraints, and

[2]See, for example, Snyder (1991), Groseclose and Snyder Jr (1996), Grossman and Helpman (2001), Helpman and Persson (2001), Dal Bó (2007), and Dekel, Jackson, and Wolinsky (2009).

[3]See Eraslan and McLennan (2013) for a discussion of the many papers that build on Baron and Ferejohn (1989).

[4]An earlier literature (Crawford 1979; Evans 1997; Pérez-Castrillo and Wettstein 2001) had studied the implications of competition for coalitional bargaining games.

highlight when the first proposer may capture the entire surplus.

Other mechanisms for endogenous bargaining power have also been modeled. Chatterjee, Dutta, Ray, and Sengupta (1993) study a setting in which the first rejector of a proposal is the next proposer. Cotton (2012) studies a repeated bargaining model in which a successful agenda-setter retains power subject to having sufficient support from other legislators. McKelvey and Riezman (1992), Eguia and Shepsle (2012), Bassi (2013), and Diermeier, Prato, and Vlaicu (2013) offer frameworks in which players first agree to procedures that determine bargaining power and then bargain over policies.

This paper connects to my prior work with B. Douglas Bernheim and Xiaochen Fan (Ali, Bernheim, and Fan 2014) in which we study the implications of information about bargaining power being revealed in prior periods. In that setting, we show that power can become concentrated in the hands of the first proposer if enough players can be ruled out from being the next proposer in each period; in other words, if the recognition process is sufficiently *predictable*, then the first proposer captures the entire surplus. By contrast, in the all-pay protocol studied in this paper, players may not be ruled out from being the next proposer; for example, if players lobby according to a standard linear all-pay auction, there exists an equilibrium in which each player's probability of being the proposer is $1/n$, and so the recognition process is entirely unpredictable. Therefore, the strategic forces that concentrate political power when recognition is for sale differs from those when recognition is predictable. Together, these results indicate a challenge for institutional design:- one may think that the antidote to the results of this paper is to procedurally constrain the leader from conferring agenda-setting power to the one who promises him the most favors, but such procedures may make bargaining power sufficiently predictable that paradoxically induces the same perverse outcome!

Naturally, this study builds on the rich insights derived in the study of all-pay auctions (e.g. Baye, Kovenock, and De Vries 1996; Che and Gale 1998; Kaplan and Wettstein 2006; Siegel 2009). I apply the payoff characterization result developed by Siegel (2009) to establish that only one player can have a strictly positive continuation value. This paper illustrates how his logic can be be usefully applied to a bargaining context in which players compete over time, and the value of the prize is endogenously derived from the ensuing negotiations.

2 A Two Period Example

I illustrate the logic of my results in a setting with three players—Ann, Betsy, and Carol—who have two periods to agree to a division of the dollar. I show that extreme inequality results when players are symmetric or if a player finds it easier to lobby for recognition than others. I then study how bidding caps and restricting the amount of recognition for sale can foster equity.

2.1 A Symmetric Setting

At $t = 0$, each player selects a non-negative bid for recognition. All players pay their bids and the Chair selects one of them to be the proposer at $t = 0$, p^0. The proposer p^0 proposes a division of the dollar, and if at least two players (including herself) vote in support, the proposal is implemented. Otherwise, the game repeats at $t = 1$, and if that proposal is also rejected, the dollar is burned. Each player has a discount factor of 1 so delay is not costly. A player's payoff is the amount she obtains from negotiations minus her bids.

Proceeding by backward induction, consider first the proposer's choice of proposal in the final period ($t = 1$). She must obtain the entire dollar in every SPE since by offering ϵ to one other player, she can guarantee herself a payoff of $1 - \epsilon$. Anticipating this outcome, the bidding stage in the final period reduces to an all-pay auction in which the prize is of value 1. That game has multiple equilibria,[5] but unique expected equilibrium payoffs:- all three players have an expected payoff of 0 before bidding. The auctioneer extracts all surplus.

Behavior in the final period influences negotiations in the first period: each player has a continuation payoff of 0 and no gain from rejecting an offer. Thus, the first proposer, p^0, extracts all surplus and bidding in the first period reduces to the same all-pay auction as above. By induction, the same behavior would emerge even if the horizon were longer.

2.2 Advantaged Players Win

In the above example, the homogeneity of players ensures that no player has anything to gain from disagreement; thus, the equilibrium degeneracy above emerges even if the agreement of an offer requires unanimous consent. However, once such homogeneity is perturbed, the first proposer captures the entire surplus with a simple-majority rule, but not an unanimity rule.

Suppose that Carol has an advantage in the auction, modeled as a "head-start": the Chair selects her to be proposer in a round so long as no other player outbids her by $h \in (0, 1/2)$. In the final period, because no player bids more than 1, Carol can ensure that she is selected as the proposer by bidding strictly more than $1-h$, and thus, she can attain a payoff arbitrarily close to h. By contrast, Ann and Betsy expect 0 payoffs before bidding for recognition in the final period, dissipating all of their surplus in the competition for power. An equilibrium of the all-pay auction that generates

[5]For example, a symmetric equilibria is that in which each bidder bids with density $\frac{1}{2\sqrt{b}}$ on $(0, 1]$. The game also has an asymmetric equilibrium in which Ann bids 0 with probability 1, and each of Betsy and Carol bids uniformly on $[0, 1]$.

these payoffs is the following: Ann bids 0 with probability 1, Betsy bids 0 with probability h and uniformly on $[h,1]$, and Carol bids 0 with probability h and uniformly on $[0,1-h]$. The auctioneer breaks ties in favor of Carol.[6]

Now consider negotiations in the first period: each of Ann and Betsy has a continuation value of 0. So regardless of the identity of the first proposer, she can find a coalition partner who has a strict incentive to accept any proposal that offers $\epsilon > 0$. Hence, in equilibrium, bidding in the first period reduces to the same all-pay auction as that in final period. (By induction, the same holds in longer bargaining games.)

Imposing an unanimity rule leads to different behavior. Because Carol has a strictly positive continuation value, if the first proposer is either Ann or Betsy, that proposer cannot extract all surplus. By contrast, if Carol is the proposer, she can extract all of the surplus in negotiations. So in the first period, the bidding stage reduces to an all-pay auction in which Carol has a head-start of h and a prize of 1 and Ann's and Betsy's prize is of value $1-h$. Since Ann and Betsy then would never bid more than $1-h$, a lower bound for Carol's expected payoff is $1-2h$. As the horizon approaches ∞, and each player is perfectly patient, Carol captures the entire surplus.

2.3 Selling Recognition Can Be Inefficient

There are three sources of inefficiency that emerge from this competition. An immediate source is that if one thinks of the lobbying efforts as dissipated rents, then in the symmetric setting of Section 2.1, all surplus is lost. Even if one counts the payoffs of the auctioneer, the lobbying efforts or bribes from members in the group may not translate $1:1$ into utility for the auctioneer (for example, if costs are incurred to avoid detection as argued by Shleifer and Vishny 1993). A less immediate but equally important source is that when utility is non-transferable, and each player's utility is concave in her bargaining share, then these extreme outcomes are inefficient from a utilitarian standpoint.

To illustrate, suppose that player i's payoff is $\sqrt{x_i}$ when she agrees to receive $x_i \geq 0$. Modifying the utility function in this way has no effect on the equilibrium dynamics described above and so the first proposer captures the entire surplus, resulting in an aggregate utility of 1. By contrast, suppose that recognition were not sold in the second period and instead each player is recognized with probability 1/3 in that period. The first proposer has to offer a payoff of at least 1/3 with one other player, which implies that she shares 1/9 and keeps the remaining 8/9 for herself. Aggregate utility increases to $\frac{1+2\sqrt{2}}{3} > 1$; restricting recognition from being sold leads to more equal bargaining, and more aggregate utility.

[6] I follow the approach of Simon and Zame (1990) in treating the auctioneer as a player in the game, and derive the tie-breaking rule as part of the equilibrium.

2.4 How to Foster Equity

Two institutional mechanisms limit the degree of inequality. The first is restricting the "amount" of recognition that can be sold. The second is the imposition of a bidding cap and restricting the auctioneer to a symmetric tie-breaking rule. I illustrate the implications of these arrangements by introducing these features into the symmetric setting of Section 2.1, and derive comparative statics on how these features influence the equity of negotiations.

Restricting How Much Bargaining Power is Sold. Suppose that in each period, winning the auction increases one's recognition probability by only $\lambda \in [0,1]$: the winner of the auction is recognized with probability $\lambda + \frac{1-\lambda}{3}$, while each other player is recognized with probability $\frac{1-\lambda}{3}$. At $\lambda = 0$, this setting corresponds to the recognition rule in Baron and Ferejohn (1989), and at $\lambda = 1$, this setting corresponds to the pure all-pay auction.

Winning the auction in the final period means that a player is recognized as the proposer, and obtains the entire surplus with probability $\lambda + \frac{1-\lambda}{3}$ whereas losing it means that the player obtains it with probability $\frac{1-\lambda}{3}$. Since players will dissipate their surplus, each has a continuation payoff of $\frac{1-\lambda}{3}$ if the proposal in the first period is rejected. Therefore, the first period proposer shares $\frac{1-\lambda}{3}$ with at least one player, and extracts the remainder $\frac{2+\lambda}{3}$. Greater institutional restrictions that reduce the extent to which proposer power can be sold lead to more equitable negotiations. These restrictions also reduce the amount of resources devoted to the race for recognition.

Bidding Caps. Suppose that an exogenous per-period bidding cap of $\bar{b}$ is imposed only at the final period and that the auctioneer is restricted to using a symmetric tie-breaking rule in that period. No bidding cap is imposed in the first period. Nevertheless, the bidding cap at $t = 1$ influences the equity of bargaining agreements at $t = 0$.

By backward induction, it remains true that if there is disagreement at $t = 0$, the proposer at $t = 1$ captures the entire surplus. Bidding behavior is now reduced to an all-pay auction with a bidding cap of $\bar{b}$ and a prize of 1. With a symmetric tie-breaking rule, such settings are known (Che and Gale 1998) to have an equilibrium in which all players have an *ex ante* expected payoff of $\max\left\{0, \frac{1}{3} - \bar{b}\right\}$. The pertinent case here is when $\bar{b} < \frac{1}{3}$ (since otherwise, the first proposer captures the entire surplus): in this case, all three players bid $\bar{b}$ with probability 1, and are willing to do so for the 1/3 chance of being the winner.

Anticipating this event, the proposer at $t = 0$ cannot capture the entire surplus since all three players have a strictly positive continuation value. Instead, the proposer offers $\frac{1}{3} - \bar{b}$ to one of the other players, and keeps the remainder, $\frac{2}{3} + \bar{b}$. Therefore, the first proposer cannot appropriate the entire surplus, and as the bidding cap is reduced, she is compelled to share more.

This force moderates the race for recognition: if a player is not recognized, she anticipates receiving $\frac{1}{3} - \bar{b}$ with probability 1/2, and if she wins, a prize of $\frac{2}{3} + \bar{b}$. Thus, even though no bidding cap is imposed in the first period, the reduced all-pay auction involves a lower prize of $\frac{1+3\bar{b}}{2}$, and therefore reduces the amount spent on lobbying for recognition. To the extent that lobbying efforts may be socially inefficient, the bidding cap in the final period can foster both equity and efficiency even though agreement is reached immediately.[7]

3 Contests for Power: A General Analysis

Consider a group of players $\mathcal{N} = \{1, ..., n\}$ that are bargaining over the division of a dollar, i.e., choosing a policy in $\mathcal{X} \equiv \{x \in [0,1]^n : \sum_{i \in \mathcal{N}} x_i = 1\}$. Bargaining takes places at discrete times in $\mathcal{T} \equiv \{t \in \mathbb{N} : t \leq \bar{t}\}$ in which $\bar{t} \leq \infty$ is the deadline for bargaining. In each period t:

1. Players lobby for bargaining power, and the proposer for time t, p^t, is determined.

2. The proposer proposes a division x^t in $\mathcal{X}$.

3. Legislators vote to accept or reject the proposal sequentially.[8]

Lobbying: Each player i chooses a score $s_i \in \mathcal{S}_i \equiv [\underline{s}_i, \infty)$ in which $\underline{s}_i \geq 0$ reflects the head-start of a player. When player i chooses score s_i in period t, she incurs the cost $c_i(s_i)$, which is a continuous and strictly increasing function of her score, satisfies $c_i(\underline{s}_i) = 0$ and $\lim_{s_i \to \infty} c_i(s_i) > 1$. When necessary, I extend c_i to $[0, \infty)$ in the natural way: for every $s < \underline{s}_i$, $c_i(s) = 0$. The auctioneer chooses a player among those with the highest score to be the proposer, and can use any procedure to break ties.

These head-starts may reflect that the leader may prefer recognizing certain players over others, *ceteris paribus*, or that certain players can easily and effectively use some social resources and network connections more easily to influence the leader. Thus, head-starts may, in certain contexts, reflect seniority rules (McKelvey and Riezman 1992) in which proposal power shifts towards senior player a in the absence of costly lobbying by others.

[7] The effectiveness of bidding caps depends crucially on the auctioneer's sharing rule. Were the auctioneer to always break ties in favor of Carol in the final period, then there exists an equilibrium in which Ann and Betsy both bid 0 with strictly positive probability and have 0 expected payoffs at that stage. But then the proposer in the first period can capture the entire surplus.

[8] Sequential voting avoids coordination failures at the voting stage, and is equivalent to assuming that players vote as if pivotal.

Voting: I consider coalitional structures that include simple majority and supermajority rules, but also extend to settings in which players and groups have different voting weights. Let $\mathcal{C} \subset 2^{\mathcal{N}} \backslash \varnothing$ be a set of *winning coalitions*. For every period t, a proposal is accepted in period t if and only if there is a set of players C in $\mathcal{C}$ that all vote to accept the proposal. I assume that $\mathcal{C}$ is **monotone**: every superset of a winning coalition is also a winning coalition. The voting rule satisfies **no veto power** if $\mathcal{C}$ includes all coalitions that have at least $n-1$ players. A voting rule is a quota rule if there exists $q \in \{0, \ldots, n\}$ such that C is a winning coalition if and only if $|C| \geq q$, and is unanimous if $q = n$.[9]

Payoffs: Players payoffs augment conventional exponential discounting with the costs of lobbying. If policy x is implemented in round t, the payoff to legislator i after choosing scores $(s_i^0, \ldots, s_i^t)$ is

$$\pi_i(x, t; s_i^0, \ldots, s_i^t) \equiv \delta_i^t u_i(x_i) - \sum_{\tau=0}^{t} \delta_i^\tau c_i(s_i^\tau),$$

where for each i, u_i is strictly increasing, continuous, weakly concave, and satisfies $u_i(0) = 0$. The discount factor varies across legislators, but $\delta_i < 1$ for each player i. If no policy is ever accepted, then each player obtains 0 from negotiations but incurs all the costs from lobbying.

I often refer to two special cases:

- players are **one-shot symmetric** if $c_i(\cdot) = c_j(\cdot)$ and $u_i(\cdot) = u_j(\cdot)$ for each pair i and j.
- players are **ordered** if whenever $i < j$, then $c_j(s) \leq u_j(1)$ implies that $c_i(s) < u_i(1)$.

Players being ordered is a *generic property* insofar as whenever it is the case that for i and j, and s, $c_i(s) = u_i(1)$ and $c_j(s) = u_j(1)$, then perturbations to $(c_i(\cdot), c_j(\cdot), u_i(1), u_j(1))$ result in the players being ordered. Note that neither order nor one-shot symmetry restrict the voting rule or patience.

Solution Concept: I denote by h^t the full history of scores chosen, proposers selected, proposals made, and voting decisions in periods $0, \ldots, t-1$, and let $\mathcal{H}^t$ be the set of all such feasible histories. I denote by $\mathcal{H} \equiv \cup_{t \in \mathcal{T}} \mathcal{H}^t$ the set of all feasible histories. A lobbying strategy is a function $\sigma_i^s : \mathcal{H} \to \Delta \mathcal{S}_i$, which represents her randomization over scores. Using $\mathcal{H}_i$ to denote the set of all interim histories in which player i is the proposer, let $\sigma_i^p : \mathcal{H}_i \to \Delta \mathcal{X}$ represent her randomization over proposals. Finally, let $\sigma_i^v : \mathcal{H} \times \mathcal{S}_1 \times \ldots \mathcal{S}_n \times \mathcal{N} \times \mathcal{X} \to \Delta\{\text{Yes}, \text{ No}\}$ represent her randomization over whether to accept or reject the proposal on the table.

[9] In the context of stochastic recognition, Banks and Duggan (2000) and Eraslan and McLennan (2013) study multilateral bargaining with similar coalitional structures.

In the finite-horizon setting ($\bar{t} < \infty$), I study subgame perfect equilibria (henceforth SPE), solving for them by backward induction. In the infinite-horizon ($\bar{t} = \infty$), a more restrictive equilibrium concept is needed: as is well-known, every division can be supported as an SPE of a standard multilateral bargaining if players are sufficiently patient (Baron and Ferejohn 1989; Osborne and Rubinstein 1990), and I suspect that the same is true in this setting. Thus, I follow the literature in studying stationary subgame perfect equilibria (henceforth SSPE): these are SPE in which behavior is independent of time and history.[10] Therefore, in the infinite-horizon setting, player i's strategy may be represented as $(\overline{\sigma}_i^s, \overline{\sigma}_i^p, \overline{\sigma}_i^v)$ in which $\overline{\sigma}_i^s \in \Delta\mathcal{S}_i$, $\overline{\sigma}_i^p \in \Delta\mathcal{X}$, and $\overline{\sigma}_i^v : \mathcal{X} \to \Delta\{\text{Yes}, \text{ No}\}$.

3.1 A Key Lemma from All-Pay Auctions

An important simplification comes from the tight payoff characterization of Siegel (2009). He models an all-pay contest more general than the reduced all-pay auctions that I study, and so below, I describe his results as they apply to the setting here. Suppose that there are n players participating in an all-pay auction. When player i wins the auction, the value of the prize for her is $\overline{v}_i \geq 0$, and her payoff from losing is $\underline{v}_i < \overline{v}_i$. Each player i chooses a score $s_i \in \mathcal{S}_i$ at cost $c_i(s_i)$. The auctioneer selects a winner from among those who choose the highest scores. I use the following results from Siegel (2009).[11]

Lemma 1. *The all-pay auction has a Nash equilibrium. In every equilibrium, there exists a set of players J such that $|J| \geq n-1$, and for each $j \in J$, player j's expected equilibrium payoff is $\underline{v}_j$.*

In my setting, unlike an all-pay auction, the prize is not a payoff but is instead a role in the extensive-form of negotiations. So in applying Lemma 1 below, I derive the payoff of both winning and losing recognition recursively, i.e., from continuation values in dynamic bargaining.

3.2 Main Result

The main result of this paper states that whenever less than unanimous agreement is needed to implement an offer, the first proposer captures the entire surplus.

Theorem 1. *If the voting rule satisfies **no veto power**, the proposer selected at $t = 0$ captures the entire surplus in every SPE of the finite horizon, and in every SSPE of the infinite horizon.*

The logic is similar to that of the examples in Section 2. I first construct an SSPE for both the finite and infinite horizon, and then prove that this is the unique SPE outcome of the finite horizon,

[10] See Baron and Kalai (1993) for a justification for SSPE from the perspective of simplicity.
[11] The existence result is his Corollary 1, the bound on the payoff for $n-1$ players is his Zero Lemma.

and the unique SSPE outcome of the infinite horizon. I postpone discussion of implications of this result to Section 3.3. Section 3.4 studies what happens when players may have veto power.

Proof. **Step 0: The General Reduced Game.** Consider the all-pay auction in which $\overline{v}_i = u_i(1)$, $\underline{v}_i = 0$, and the costs of lobbying are those described in Section 3. Denote this game as $\mathcal{G}^R$. By Lemma 1, $\mathcal{G}^R$ has a Nash equilibrium, and for any equilibrium, at least $n-1$ players have an ex ante expected equilibrium payoff of 0. Denote by $(\sigma_1^R, \ldots, \sigma_n^R) \in \Delta\mathcal{S}_1 \times \ldots \times \Delta\mathcal{S}_n$ a Nash equilibrium of this game, and let w_i denote player i's ex ante expected equilibrium payoff.

Step 1: Existence of Equilibrium in Finite and Infinite Horizon. Consider the following strategy profile:

1. for each history $h \in \mathcal{H}$, player i chooses $\sigma_i^s(h) = \sigma_i^R$,
2. for each history $h_i \in \mathcal{H}_i$, player i makes the proposal x that sets $x_i = 1$ with probability 1,
3. for each history, at the voting stage, a player i votes to accept any proposal that offers her a payoff no less than $\delta_i w_i$.

Plainly, no player has any incentive to deviate at the voting stage. Since the proposer captures the entire surplus, she has no incentive to deviate. Therefore, at the bidding stage, the game reduces to the all-pay auction $\mathcal{G}^R$, and the lobbying strategies are an equilibrium of that game.

Step 2: Unique SPE Outcome of Finite Horizon. The proposer in the final terminal period must capture the entire surplus, and so the auction at time $\overline{t}$ reduces to $\mathcal{G}^R$. By Lemma 1, at least $n-1$ players have a continuation payoff of 0 at the beginning of period $\overline{t}$ (before bidding) regardless of the equilibrium behavior at $\overline{t}$. Therefore, so long as the voting rule satisfies no veto power, the proposer in period $\overline{t}-1$ can guarantee passage of a proposal that promises ϵ to $n-2$ players, and in equilibrium, captures the entire surplus. Thus, the auction at $\overline{t}-1$ also reduces to an all-pay auction in which $\overline{v}_i = u_i(1)$ and $\underline{v}_i = 0$ for each player i. By induction, the first proposer captures the entire surplus.

Step 3: Unique SSPE Outcome of Infinite Horizon. In an SSPE, there exists a vector $(W_1, \ldots, W_n)$ such that at the beginning of period t, player i's value is W_i. Lemma 3 in Appendix A establishes that every equilibrium proposal offered with strictly positive probability is accepted with probability 1. Once a proposer is recognized, she makes offers to a minimal winning coalition, and offers each other player in her coalition their discounted continuation value. Therefore, when player i is the proposer, her expected payoff, $\overline{V}_i$, is

$$\overline{V}_i \equiv u_i\left(1 - \min_{C \in \mathcal{C}} \sum_{j \in C \setminus \{i\}} u_j^{-1}(\delta_j W_j)\right). \tag{1}$$

Lemma 3 in Appendix A demonstrates that the above term is well-defined. When player i is not the proposer, she obtains $\delta_i W_i$ whenever she is included in a minimal winning coalition. Her expected payoff conditional on losing at the lobbying stage is

$$\underline{V}_i \equiv \left(\sum_{j \in \mathcal{N} \setminus \{i\}} Pr(j \text{ is the proposer} \mid i \text{ is not the proposer}) \sum_{x \in \mathcal{X}: x_i > 0} \overline{\sigma}_j^p(x) \right) (\delta_i W_i) , \tag{2}$$

which encompasses the probability that player j is the proposer and includes player i in j's minimal winning coalition.

At the bidding stage, behavior reduces to that of an all-pay auction in which player i obtains $\overline{V}_i$ if she wins the auction and obtains the expected payoff of $\underline{V}_i$ if she loses the auction. Lemma 1 implies that for at least $n-1$ players, in equilibrium, $W_i = \underline{V}_i$. Combining this equation with (2) implies that for at least $n-1$ players, $W_i = 0$. Since the voting rule satisfies no veto power, for each player i, there exists a coalition $C \in \mathcal{C}$ such that $\sum_{j \in C \setminus \{i\}} u_j^{-1}(\delta_j W_j) = 0$. Therefore, $\overline{V}_i = u_i(1)$, which implies that the first proposer captures the entire surplus. □

3.3 Implications

Theorem 1 illustrates a danger from weak institutions and corruption: if bargaining power can be sold or gained through lobbying, an extreme outcome emerges whenever a full consensus is not needed for agreement. Perhaps surprisingly, the heterogeneity of patience or risk-aversion—traditional sources of bargaining power (Rubinstein 1982; Binmore, Rubinstein, and Wolinsky 1986)—cease to matter in this case. Moreover, because the first proposer captures the entire surplus, the outcome (and lobbying activity) is equivalent to that which would emerge if the leader were selling bargaining power in all periods.

The most particularistic outcome emerges leading players to heavily invest in their lobbying efforts. To understand how much of these payoffs are dissipated through lobbying, I return to the two special sub-classes described in Section 3.

First, I describe the implications of players being symmetric even to a limited degree.

Corollary 1. *Suppose that players are one-shot symmetric, and the voting rule satisfies the no veto property. Then all players dissipate their surplus in the race for recognition, and have an ex ante expected equilibrium payoff of* 0*.*

The proof of Corollary 1 is straightforward: for each player, the prize of winning is $u(1)$ (in which u is the common utility function) and that from losing is 0. When players are symmetric, it follows from Corollary 3 of Siegel (2009) that all players dissipate their surplus in this all-pay auction. Therefore, expected total lobbying expenditures across the group corresponds to $u(1)$ when players are symmetric.

Second, I consider the implications of players being well-ordered.

Corollary 2. *Suppose that players are ordered, and the voting rule satisfies the no veto property. Then all players among* $2, \dots, n$ *have an ex ante expected equilibrium payoff of* 0*, and player* 1*'s ex ante expected equilibrium payoff is* $u_1(1) - c_1(c_2^{-1}(u_2(1)))$*.*

When players are ordered, then the reduced all-pay auction corresponds to a prize of winning $u_i(1)$ for player i and 0 from losing. Denote the solution to $u_2(1) = c_2(s)$ by r_2; that players are ordered implies that $u_1(1) - c_1(r_2) > 0$ and for all players $j \in \{3, \dots, n\}$, $u_j(1) - c_j(r_2) < 0$. Therefore, the generic conditions of Siegel (2009) are satisfied, and his Theorem 1 implies the above expected payoffs. As a consequence, whenever players can be ordered (which happens generically), only the player who finds it most cheap to lobby for the entire prize has a strictly positive payoff. Note that in this case again, players' patience ceases to matter, but the concavity of a player's utility function influences whether she is advantaged.

If utility is transferable ($u_i(\cdot)$ is the identity function), then total expected equilibrium expenditures correspond to $c_1(c_2^{-1}(1))$, thus, being determined by the costs of lobbying for only two players. Thus, the total expenditure is invariant to patience and constant across all monotone voting rules that satisfy the no veto property. In the context of quota rules, shifting from simple majority to another non-unanimous voting rule has no implications for equity or the extent of rent dissipation.

Selling bargaining power is also detrimental to utilitarian efficiency: for example, if all players share the same strictly concave utility function, total utility is higher when the surplus is shared. This inefficiency when applied to the case of legislative pork implies that selling bargaining power could lead to inefficiently high investment in certain districts and inefficiently low investments in others. This is one channel by which weak (and corrupt) institutions could adversely affect growth.

3.4 Veto Power

Theorem 1 concerns negotiations in which no player has veto power. When a player has veto power, the first proposer may not capture all of the surplus because if any other player has a strictly positive continuation value, the first proposer must share some surplus with that player. But the first proposer does not share more than with that player.

Theorem 2. *Suppose that the voting rule fails* ***no veto power****. Then in every SPE of the finite horizon, and in every SSPE of the infinite horizon, at least* $n - 2$ *players obtain a payoff of* 0*.*

The argument, relegated to Appendix A, uses the observation that in both finite and infinite horizon, at least $n-1$ players have a continuation payoff of 0 in any equilibrium, and so only a veto player with a strictly positive continuation payoff captures some of the surplus.

More can be said when players are heterogeneous, and some find lobbying less costly. Perhaps surprisingly, in this case, slight advantages in lobbying can lead a player to capture the entire surplus in the continuous-time limit, even if she is not the first proposer!

To derive this result, I strengthen the ordering conditions from Section 3. Suppose that players are ranked so that if $i < j$, then player i has a (weakly) greater head-start ($\underline{s}_i \geq \underline{s}_j$) and strictly lower costs beyond it: for every $s > \underline{s}_i$, $c_i(s) < c_j(s)$. Moreover, suppose that utility is transferable so that $u_i(\cdot)$ is the identity function. I call such an environment **uniformly ordered**.

I consider the infinite horizon, and denote the period length between offers by Δ and each player's discount rate by ρ_i so that $\delta_i = e^{-\rho_i \Delta}$.

Theorem 3. *Suppose that the voting rule is unanimity. For every $\Delta > 0$, in every SSPE, all players $2, \ldots, n$ have ex ante expected payoffs of 0, and only player 1 has a strictly positive ex ante expected payoff. As $\Delta \to 0$, the ex ante expected payoff of player 1 converges to 1 in every SSPE.*

Proof. Let W_i^Δ summarize player i's continuation value at the beginning of the period, $\overline{V}_i^\Delta$ summarize how much she obtains when she is the proposer, and $\underline{V}_i^\Delta$ summarize her expected payoff conditional on losing the auction when the period length is Δ. The following are the analogues of (1)-(2) for an unanimity voting rule:

$$\overline{V}_i^\Delta = 1 - \sum_{j \in \mathcal{N} \setminus \{i\}} e^{-\rho_j \Delta} W_j^\Delta,$$
$$\underline{V}_i^\Delta = e^{-\rho_i \Delta} W_i^\Delta.$$

By Lemma 1, we know that for at least $n-1$ players, $W_i^\Delta = \underline{V}_i^\Delta$, which implies that $W_i^\Delta = 0$. To argue that only $W_1^\Delta > 0$, I eliminate other possibilities.

First suppose that $W_i^\Delta = 0$ for all i. Then $\overline{V}_i^\Delta = 1$ and $\underline{V}_i^\Delta = 0$ for each player i. But then players $2, \ldots, n$ never choose a score beyond $c_2^{-1}(1)$, in which case, player 1 can attain a payoff of $1 - c_1(c_2^{-1}(1))$. Because players are well-ordered, this strictly exceeds 0, which contradicts $W_1^\Delta = 0$.

Now suppose that $W_1^\Delta = 0$ but $W_j^\Delta > 0$ for some $j \neq 1$. It then follows that for all $i \neq j$, $\overline{V}_i^\Delta = 1 - e^{-\rho_j \Delta} W_j^\Delta$, and $\underline{V}_i^\Delta = 0$, and $\overline{V}_j^\Delta = 1$, and $\underline{V}_j^\Delta = e^{-\rho_j \Delta} W_j^\Delta$. But then no player chooses a score beyond $c_2^{-1}(1 - e^{-\rho_j \Delta} W_j^\Delta)$. Therefore, it follows that for every $\epsilon > 0$,

$$W_1^\Delta \geq 1 - e^{-\rho_j \Delta} W_j^\Delta - c_1(c_2^{-1}(1 - e^{-\rho_j \Delta} W_j^\Delta)) - \epsilon$$

in which the inequality follows from player 1 choosing a deviation that places probability 1 on a score slightly exceeding $c_2^{-1}(1 - e^{-\rho_j \Delta} W_j^\Delta)$. Since $e^{-\rho_j \Delta} W_j^\Delta < 1$, it follows that $c_2^{-1}(1 - e^{-\rho_j \Delta} W_j^\Delta) > \underline{s}_2 \geq \underline{s}_1$. Since players are uniformly ordered,

$$c_1(c_2^{-1}(1 - e^{-\rho_j \Delta} W_j^\Delta)) < 1 - e^{-\rho_j \Delta} W_j^\Delta$$

Therefore, there exists $\epsilon > 0$ such that

$$1 - e^{-\rho_j \Delta} W_j^\Delta - c_1(c_2^{-1}(1 - e^{-\rho_j \Delta} W_j^\Delta)) - \epsilon > 0,$$

which in combination with the earlier inequality contradicts $W_1^\Delta = 0$. Thus, we have established that $W_1^\Delta > 0$ and $W_i^\Delta = 0$ for all $i \geq 2$, which implies that $\overline{V}_1^\Delta = 1$, $\underline{V}_1^\Delta = e^{-\rho_1 \Delta} W_1^\Delta$, $\overline{V}_i^\Delta = 1 - e^{-\rho_1 \Delta} W_1^\Delta$, and $\underline{V}_i^\Delta = 0$ for all $i \geq 2$.

The reach of each player is the score at which she is indifferent between winning for sure and losing, i.e., $\overline{V}_i^\Delta - c_i(r_i^\Delta) = \underline{V}_i^\Delta$. Since $\overline{V}_i^\Delta - \underline{V}_i^\Delta$ is constant across players, and players are uniformly ordered, the contest is a "generic contest" in the terminology of Siegel (2009), and so his Theorem 1 applies. Therefore, the following must be true:

$$\begin{aligned} W_1^\Delta = \overline{V}_1^\Delta - c_1(r_2^\Delta) &= 1 - c_1(r_2^\Delta), \\ 1 - e^{-\rho_1 \Delta} W_1^\Delta - c_2(r_2^\Delta) = \overline{V}_2^\Delta - c_2(r_2^\Delta) &= \underline{V}_2^\Delta = 0. \end{aligned}$$

Substituting the first equation into the second implies that

$$1 - e^{-\rho_1 \Delta} = c_2(r_2^\Delta) - e^{-\rho_1 \Delta} c_1(r_2^\Delta).$$

As $\Delta \to 0$, the LHS converges to 0, and the RHS converges to $\lim_{\Delta \to 0}[c_2(r_2^\Delta) - c_1(r_2^\Delta)]$. For the latter to converge to 0, it must be that $c_2(r_2^\Delta) \to 0$, which implies that $c_1(r_2^\Delta) \to 0$. Therefore, $\lim_{\Delta \to 0} W_1^\Delta = 1$, which implies that player 1 captures the entire surplus as $\Delta \to 0$. □

Theorem 3 has an intuition similar to the *discouragement effect* that can arise in multi-stage contests (Harris and Vickers 1987; Klumpp and Polborn 2006; Konrad and Kovenock 2009): player 1 has a persistent advantage in future rounds of negotiations, whereas other players dissipate their surplus in the future. Since player 1 can veto any proposal (because of the unanimity rule), she accepts only those proposals that assure her the discounted surplus that she obtains from waiting until the future. As she becomes patient, or the period-length between offers shrinks, her demands as a voter increase. Because a proposer has to share so much of the surplus with her, others are discouraged from competing for recognition, and thus, in equilibrium as $\Delta \to 0$, player 1 captures the entire prize at virtually no cost.

With an unanimity rule, unlike the case of other voting rules, there is a difference between selling recognition each period at a time or selling it permanently (before negotiations begin). In the latter case, the player who wins the prize is virtually a dictator, since she proposes the surplus in each period. Therefore, it leads to a more heated contest for recognition, with greater dissipation of rents. Theorem 3 pertains to the former case, and as shown above, a single player captures the entire surplus only when all players are perfectly impatient or in the limit as all players approximate perfect patience. When players are perfectly impatient, the dissipation of rents coincides with that of selling recognition permanently. By contrast, when players approach perfect patience, all others are discouraged almost completely from participating in the contest, and so a single player captures the entire surplus with virtually no rents being dissipated in the race for recognition.[12]

For completion, I also describe what happens when players are symmetric.

Corollary 3. *Suppose that the players are one-shot symmetric and the voting rule is unanimity. In every SPE of the finite horizon, the proposer selected at* $t = 0$ *captures the entire surplus. There exists an SSPE of the infinite horizon in which the first proposer captures the entire surplus. In these equilibria, each player has an expected payoff of* 0*, and dissipate all of their surplus in lobbying.*

I omit a formal proof because the logic is a straightforward extension of that of Theorem 1. In the finite horizon, the proposer in the final period captures the entire surplus. Therefore, the game reduces to a symmetric all-pay auction of the form of $\mathcal{G}^R$ in which players obtain the same prize from winning and face the same lobbying costs. By Corollary 3 of Siegel (2009), it must be the case that all n players dissipate their surplus in the race for recognition, which implies that the proposer in the preceding round captures all of the surplus. Constructing the SSPE of the infinite horizon follows Step 1 of the proof Theorem 1 using lobbying strategies of the reduced symmetric all-pay auction. However, I do not know if this is the unique SSPE outcome: there may exist equilibria in which a player with veto power obtains strictly positive shares from another player.

4 Restricting the Sale of Bargaining Power

In the prior section, the leader can influence all bargaining power; however, institutional safeguards may prevent bargaining power from being so sensitive to bids and lobbying efforts. So as to gain insight on the impact of these institutional safeguards, and towards generating a comparative static, I consider a setting in which the auctioneer can sell only an additional fraction $\lambda \in [0, 1]$ of bargaining

[12] Yildirim (2010) performs a similar comparison, and shows that persistent recognition leads to more inequality; however, it only leads to greater dissipation of rents in his setting under additional conditions.

power. This setting generates an unambiguous comparative static prediction: stronger institutions foster more universalism and sharing, whereas weaker institutions and corruption foster more of a "winner-take-all" system. Moreover, this setting permits one to examine the impact of more patience, higher threshold voting rules, and larger legislatures.

The winner of the auction is the proposer with probability $\lambda + \frac{1-\lambda}{n}$, whereas each loser is the proposer with probability $\frac{1-\lambda}{n}$. Observe that at $\lambda = 1$, the setting corresponds to that of Section 3 whereas at $\lambda = 0$, it corresponds to Baron and Ferejohn (1989). I assume that all players are one-shot symmetric, $\delta_i = \delta$ for each player i, and that utility is transferable.

For simplicity, consider symmetric equilibria in which proposers randomize uniformly across all possible minimal winning coalitions.[13] Let W be the expected value from this round for a player, let $\overline{V}^\lambda$ be a player's payoff when she wins the auction, and $\underline{V}^\lambda$ be her payoff when she loses the auction. Suppose a player i wins the auction. It follows that her expected payoff is

$$\overline{V}^\lambda \equiv \left(\lambda + \frac{1-\lambda}{n}\right)(1-(q-1)\delta W) + (n-1)\left(\frac{1-\lambda}{n}\right)\left(\frac{q-1}{n-1}\delta W\right), \tag{3}$$

in which the first term is the probability with which the winner is recognized and the rents she gains, and the second term is the probability with which others are recognized and the probability that player i is included in the minimal winning coalition. Similarly, if player i, loses the auction, her expected payoff is

$$\underline{V}^\lambda \equiv \left(\frac{1-\lambda}{n}\right)(1-(q-1)\delta W) + \left(\lambda + (n-1)\left(\frac{1-\lambda}{n}\right)\right)\left(\frac{q-1}{n-1}\delta W\right), \tag{4}$$

in which I modify the probability of recognition based on player i's losing the auction.

Finally, because players are symmetric, they must have the same payoffs from the all-pay auction and dissipate all of their surplus (Corollary 3 of Siegel 2009). Therefore, it follows that $W = \underline{V}^\lambda$, which in combination with (3)-(4) implies that

$$\underline{V}^\lambda = \frac{(1-\lambda)(n-1)}{n((n-1)-\lambda\delta(q-1))},$$
$$\overline{V}^\lambda = \frac{\lambda((n-1)^2 - \delta n(q-1)) + (n-1)}{n((n-1)-\lambda\delta(q-1))}$$

[13]This assumption is not needed because it can be shown by extending the arguments of Eraslan (2002) to this setting that the payoffs described below are the unique SSPE payoffs.

The equilibrium value of the prize is

$$\overline{V}^{\lambda} - \underline{V}^{\lambda} = \frac{\lambda((n-1) - \delta(q-1))}{(n-1) - \lambda\delta(q-1)},$$

which is strictly increasing in λ. This setting generates comparative statics:

1. For every $\lambda < 1$, $\underline{V}^{\lambda}$ is strictly positive, which implies that once there are some restrictions on how much bargaining power can be sold, the proposer does not capture the entire surplus (and losers of the auction expect some continuation value). Moreover, $\underline{V}^{\lambda}$ is strictly decreasing in λ so tighter restrictions on the sale of bargaining power induce the proposer to share more surplus with others. Finally, because $\overline{V}^{\lambda} - \underline{V}^{\lambda}$ is strictly increasing in λ, the amount spent on lobbying decreases when there is less bargaining power being influenced by lobbying.

2. Fixing $\lambda < 1$, I consider the implications as players become more patient or as the voting threshold is increased. The amount shared by the proposer to each member of the minimal winning coalition $\delta\underline{V}^{\lambda}$ is strictly increasing in δ and q (and indeed each term in that product is strictly increasing in these primitives). Correspondingly, the equilibrium value of the prize $\overline{V}^{\lambda} - \underline{V}^{\lambda}$ is strictly decreasing in δ and q. Therefore, patience and a higher threshold voting rule leads to more equal sharing and less lobbying for becoming the proposer.[14]

5 Other Extensions

5.1 Bidding Caps

One stark way by which the inequity of Theorem 1 can be avoided is through the introduction of hard lobbying caps (Che and Gale 1998), provided that the auctioneer commit to a stochastic tie-breaking rule. Consider a simple all-pay auction in which $\mathcal{S}_i = [0, \overline{s}]$ and $c_i(s_i) = s_i$ for each player i. The bidding cap $\overline{s}$ influences negotiations once $\overline{s} < \frac{1}{n}$. In this case, there exists an equilibrium in which each player bids at the cap $\overline{s}$ with probability 1, the auctioneer uses a symmetric tie-breaking rule, and once recognized, each player proposes $\delta(\frac{1}{n} - \overline{s})$ to $q-1$ randomly chosen coalition members. None of these coalition members have any motive to reject such a proposal since each is offered her discounted continuation value, a recognized proposer has no incentive to propose anything else, and no player has an incentive to deviate at the bidding stage. Lower bidding caps plainly induce more sharing by the proposer, and thus, ameliorate inequality in the final distribution.

[14] Yildirim (2007) finds the same comparative statics predictions in a different formulation of how a player's score stochastically translates to her recognition probability, and thus, there may be a general advantage to having frequent offers and higher threshold voting rules when the quantity of recognition being sold is restricted.

However, both the impartiality of the auctioneer and the small scale of the bidding caps is needed for them to be effective. If the bidding cap exceeds $\frac{1}{n}$, then even with a symmetric tie-breaking rule, each of the players has a continuation value of 0 at the beginning of each period, and so the first proposer captures the entire surplus. Similarly, if the auctioneer uses a deterministic tie-breaking rule, then even with a bidding cap below $\frac{1}{n}$, $n-1$ players shall have expected payoffs of 0 at the beginning of each period, permitting the first proposer to capture the entire surplus.

5.2 History-Dependent Lobbying Costs

Thus far, the lobbying costs incurred in one period do not influence the effects or costs of lobbying in the future. But the logic is considerably more general, and permits us to also study settings in which lobbying today impacts future lobbying costs. I illustrate this feature in the finite horizon. Suppose that in each period t, player i chooses a score $s_i^t \in [0, \infty)$, and her cost depends also on the previous scores chosen by her and others. In particular, let h_S^t be the full history of scores chosen by all players, and $c_i(s; h_S^t)$ be the cost that she incurs in period t of choosing score s after history h_S^t. I assume that for every history h_S^t and every player i, $c_i(s; h_S^t)$ is continuous and non-decreasing in s, and satisfies $c_i(0; h_S^t) = 0$ and $\lim_{s\to\infty} c_i(s; h_S^t) > 1$. A player's payoff is as defined before, with the per-period cost of lobbying replaced by this history-dependent cost.

The logic of Theorem 1 applies seamlessly in the finite horizon setting: because the last proposer captures the entire surplus, the bidding stage in $\bar{t}$ reduces to an all-pay auction with a prize of $u_i(1)$ and costs of lobbying $c_i(\cdot; h_S^t)$ for each player i. Since Lemma 1 applies to this setting, it follows by induction that the proposer in the penultimate period captures the entire surplus as well, and by induction, so does the first proposer. With an infinite horizon, different results may emerge because the game is no longer stationary, and the appropriate solution-concept is Markov Perfect Equilibria (MPE) in which players can condition their strategies on the history of scores thus far. While it is straightforward to construct an MPE exists in which the first proposer captures the entire surplus, it is also plausible that the history of bidding could be used to coordinate on other equilibria.

One natural form of history-dependence that violates the assumptions above is that of a cumulative budget that a player cannot exceed over time. If players have the same budget that is strictly below 1, then the budget acts exactly like a bidding cap. As we see in Section 5.1, bidding caps can lead to the proposer sharing her surplus if the auctioneer uses a stochastic tie-breaking rule.

5.3 First Price Auctions

An all-pay auction corresponds to a bidding game in which players expend their efforts towards recognition *before* the leader chooses the proposer. Alternatively, players may commit to promises as to how much they will offer the leader *after* they are recognized. That setting is best modeled as a first-price auction, and the race for recognition now features strategic motives analogous to Bertrand competition. I first analyze a setting with history-independent lobbying costs, and then later discuss the implications of budgets.

The first step is to prove a result analogous to Lemma 1.

Lemma 2. *The first-price auction has a Nash equilibrium. In every equilibrium, there exists a set of players J such that $|J| \geq n-1$, and for each $j \in J$, player j's expected equilibrium payoff is $\underline{v}_j$. Moreover, if the auction is generic, player 1 has an expected payoff of $\overline{v}_1 - c_1(r_2) > \underline{v}_1$ and each other player j has an expected payoff of $\underline{v}_j$ in every weakly undominated Nash equilibrium.*

Using Lemma 2, only minor modifications to the argument of Theorem 1 are needed to establish the analogue for first-price auctions.

Theorem 4. *Suppose the voting rule satisfies no veto power, and only the player who chooses the highest score incurs the cost of lobbying. Then the proposer selected at $t = 0$ captures the entire surplus in every SPE of the finite horizon, and in every SSPE of the infinite horizon.*

Thus, the result on the first proposer capturing the entire surplus applies even if the winner is the only player to incur the cost of lobbying. Pinning down the extent to which there is rent dissipation requires further assumptions. Suppose that utility is transferable. Let $r_i^{(1)}$ be player i's reach when the payoff from losing is 0 and that from winning is 1, and suppose that players are ordered so that $r_1^{(1)} \geq r_2^{(1)} \geq \ldots \geq r_n^{(1)}$. When $r_1^{(1)} = r_2^{(1)}$, then all players have an expected payoff of 0 in equilibrium so the race for recognition dissipates all surplus. When $r_1^{(1)} > r_2^{(1)} > r_3^{(1)}$, there exists multiple equilibrium outcomes, although in each of these equilibria, player 1 is the first proposer and captures the entire surplus. In particular, for every $s \in [r_2^{(1)}, r_1^{(1)}]$, there exists an equilibrium in which all of the players bid s with probability 1, and the leader selects player 1 to pay her bid and be the proposer. However, such equilibria involve players $2, \ldots, n$ selecting *weakly dominated scores at the bidding stage.*[15] If we rule out such behavior, then Lemma 2 implies that player 1's payoffs are pinned down as $1 - c_1(r_2^{(1)})$, exactly as in the all-pay auction.

With an unanimity voting rule, the analogue of Theorem 3 emerges, assuming the same conditions on costs of lobbying as in Section 3.4: the first proposer shares surplus with only player 1 if she does so with anyone. Eliminating weakly dominated scores at the bidding stage leads to player 1 capturing virtually the entire surplus regardless of the identity of the first proposer as $\Delta \to 0$.

[15] These are not weakly dominated strategies in the formal sense: player 2 may find it a strict best response to offer a score of $s = r_2^{(1)} + \epsilon$ if player 1 is still selected as the proposer, and chooses a proposal that offers a positive share to player 2 whenever player 2's score is s.

As mentioned earlier, Board and Zweibel (2012) study a bilateral bargaining framework in which recognition is resolved through a first-price auction in each period, and each player faces a budget of the bids that she can make over time. In bilateral bargaining, the natural voting rule is unanimity, and their focus is on the intertemporal tradeoffs that emerges with budgets. Budgets introduce an additional state variable, and the possibility for tied budgets that are strictly less than 1 permits the auctioneer / leader to break ties stochastically, which generates different results. I do not offer a general analysis to bypass these challenges, but show by example how the first proposer can nevertheless capture the entire surplus when the voting rule is majority.

Example 1 (First Price Auction)**.** *Consider a two period example, as in Section 2, but suppose the sum of player i's bids cannot be more than* $k_i^0 < 1$*. Suppose that* $1 > k_A^0 > k_B^0 > k_C^0 > 0$*, and that the cost for each player* $c_i(s_i) = s_i$*.*

I proceed by backward induction from $t = 1$*. Because the final proposer* p^1 *obtains the entire dollar, each player is willing to pay their entire remaining capital for it at the bidding stage. The outcome depends on the profile of capital budgets at this stage,* (k_A^1, k_B^1, k_C^1)*:*

1. *if one of the players has a strictly higher budget than the others, that player must secure recognition with probability* 1 *in any equilibrium, and all other bidders have an expected payoff of* 0 *at the beginning of this round;*

2. *if the two richest bidders are tied in their budget, the auctioneer can use a number of different tie-breaking rules, but any bidder with a strictly lower budget than the other two (if any exists) has an expected payoff of* 0 *at the beginning of this round.*

We use this specification of behavior at $t = 1$ *to analyze behavior at* $t = 0$*. Suppose scores* (s_A^0, s_B^0, s_C^0) *have been placed, and a proposer* p^0 *has been selected. Regardless of bidding strategies, Carol is guaranteed to have a strictly lower budget than at least one other player at* $t = 1$*. So Carol has a continuation value of* 0*. If the proposer* p^0 *is Ann or Betsy, she can ensure passage of a proposal by offering* $\epsilon > 0$ *to Carol, and in equilibrium, captures the entire surplus. If the proposer* p^0 *is Carol, then at* $t = 1$*, Betsy must have a strictly lower budget than Ann, since neither Ann nor Betsy pay any bids at* $t = 0$*. Therefore, in the event of disagreement today, Betsy's continuation value is* 0*, which means if Carol is the proposer at* $t = 0$*, she captures the entire surplus. Thus, regardless of the bidding profile, the first proposer captures the entire surplus at* $t = 0$*.*

5.4 Stochastic and Endogenous Surplus

The space of proposals $\mathcal{X}$ has been assumed to be invariant to the timing of negotiations and the actions of players. But the surplus may vary stochastically and emerge endogenously from the choices of players. When the surplus varies stochastically, there is a motive to delay negotiations until it is larger (Merlo and Wilson 1995); Eraslan and Merlo (2002) emphasize how because players fear being excluded from a minimal winning coalition in the future, they are not willing to wait for the surplus to grow, and may reach agreement "too quickly" in states where the surplus is low. I show that selling agenda-setting power exacerbates this issue, leading to immediate agreement regardless of the initial state. In this section, I consider the implications of selling agenda setting power when players can influence the size of the surplus.[16]

I first consider a setting in which the surplus is stochastic. As in Eraslan and Merlo (2002), suppose that utility is transferable, and that the size of the surplus in period t, π^t is drawn i.i.d. according to cdf F with support $[\underline{\pi}, \overline{\pi}]$ in which $\underline{\pi} > 0$. Moreover, suppose that all players share a common discount factor δ. The timing of the game is such that at the beginning of period t, players first observe the size of the surplus π^t. The remainder of the game follows that of Section 3, except that the proposer selects proposals in $\mathcal{X}(\pi^t) \equiv \{x \in [0,1]^n : \sum_{i \in \mathcal{N}} x_i = \pi^t\}$. In studying the infinite horizon, I expand the notion of SSPE so that players condition their choices in period t also on the payoff relevant state, π^t, in period t.[17]

Corollary 4. *If the voting rule satisfies no veto power and players are uniformly ordered, then there exists an SSPE in which bargaining ends in period* 0*, and the first proposer captures the surplus* π^0*.*

The construction is analogous to that of the equilibrium in Theorem 1: suppose that in each period t, and for each surplus π^t, players lobby as in the all-pay auction in which $\overline{v}_i = \pi^t$ and $\underline{v}_i = 0$, the selected proposer always proposes to keep the entire surplus, and all players vote to accept any proposer that exceeds her discounted continuation payoff. Since each reduced all-pay auction is generic, and players are uniformly ordered, then all players but player 1 anticipate an expected payoff of 0 regardless of the size of the surplus. Because the voting rule satisfies no veto power, the first proposer captures the entire surplus.

By contrast, with an unanimity rule, an analogue of Theorem 3 applies: player 1 captures the entire surplus as $\Delta \to 0$. Since player 1 captures the entire surplus, and does not find it costly to wait for the surplus to grow, her expected equilibrium payoff converges to $\overline{\pi}$. Thus, the sale of bargaining power may exacerbate the difference between the unanimity and other voting rules when the surplus is stochastic.

Now suppose that players can influence the size of the surplus by investing in it. Prior to lobbying for recognition, in each period t, player i invests effort e_i^t into the surplus, and the total surplus in period t is $\pi(e_1^t, \ldots, e_n^t) > 0$, which is strictly increasing in each effort level. The cost of

[16] I thank Huseyin Yildirim for suggesting that I study this setting.

[17] If players were compelled to lobby prior to observing the size of the surplus, the negative conclusion for efficiency emerges immediately from Theorem 1.

effort for player i is $K_i(e_i) \geq 0$, which is strictly increasing and smooth in e_i. Because players $2, \ldots, n$ anticipate that they dissipate all of their surplus in negotiations, only player 1 has an incentive to invest.

Corollary 5. *If the voting rule satisfies no veto power and players are uniformly ordered, then in every SSPE, only player* 1 *invests in the surplus.*

The idea is simple: because at least $n - 1$ players have continuation payoffs of 0, the proposer captures the entire surplus. Since players are uniformly ordered, only player 1 obtains rents on the surplus, and all others dissipate all rents from winning negotiations in the race for recognition. Therefore, none of them have any incentive to invest in the surplus.

6 Conclusion

This paper has investigated the implications of selling proposer power through an auction format. I find that the first proposer becomes a dictator whenever no player has veto power, and proposer power can be sold in its entirety. When players have veto power, then power is concentrated in the hands of two players, and slight lobbying advantages can lead a player to capture a substantial share of the surplus even if she is not the first proposer.

Most papers on bilateral and multilateral negotiations treat the recognition process as a primitive. I view this paper, and related papers on endogenous bargaining power, to offer a starting point to understand how proposal power may be set in practice, and how it should be set to generate equitable and efficient agreements. Institutional designs and procedural constraints on how players gain agenda-setting power are pivotal in the allocation of rents and surplus.

Appendix: Omitted Proofs

Lemma 3. *Consider an SSPE.*

1. *For each player i, the following expression is well-defined:*

$$\overline{V}_i \equiv u_i \left(1 - \min_{C \in \mathcal{C}} \sum_{j \in C \setminus \{i\}} u_j^{-1}(\delta_j W_j) \right).$$

2. *Every proposal offered with strictly positive probability is accepted with probability* 1.

Proof. The arguments below are adaptations of proofs of Theorem 4 of Ali, Bernheim, and Fan (2014).

Proof of Part 1: In equilibrium, let $\overline{x}$ be the undiscounted average of policies selected on the equilibrium path. Because u_j is concave for each j and $\delta_j < 1$, and lobbying is only potentially costly, Jensen's Inequality implies that $u_j(\overline{x}_j) > \delta_j W_j$, and therefore for every $C \subset \mathcal{N}$,

$$\sum_{j \in C \backslash \{i\}} u_j^{-1}(\delta_j W_j) \leq \sum_{j \in \mathcal{N}} u_j^{-1}(\delta_j W_j) < \sum_{j \in \mathcal{N}} \overline{x}_j \leq 1. \tag{5}$$

Therefore, $1 - \min_{C \in \mathcal{C}} \sum_{j \in C \backslash \{i\}} u_j^{-1}(\delta_j W_j) \in (0,1]$ and so $\overline{V}_i$ is well-defined.

Proof of Part 2: Suppose there is an equilibrium proposal offered with strictly positive probability, x', by player i that is rejected with strictly positive probability. Select some coalition C such that $i \in C$ and for every other coalition $C' \in \mathcal{C}$ such that $i \in C'$,

$$\sum_{j \in C \backslash \{i\}} u_j^{-1}(\delta_j W_j) \leq \sum_{j \in C' \backslash \{i\}} u_j^{-1}(\delta_j W_j). \tag{6}$$

In other words, C is a minimal winning coalition for player i. Define a proposal x^ϵ for small $\epsilon \geq 0$ in which $x_j^\epsilon = \delta_j W_j + \epsilon$ for every $j \in C \backslash \{i\}$, $x_j^\epsilon = 0$ for every $j \notin C$, and the proposer i keeps the remainder. In equilibrium, the proposal x^ϵ is accepted by all members of C with probability 1 if $\epsilon > 0$, and therefore is implemented. Observe that (5) implies that $u_i^{-1}(\delta_i W_i)$ is strictly less than $1 - \sum_{j \in C \backslash \{i\}} u_j^{-1}(\delta_j W_j)$, and therefore, for sufficiently small $\epsilon > 0$, x_i^ϵ is strictly greater than $u_i^{-1}(\delta_i W_i)$. Thus, conditional on x' being rejected, player i is discretely better off deviating to x^ϵ for sufficiently small $\epsilon > 0$. Conditional on x' being accepted, player i's share can be no greater than she obtains when offering x^0. Since proposal x' is rejected with strictly positive probability, player i is strictly better off offering x^ϵ for sufficiently small $\epsilon > 0$. Therefore, no equilibrium offer x' can be rejected with strictly positive probability. □

Proof of Theorem 2 on p. 14. Suppose that the voting rule fails the no veto property. Then there exists a player such that the coalition of all other players is not a winning coalition. I prove that the first proposer does not share surplus with more than a single other player in both the finite and infinite horizon.

Finite Horizon: The proposer in the final terminal period must capture the entire surplus, and so the auction at time $\bar{t}$ reduces to $\mathcal{G}^R$. By Lemma 1, at least $n-1$ players have a continuation payoff of 0 at the beginning of period $\bar{t}$ (before bidding) regardless of the equilibrium behavior at $\bar{t}$. Let $w_i^{\bar{t}}$ be the expected payoff of player i at the beginning of $\bar{t}$, which is 0 for $n-1$ players. Then in equilibrium, if the proposer in period $\bar{t}-1$ is player j, she obtains $u_j(1 - \sum_{i \neq j} u_i^{-1}(\delta_i w_i^{\bar{t}}))$, sharing surplus only with a veto player who has a strictly positive continuation payoff. Therefore, the auction at $\bar{t}-1$ reduces to an all-pay auction with a prize structure of $\overline{v}_j = u_j(1 - \sum_{i \neq j} u_i^{-1}(\delta_i w_i^{\bar{t}}))$ and $\underline{v}_j = \delta_j w_j^{\bar{t}} \mathbf{1}_{\mathcal{N} \backslash \{j\} \notin \mathcal{C}}$ for each player j. Lemma 1 applies to this auction, and by induction, the result follows for the first period.

Infinite Horizon: In an SSPE, the argument of Theorem 1 establishes that for at least $n-1$ players, $W_i = 0$. Therefore, the first proposer shares $\delta_j W_j \mathbf{1}_{\mathcal{N} \backslash \{j\} \notin \mathcal{C}}$ with each player j, which can be positive for only a single player j.

□

Proof of Lemma 2 *on p.* 21. I first construct a Nash equilibrium: suppose that each player $i > 1$ bids her reach r_i, and player 1 bids r_2. If $r_1 > r_2$, the auctioneer breaks ties in favor of player 1, and if $r_1 = r_2$, the auctioneer can use any tie-breaking rule. It is straightforward to see that no player has an incentive to deviate from this profile.

Now consider any other equilibrium. I adapt the Tie and Zero Lemmas from Siegel (2009) to the first price auction. Let σ_i denote the equilibrium (mixed) strategy of player i. Let $s_i^l \equiv \inf[Supp[\sigma_i]]$ and $s_i^h \equiv \sup[Supp[\sigma_i]]$, and let $F_i(s)$ be the cdf of σ_i.

Claim 1. *Suppose that in equilibrium, each of a set of players J have an atom at score x in which $|J| > 1$. Each player j in J other than the lowest indexed player in J anticipates a payoff of $\underline{v}_j$.*

Proof. Let player i be the lowest indexed player who choose an atom at score x. Suppose towards a contradiction that $j \in J\backslash\{i\}$ anticipates a payoff from choosing score x that strictly exceeds $\underline{v}_j$. By definition of player j's reach, r_j, x must be strictly less than r_j. By the ordering on labels, $r_i \geq r_j$, and therefore, $x < r_i$. Furthermore, there must be a strictly positive probability with which each of players i and j win at score x, and so, $\prod_{k \in \mathcal{N}\backslash\{i,j\}} F_k(x) > 0$. Since players in $J\backslash\{i\}$ choose x with an atom, there exists $\gamma > 0$ such that player i can increase her probability of winning the prize by γ by bidding $x + \epsilon$ for every $\epsilon > 0$. Therefore, in equilibrium, player i cannot choose x with strictly positive probability. □

Now consider any pair of players i and $j > i$, and let $s_{ij}^l = \min\{s_i^l, s_j^l\}$. If both players i and j choose score s_{ij}^l with strictly positive probability, then Claim 1 implies that player j expects $\underline{v}_j$. If only one of the players chooses score s_{ij}^l with strictly positive probability, then the other player is choosing a higher score with probability 1, which implies that once more, one of the players expects her payoff from losing. Finally, if neither player chooses s_{ij}^l with strictly positive probability, then by definition of s_{ij}^l, one of players i and j is choosing scores arbitrarily close to s_{ij}^l. Suppose that this is player $i' \in \{i, j\}$, and let the other player in $\{i, j\}$ be denoted by j'. Since $F_{j'}(s_{ij}^l) = 0$, and $F_{j'}$ is right-continuous, for every $\epsilon > 0$, player i' has best-responses that win with probability no more than ϵ. Therefore, player i' must have zero expected payoffs. Thus, for each pair of players, at least one's equilibrium payoff coincides with her payoff from losing the auction, which establishes the first part of Lemma 2.

Now consider a generic auction, and a weakly undominated Nash equilibrium. In such an equilibrium, every player $j > 1$ must be choosing a score less than r_j with probability 1. Therefore, a lower bound on player 1's equilibrium payoff is $\overline{v}_1 - c_1(r_2)$. If player 1 were to have a strictly higher equilibrium payoff, then $s_1^h < r_2$. Player 2 would then have a strictly profitable deviation to choosing a score in the interval $(s_h^1, r_2) \cap (r_3, r_2)$ since all players are choosing scores that are below that interval (so player 2 would win for sure) and all scores are below player 2's reach. □

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