LEGITIMIZING POLICY

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Abstract: In many settings of policy bargaining, the number of signatories increases the policy's impact by giving it more weight. An agent can then choose to legitimize a policy by publicly approving it even when it's inconsequential for whether the policy passes or not. What is the effect of such legitimacy concerns on the bargaining outcome? We study this question theoretically and empirically. We show theoretically that policy proposals will equal the proposer's ideological bliss point in groups that are either very cohesive or have extreme ideological disagreement. However, in groups with intermediate ideological disagreement, the proposed policy will deviate from the proposer's ideology. Hence, ideological disagreement within a group has a non-monotonic effect on the policy. We corroborate the model's predictions in a natural experimental setting—U.S. appeals courts—where causal identification is based on random assignment of judges into judicial panels of three, and where judges care about legitimacy of the policy.

Keywords: Legitimacy; group decision making; judicial decision making; bargaining; ideology.

JEL codes: D7, K0, Z1.

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1 Introduction

"We define political legitimacy as the internalized belief that a political authority has the right to govern and have its demands obeyed." Greif and Rubin (2020)

Differences in ideologies or viewpoints matter in many settings, for instance, within political parties, in government coalitions, in firm boards, in committees and judicial panels (Merlo and Paula 2017; Chin, Hambrick, and Treviño 2013; Sunstein et al. 2006). This paper studies situations in which such differences are a source of disagreement and where, beyond the necessary majority, the number of signatories of a policy affects its impact. This can capture, for instance, that effort for a successful implementation is higher if there is more agreement (Vantilborgh et al. 2014); that the population subject to the policy will take it more seriously if it is anchored in a broader set of interests (Aldashev et al. 2012; Clark and Hadfield 2019); or that a higher number of signatories provides a stronger signal of coordination and coalition strength (Hall and Magrath 2007; Avoyan and Ramos 2021). Within political parties, unanimity may shield against media playing on division on the policy; a broad government coalition may give stability to the policy and signal to the population that it should obey the new rule; on firm boards, a broader coalition may shield against whistle-blowing and signal resolve of the chosen course; within firm management, a large support may signal to the workers that all managers are pulling in the same direction; within committees it may signal that the decision is wise; and within judicial panels unanimity may lower the chance of appeal.

With these applications in mind, consider an agent with some ideological bliss point who needs to decide whether to support a policy. Suppose further that this decision will not directly affect whether the policy goes through, but rather its weight: if the agent legitimizes the policy by supporting it, the value of the policy is amplified. We ask three questions: 1) Which policies would the agent support? 2) How does this affect the policies that are negotiated by the group? 3) What is the bargaining power of the different agents as a function of the group constellation?

We develop a model that provides theoretical predictions for answering these questions. It is kept as simple as possible containing only the minimal necessary ingredients. The model is based on bargaining between three agents.[1] The agents have different ideologies. What they are set to decide is the (uni-dimensional) ideology of a policy, i.e., a Hotelling-style model. The further away the policy is from an agent, the lower her payoff is. This is important, since we do not want to limit ourselves to situations where the size of the pie is fixed (as in Baron and Ferejohn 1989), but instead to allow for circumstances where if one agent is better off, not all others are necessarily worse off. This could capture, for instance, decisions such as which tax rate to set, how strict to be on abortion, a country's position in foreign policy, where to place a job-generating industry etc. We use a very simple protocol of bargaining.[2] First, one of the agents is chosen—either exogenously or endogenously, by voting in pairwise comparisons—to be the proposer of policy. Then the chosen agent proposes a policy. Finally, the non-proposers decide whether to legitimize the proposal.[3] This protocol is a reduced form of several real-world situations. For instance, the agents can be parties after an election. The first step then represents which party gets to form a government, the second step is the government's choice of policy, and the third step is the decision of the other parties in the parliament whether to legitimize that policy. Alternatively, the model may represent for example agents in a committee. The first step is then the choice of a chair who gets to propose the policy, the second is the chair's choice of proposed policy, and the third is whether the other members wish to legitimize that policy.

The main innovation of our model compared to previous models in the literature is captured by two seemingly small, but crucial, components that embed the idea of legitimizing

[1] In the previous literature this is often referred to as *legislative bargaining*. This literature was pioneered by Baron and Ferejohn (1989). See Eraslan and Evdokimov (2019) for a literature review.

[2] In particular, it is much simpler than related bargaining models by, e.g., Cardona and Ponsati (2011), Diermeier and Merlo (2000), Predtetchinski (2011), Banks and Duggan (2006), and Duggan et al. (2000).

[3] Our model bears resemblance to a model by Cameron and Kornhauser 2009 and to "concurrence models" (such as Carrubba et al. 2012 and Ainsley, Carrubba, and Vanberg 2020), which are generally much richer but are applied specifically to collegial courts, in particular the US Supreme Court. In these models there are more agents (to reflect the size of the US Supreme Court), and beyond choosing policy from a continuum, the agents face a binary choice of verdict. Thus, many more things can happen in equilibrium. Importantly, however, none of these papers analyzes the non-monotonic effect of ideological cohesion on decisions, which is the main finding of the current paper.

a policy. First, an agent gets a positive payoff if the policy is near her bliss point, but as the policy moves away from the agent, the payoff eventually becomes negative. One can think of this as capturing whether the agent thinks the policy does more good (if close to her bliss point) or more harm (if far from the bliss point). Second, payoffs are amplified when more agents sign (endorse) the policy, capturing the effect of its increased legitimacy. These two assumptions are jointly important. When a policy comes with a positive payoff, endorsing it increases the gain from it. Conversely, endorsing a negative policy increases the *loss* attached to it.[4]

How the ideology of "group" members affects outcomes is hard to study empirically due to unobservability of individual ideology and since most groups are formed endogenously (e.g., in a party system, the formation of coalition is endogenous). In the U.S. Courts of Appeals (U.S. Federal Circuit Courts) we find a setting where groups make ideologically contentious decisions (Epstein, Landes, and Posner 2013, Chen, Michaeli, and Spiro 2019) and where the two problems are resolved. First, there exist commonly used and exogenous measures of individual ideology. Second, assignment to groups is random: for each judicial case, three judges are randomly assigned to sit together on a panel. Their decision (the verdict and the text motivating it) is a policy, in the sense that it guides how to rule on future cases in same-level and lower courts.[5]

Our theoretical predictions are supported by the empirical analysis. On question 1, the model predicts that agents will be more inclined to support policies close to their own bliss point. In our empirical setting, this has already been established by previous research (Epstein, Landes, and Posner 2013; Chen, Michaeli, and Spiro 2019). On question 3, our model predicts that the median agent will have the strongest, but not the sole, influence on policy. In many group constellations the median can play the other agents against each other and get her will fully. In other constellations, the median will need to compromise.

[4]This aspect relates to Gratton, Holden, and Lee (2020) with the main difference being that in their model legitimacy is exogenous and refers to the leader's political capital.

[5]Ideology (or personal preferences) has also been documented to play a role in other courts. See, for instance, Cohen, Klement, and Neeman (2015) and Anwar, Bayer, and Hjalmarsson (2018) for recent evidence. There is also a literature on legal decisions in groups, but it does not analyze ideology (e.g., Posner 2004; Adams and Ferreira 2010; Gershoni 2021).

In our empirical tests we find that the median does not solely determine the policy but does have a central role. The main novelty of the paper, both theoretically and empirically, regards question 2: how policy is affected by the quest for legitimacy. Here our model predicts that the policy will deviate from the median's preference in the direction of another agent's preference when, roughly speaking, the group's level of ideological cohesion is intermediate. The intuition is as follows. When all ideologies closely align (high cohesion), the median gets her will fully since all want to strengthen—hence sign onto—her preferred policy. At the other extreme, when the group has strong ideological disagreement (low cohesion), there is no common ground for a policy to be signed by all, hence the median (endogenously having the most influence) again gets the policy in line with her ideology, but attains only few signatures thus low legitimacy. When the group is at an intermediate level of cohesion, so that there exist policies for which the median can get the support of others and where compromise in return for legitimacy is in the median's interest, the policy deviates from the median's bliss point. The empirical prediction generated by this pattern is that, as a function of, say, the "rightist" agent's ideological distance to the median, the policy is first constant, then increasing (i.e., moves to the right), and finally drops sharply back to the original constant (as the rightist becomes too far away to please). A similar pattern is predicted for the leftist agent's ideology. We test this prediction both non-parametrically (a local polynomial regression) and using structural-break tests. The results align with our theoretical predictions. To put this back in the context of our leading examples, our results reinforce the common wisdom that being "easy to get" or "hard to get" are both less effective than being in between: the easy-to-get agent (in a government coalition, firm board, etc.) is ignored because her support is assured, the hard-to-get agent is ignored because her support is too costly to pursue, and only the in-between agent gets to effectively impact the policy.

2 Model

Three agents sit together in a *group*. Each agent has an ideology $x \in \mathbb{R}$ which is public information. One can think of the group as parties after an election or as agents in a committee. We let $L \leq M \leq R$ denote the ideology of the agents and for simplicity we will also call the agents L, M and R.

The timing of the actions within a group is as follows. First, the proposer of the policy is determined, either exogenously (Section 2.1) or endogenously (2.2). Second, the proposer proposes a policy $v \in \mathbb{R}$. Third, the two other agents decide simultaneously whether to sign the policy or not. The proposer automatically signs the policy upon proposing it.

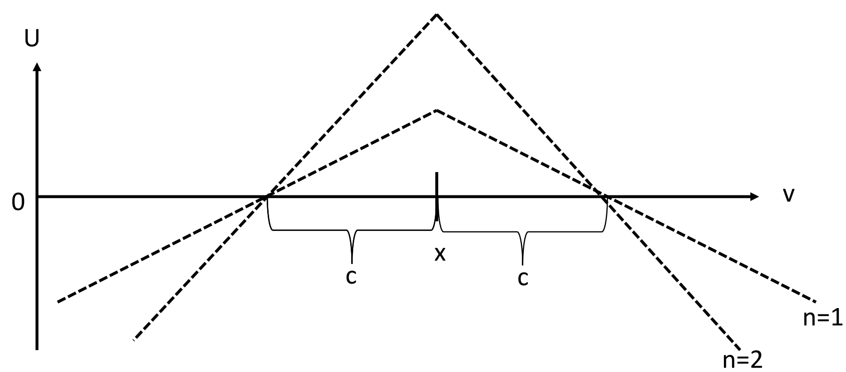
2.1 Exogenous proposer of policy

Suppose first that the proposer of the policy is determined exogenously. An agent cares about the ideology of the policy and about its *legitimacy*, as reflected by the number of agents signing it. To capture this, we let the payoff of agent x from policy v be given by

$$(1) \qquad u_{\mathrm{x}}(v;n) = \phi(v-x)\,\lambda(n),$$

where $\phi(v-x)$ is symmetric around 0 and monotonically decreases in $|v-x|$ to capture utility loss from bliss-point deviations; $n \in \{1,2,3\}$ is the number of agents signing policy v and $\lambda(n) > 0$ is the legitimacy attributed to the policy. Our two key assumptions are the following. First, $\phi(0) > 0$ but $\phi(v-x)$ is allowed to be negative for large $|v-x|$ to capture that an agent may think a policy does more harm than good. Second, we assume that $\lambda'(n) > 0$ to capture the notion that more signatures make the the policy more influential or more likely to have an effect. We normalize $\lambda(1)$ to equal 1. The payoffs are depicted in Figure 1 (for simplicity only for $n = 1,2$ and—like all other figures in the paper—using a linear $\phi(v-x)$), where we denote $c \equiv \phi^{-1}(0)$. That is, on top of preferring to minimize $|v-x|$, an agent wishes to increase the legitimacy of policies she is happy with ($|v-x| \leq c$) and decrease the legitimacy of policies she is unhappy with ($|v-x| > c$). One might note that we allow for a policy with only one signature ($n = 1$). This possibility is clearly context-dependent, and we allow it here simply because it is a viable possibility in the empirical setting in which we test our model (this would be a "plurality opinion" in our empirical setting of Federal Circuit Courts in the U.S.—see Section 3.1). However, all our results hold qualitatively also in settings where a majority of signatories is mandatory in order to set a policy.[6]

FIGURE 1.— Payoffs



For convenience in presentation we adopt the convention that if an agent is indifferent between signing or not, she signs. We solve the game with backward induction.

2.1.1 When does an agent sign?

From the payoff function it immediately follows that, in the subgame starting in period 3 (the signature stage), an agent will sign only policies that are sufficiently close to her bliss point ($|v - x| \leq c$). Thus trivially follows Lemma 1 (all the formal proofs can be found in Appendix A).

LEMMA 1 *The best response of an agent x in the third period is to sign a policy if and only if $|v - x| \leq c$.*

The empirical prediction following this lemma is simple: agents are more likely to sign and endorse policies that are closer to their ideal points. We will denote the number of signatories of policy v by $n(v)$.

2.1.2 Which policies do agents propose?

Which policy an agent proposes in period 2 (the proposing stage), given a chance to do so, depends on the number of signatures she expects to get. By proposing $v = x$, the

[6]This version of the model is available upon request.

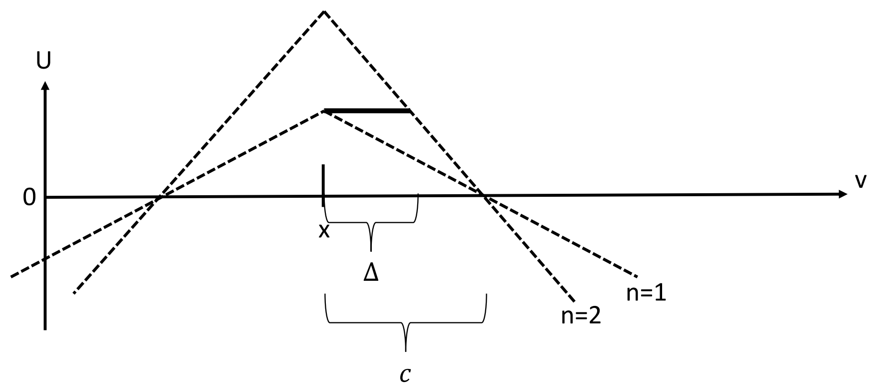
proposer can secure a payoff of at least $u_{\mathrm{x}}(x;1) = \phi(0)$. Improving upon this payoff can only be done by ensuring more signatures. The results depend on who the proposer is. There are two qualitatively different cases: when M proposes and when someone else proposes.

Median proposer

Suppose M is the proposer. Then, compared to $v = M$, any policy $v > M$ is less likely to get the support of L, and the same holds for policy $v < M$ and the support of R. Hence, by proposing $v \neq M$ rather than $v = M$, the proposer M can achieve at most one more signature. Mathematically, M will be willing to propose $v \neq M$ if and only if this extra signature is achieved, i.e. $n(v) = n(M) + 1$, and the proposal yields $\phi(v - M)\lambda(n(v)) \geq \phi(0)\lambda(n(M))$. Thus, there are only two cases to consider: one is when $|v - M| \leq \Delta_{1,2} \equiv \phi^{-1}\left(\frac{\phi(0)\lambda(1)}{\lambda(2)}\right) = \phi^{-1}\left(\frac{\phi(0)}{\lambda(2)}\right)$, which determines the bliss-point deviation that M is willing to make in order to get two signatures rather than one, and the other is $|v - M| \leq \Delta_{2,3} \equiv \phi^{-1}\left(\frac{\phi(0)\lambda(2)}{\lambda(3)}\right)$, which determines the bliss-point deviation that M is willing to make to get three signatures rather than two. To simplify notations, and to make the formal results and the graphical demonstrations easier to follow, we will assume hereafter that $\Delta_{1,2} = \Delta_{2,3} = \Delta$, which corresponds to the case of a multiplier legitimacy coefficient, i.e. $\lambda(n) = \varLambda^{n-1}$ for some $\varLambda > 1$, implying that $\Delta = \phi^{-1}\left(\frac{\phi(0)}{\varLambda}\right)$. This simplification has no effect on our qualitative results. Lemma 2 states the decision rule for this case.

LEMMA 2 *M will propose the $v \in \Upsilon := \{v : |v - M| \leq \Delta, n(v) \geq n(v')\, \forall\, |v' - M| \leq \Delta\}$ that minimizes $|v - M|$.*

FIGURE 2.— Compromise range



What the lemma essentially expresses is that M's decision rule is to first identify the proposals in the range $M \pm \Delta$ that would yield the largest number of signatures, and then choose among those the proposal v that is closest to M's blisspoint. The lemma also implies that M is willing to compromise at most Δ from the bliss point. Comparing this with the range over which the other agents are willing to sign, $x \pm c$ (Lemma 1 and Figure 2), and noting that $\Delta < c$,[7] we get a first notion of the bargaining power of M as a proposer: M's willingness to compromise is smaller than that of non-proposers. Note however that a willingness to propose at distance Δ does not mean M will actually need to deviate so much because, by Lemma 2, she will choose the closest v that gets an extra signature, that is, M has even more bargaining power. Lemma 2 thus implies that the proposed v depends on the bliss points of the non-proposers too. Let v_x^* denote the equilibrium proposal of agent x. The following proposition outlines the different cases under a median proposer.

PROPOSITION 1 *Suppose M is the proposer. Then:*

1. If $R - M \leq c$ and $M - L \leq c$ then $v_M^* = M$ and all agents sign.
2. (a) If $c < R - M \leq c + \Delta$ and $R - L \leq 2c$ then $v_M^* = R - c$ and all agents sign.
   (b) If $c < M - L \leq c + \Delta$ and $R - L \leq 2c$ then $v_M^* = L + c$ and all agents sign.

[7] $\frac{\phi(0)\lambda(n(M))}{\lambda(n(v))} = \frac{\phi(0)}{\Lambda} > 0$ implies that $\Delta = \phi^{-1}\left(\frac{\phi(0)}{\Lambda}\right) < \phi^{-1}(0) = c$.

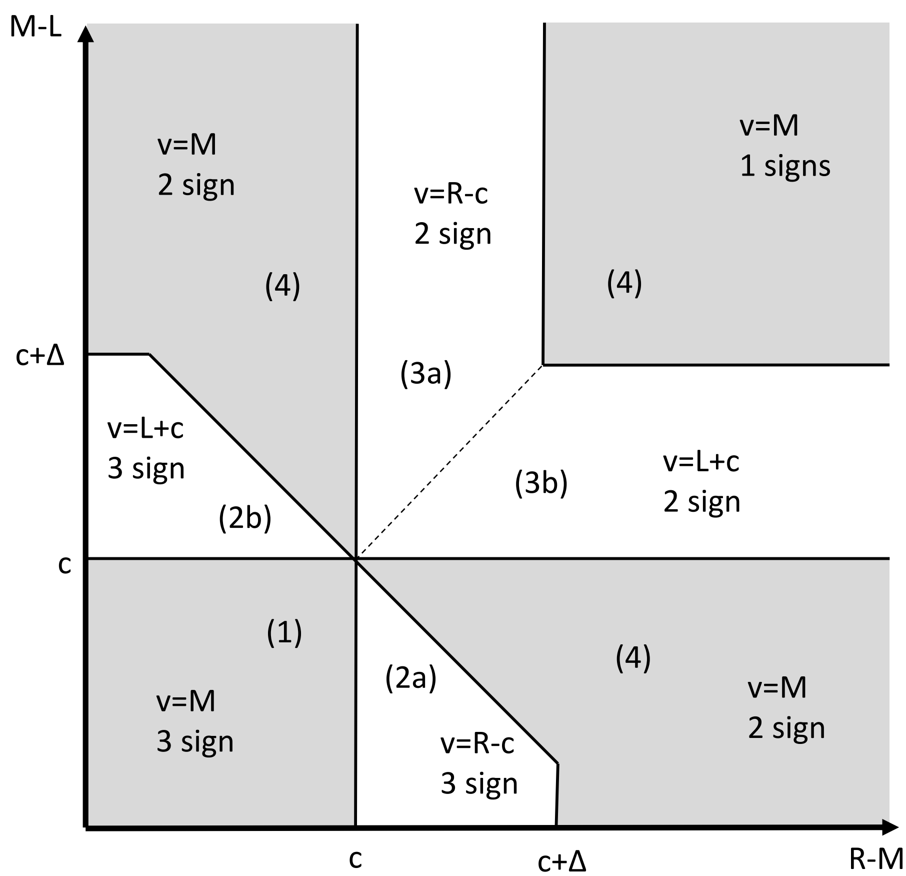
3. (a) If $c < R - M \leq c + \Delta$ and $R - M < M - L$ then $v_M^* = R - c$ and two agents sign.

   (b) If $c < M - L \leq c + \Delta$ and $M - L < R - M$ then $v_M^* = L + c$ and two agents sign.

4. Otherwise, $v_M^* = M$ and either one or two agents sign.

The results of the proposition are shown graphically in Figure 3. The intuition behind it is as follows. The median, being the proposer, has bargaining power. She can set $v = M$ but might be willing to compromise a bit to get more signatures, if it is worth it. There are essentially four main cases.

FIGURE 3.— Policy outcomes in ideology space, M proposes



Notes: Parameter space corresponding to Proposition 1. White regions correspond to those where the proposer (M) compromises.

The first case is when both non-median agents are close enough to be willing to sign the median's bliss point ($max\{M - L, R - M\} \leq c$). In this case, represented by point 1 of the proposition, the median does not need to compromise. This is the gray square at the bottom-left corner in Figure 3.

The second case is when one of the non-median agents is at an intermediate distance from the median while the other is close to the median, as represented by points 2(a) and 2(b) in the proposition. Here one of them is not close enough for both to sign the median's bliss point. The median then has to compromise to achieve a unanimously endorsed policy. How much will the median compromise? Just enough to make the furthest-away agent sign (hence $v_M^* = R - c$ if this agent is R and $v_M^* = L + c$ if this agent is L) without losing the signature of the other agent (hence the condition $R - L \leq 2c$ in points 2(a) and 2(b)). This case is depicted in the two white regions surrounding the bottom-left corner of Figure 3. There are two constraints guiding how far the median is willing to compromise. If, e.g., L is the closest to M, the first constraint is that the policy cannot be so far right that L is no longer willing to sign. The second is that it has to be worth it for M to get the third signature.[8] That both constraints have to be respected highlights the power the proposer has in the model – L may be willing to sign a policy further to the right than M is willing to propose.

In the third case, one of the non-median agents is at an intermediate distance from the median while the other is even further away from the median, as represented by points 3(a) and 3(b) in the proposition. Here the median needs to compromise even in order to achieve only one more signature (while getting everyone to sign is not feasible since the conditions imply that $R - L > 2c$). The median then compromises just enough to make the closer agent sign, thus getting two signatures in total. This case is depicted in the two white regions surrounding the upper-right corner of the figure.

The fourth and final case, as represented in point 4 of the proposition, is composed of two subcases, which have in common the property that M proposes her bliss point due to a difficulty in reaching an agreed compromise. In the first subcase, one of the non-median

[8] The first constraint is $M - L \leq 2c - (R - M) \Rightarrow R - L \leq 2c$ in points 2(a) and 2(b). The second constraint is $R - M \leq c + \Delta$ in point 2(a). If this constraint is not met, the leftmost policy that R is willing to sign ($v = R - c$) is outside the range $M \pm \Delta$. Naturally, once the third signature is attainable, the median just has to go as far right as needed to make R indifferent between signing and not, hence proposes $v_M^* = R - c$.

agents is close enough to the median to sign a policy at the median's bliss point, but either her or the median are reluctant to move the policy in the direction of the third agent to make her sign as well, and so $v_M^* = M$ with two signatures. This subcase is depicted in the gray areas at the bottom-right and upper-left corners of Figure 3. In the second subcase, both of the non-median agents are far from the median, and there's no common ground for getting even two signatures. In this case too, the median proposes a policy at her bliss point but does not attain any other signature. This subcase is depicted in the gray region in the upper-right corner of the figure.

Towards presenting the result that we will use for empirically testing our model, we present the following corollary that follows from Proposition 1 (we pose the corollary in terms of how v_M^* depends on R, equivalent statements can be made on how it depends on L).

Corollary 1 *v_M^* as a function of R has the following properties: $v_M^*(R)$ is first constant for a non-zero range, then weakly increases, then discontinuously drops and then is constant thereafter.*

While the exact pattern of $v_M^*(R)$ depends on the value of $M - L$ (see the proof in the appendix), Corollary 1 depicts an overarching pattern: when $R - M$ is small, $v_M^*(R)$ is constant; then, for larger values of $R - M$, $v_M^*(R)$ is (weakly) increasing; and finally, for even larger values of $R - M$, $v_M^*(R)$ drops (and stays constant afterwards).[9] This suggests that, when taking the model to the data, it should be possible to distill clear unified characteristics. To that end, suppose that the three agents are randomly and independently drawn from a *pool* consisting of a continuum of infinitesimal agents with a unidimensional continuous distribution of ideology $F(x)$ over a range $X \subseteq \mathbb{R}$. The next proposition presents the unified characteristics by answering the question: how does the expected equilibrium policy depend on $R - M$? Importantly, the prediction depends on the value of X, the range of possible

[9] The weakly increasing part relates not only to the continuous increase of $v_M^*(R)$ in regions (2a) and (3a) of Figure 3 for the cases of $M - L \leq c$ and $M - L > c + \Delta$ respectively; it also relates, in the case of $c < M - L \leq c + \Delta$, to the discontinuous increase of $v_M^*(R)$ when moving from region (2b) to (4), which is then followed by a continuous increase of $v_M^*(R)$ in region (3a).

ideologies.

Proposition 2 *Define* $r \equiv R - M (\leq X)$. *Then* $E[v_M^*(r)]$ *has one of the following patterns:*

(i) If $X \leq c$ *then* $E[v_M^*(r)]$ *is constant in* r.

(ii) If $c < X \leq c + \Delta$ *then* $E[v_M^*(r)]$ *is first constant and then increases in* r.

(iii) If $X > c + \Delta$ *then* $E[v_M^*(r)]$ *is first constant, then increases in* r *and afterwards it is ambiguous.*

Proposition 2 has important implications for our empirical investigation. It basically implies that the range of possible ideologies (or, if you wish, the size of c relative to this range, which captures the ideological flexibility of the agents) determines how much of the full picture will be revealed.[10] We emphasize in the proposition the range of ideologies since, when we go to the data, we do not know how broad this range is relative to c. Essentially, if the pool of agents is ideologically very broad (large X relative to c), allowing for anything from very cohesive to very non-cohesive groups, then we are in case (iii). Here, as a function of r, we should observe policies that are first constant (representing the median getting her will), then increasing (representing the need to compromise to get the signature of R) and then ambiguous (due to averaging over increasing parts and discontinuous drops, where the latter represent the refusal of the median to keep on compromising when R moves too far away from her). If the pool of agents' ideologies is somewhat more narrow then we are in case (ii). Here we are predicted to see the same pattern of constant and then increasing policy, but not the ambiguous part, as very non-cohesive groups of agents cannot be formed. Finally, if the pool is narrow (point (i)), then all groups are necessarily cohesive, implying that we will only observe the constant part. An equivalent prediction can be stated by instead increasing the distance between L to M.

Non-median proposer

We move on now to analyzing which policy a *non-median* would propose. For brevity we will focus the description and intuition on L as a proposer (corresponding results can be obtained for R as a proposer). One thing worth noting is that now L might get two extra

[10]Note that, theoretically, the function $E[v_M^*(r)]$ is not defined for $r > X$.

signatures, not only one, by moving the policy sufficiently to the right. In particular, in order to get two extra signatures, L will be willing to propose a policy at distance $|v - L|$ if such a proposal yields

$$\phi(v - L)\,\Lambda^2 \geq \phi(0) \Leftrightarrow v - L \leq \phi^{-1}\left(\frac{\phi(0)}{\Lambda^2}\right) \equiv \Delta_2. \tag{2}$$

But these two "corner" solutions (getting one signature versus getting three) should also be compared to the middle-ground solution of getting two signatures, whose attractiveness depends on the location of M with respect to the locations of L and R. The following proposition outlines the different cases, taking this caveat into account.

PROPOSITION 3 *Suppose L is the proposer.*

1. If $R - L \leq c$ then $v_L^* = L$ and all agents sign.
2. If (a) $M - L \leq c$ and $c < R - L \leq c + \Delta$;

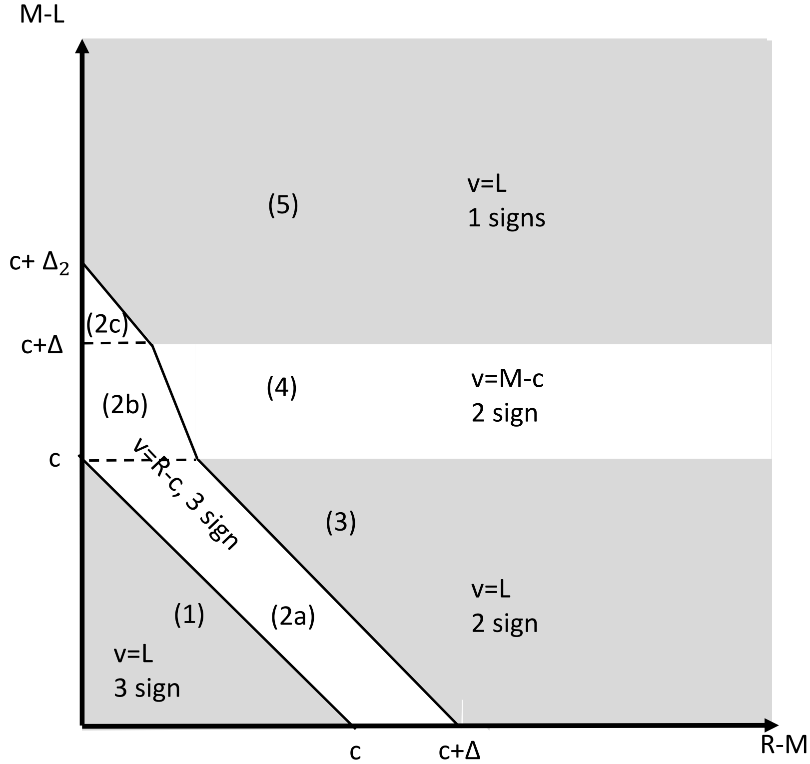
   or (b) If $c < M - L \leq c + \Delta$ and $\Lambda \geq \frac{\phi(M-c-L)}{\phi(R-c-L)}$;[11]

   or (c) If $M - L > c + \Delta$ and $R - L \leq c + \Delta_2$,

   then $v_L^* = R - c$ and all agents sign.
3. If $M - L \leq c$ and $R - L > c + \Delta$ then $v_L^* = L$ and two agents sign.
4. If $c < M - L \leq c + \Delta$ and $\Lambda < \frac{\phi(M-c-L)}{\phi(R-c-L)}$ then $v_L^* = M - c$ and two agents sign.
5. If $M - L > c + \Delta$ and $R - L > c + \Delta_2$ then $v_L^* = L$ and only one agent signs.

[11]When comparing the payoff corresponding to two versus three signatures in the case where $c < M - L \leq c + \Delta$ (here and in point (4) below), L compares $\Lambda\phi(M - c - L)$ with $\Lambda^2\phi(R - c - L)$.

FIGURE 4.— Policy outcomes in ideology space, L proposes



Notes: Parameter space corresponding to Proposition 3. White regions correspond to those where the proposer (L) compromises. Numbers in brackets refer to the numbered parts of the proposition.

The results of the proposition are depicted in Figure 4 (for a linear $\phi(\cdot)$) and its intuition is similar to that of the case where M is the proposer. L is willing to compromise with the policy if this is needed to get additional signatures and if it is worth it in the sense that the reduction in the value of the policy is small enough to be worth the extra signatures. Starting with the case where M is close to L (point 1 of the proposition), if R is also close to L then all three would sign L's bliss point so no compromise is needed.

Moving to point (2), all of its subregions share the property that R is not sufficiently close to L to sign a policy at L's bliss point, but is close enough to make L willing to compromise on $R - c$ and thus get R (hence also M) to sign.

Point (3) represents a case where R—but not M—is far from L. Then a compromise is necessary to get R to sign but it is not worth it for L, who can get M's signature on a policy at L's bliss point.

Point (4) is when M is at an intermediate distance from L, so that L's compromise is necessary and worthwhile for getting M to sign but R is not sufficiently close for overlapping interests.[12]

Finally, suppose M is far from L (point 5), so that compromising sufficiently to make M sign is not worth it for L if the reward is only this one extra signature. This holds if R is at an additional distance ($R - L > c + \Delta_2$) so that compromising even further to get the signatures of both R and M is not worth it for L.

2.2 Endogenous proposer of policy

For the purpose of generating empirical predictions we need to determine how the proposer of policy is chosen. This of course could depend on the empirical setting in question. In our setting of U.S. Circuit Courts there is an ongoing debate about how the proposer is determined, but we will show later that a median proposer fits the data more than a non-median proposer (see Section 4). In other settings this is not necessarily the case, and our model up till now can serve for generating predictions for such other settings. Since a median proposer is likely to characterize many settings, we briefly describe now a mechanism that produces it endogenously. We do not claim that this is the only way for producing a median-proposer outcome. But it seems that in our particular empirical setting (and in others) outcomes look "as if" this (or a similar) mechanism holds.

Suppose that the agents vote, in pairwise comparisons, for who gets to propose. In case of a tie, one of the agents, whose identity is predetermined, gets to be the proposer. To determine who wins that vote we need to analyze the payoffs for the agents under the different proposers.

[12] The distinction between R being "close enough" or "not sufficiently close" takes into account also the distance between L and M, which reflects the compromise needed to get M to sign. The smaller this compromise is, the more attractive it is for L to settle for two signatures rather than compromise further to get R to sign too. To see this graphically, note that the separation between regions (2b) and (4) in Figure 4 is further up and to the left when $M - L = c + \Delta$ compared to when $M - L = c$, reflecting a larger value of $R - L$ when $M - L$ is large.

LEMMA 3 *For any distribution of L, M and R, there always exist two agents who have a weakly higher payoff with M as a proposer than with the third agent as a proposer.*

The lemma follows from the fact that M and one of the other agents, say R, are always weakly better off with M as a proposer than with the third agent (L) as a proposer. First, naturally, M is better off with herself as a proposer, as she can always propose a policy that mimics that of another potential proposer or propose something even better for herself. Second, R always gets a higher payoff with M as a proposer than with L. One reason is that M is more willing to compromise in the direction of R than L is. Another reason is that, whenever L and M have a common ground (a range of ideologies they are both willing to sign), L is pulling to the left (so away from R) and M is pulling to the right (so towards M). It is important to consider here also the theoretical possibility that R would disapprove of both L's and M's proposals, yet vote for L as a proposer if L's proposal gets less legitimacy than M's proposal (even if, on a purely ideological ground, R thinks it's a worse policy). Voting for L could then be interpreted as "sabotage" on the side of R. However, to see why such sabotage is *not* a possible scenario, note that whenever a proposer M is willing to go left to get the signature of L, also a proposer L would be willing to go right to get the signature of M. Hence it cannot be that M's proposal would get L plus M's signatures while L's proposal would not.[13]

Given the lemma, under pairwise comparisons (with a convention of voting for M when indifferent) we get the following.

PROPOSITION 4 *Under pairwise comparisons, M always wins the right to propose.*

The proposition holds not only under sincere voting, where it trivially follows from Lemma 3, but also under strategic voting. The intuition is as follows. Under strategic voting, a non-median agent who holds the advantage of being the one who was predetermined to be the proposer in case of a tie, say L, would strategically vote for R when R competes against

[13] Note also that if L's proposal gets a total of two signatures while M's proposal gets three, then it must be that R signs it, hence has a positive payoff from M's proposal implying R will prefer M over L as a proposer.

M, in an attempt to force a tie. However, foreseeing that, M and R, who are both better off with M as a proposer than with L, would vote strategically too and ensure that M wins.

This voting procedure thus gives M the right to propose, implying that the empirical predictions for the questions we outline in the introduction are: 1) agents sign policies close to their bliss point (Lemma 1); 2) the policy as a function of R should follow the shape outlined in Proposition 2; and 3) M has stronger bargaining power than the other two agents (Lemma 2).

3 Identification and data

3.1 Institutional background and empirical strategy

We use as our laboratory the U.S. federal courts, where it is frequently seen that judges have the power to stymie executive orders from the U.S. president from taking place. The courts operate in a hierarchy. At the lowest level are the 94 District Courts. If there is an appeal, it goes up to one of the 12 Circuit Courts (also called the Courts of Appeals). If there is an appeal from here, the case goes to the U.S. Supreme Court, which handles very few cases, so the Circuit Courts determine the majority of what sets precedent in this common law system.[14]

Judges in the Circuit Courts have life-tenure and are appointed by the U.S. President and confirmed by the U.S. Senate. Each Circuit Court consists of a **pool** of 8-40 judges sitting in different duty stations in different states across the Circuit. For each case, three judges are randomly chosen to form the **panel** that rules on the case.[15] The panel is the equivalent of the group in our model. The three judges in the panel decide a binary *verdict* (affirming

[14] The federal courts get almost 400,000 cases per year, but only 100 reach the Supreme Court, so the Circuit Courts (taking roughly 67,000 cases per year) are responsible for the majority of precedent-setting cases, cases which law students are reading, as they learn about this high-stakes common-law space, where judges can introduce theories, shift standards or thresholds, and rule on the constitutionality of states' laws.

[15] The assignment of judges in Circuit Courts fall into two categories: 1) Once a case arrives, three randomly chosen judges are assigned to the case; 2) Once a year, the calendar is randomly set up in advance determining which judges will sit in which panels on which days in the upcoming year, and when a case comes up it gets assigned to the next panel. For both categories, there is no evidence that cases are systematically assigned to judges based on their own or the cases' characteristics. While some circuits take into account concerns such as workload, leading some scholars to argue that case assignment is not fully random but only quasi-random (see e.g. Chilton and Levy 2015; Hall 2010), we follow previous research in treating case assignments in these courts as being as-if-random (see Chen and Sethi (2011), Berdejo and Chen (2016) and Chen (2016) for tests confirming this practical randomness).

or overturning the lower court verdict), where a majority of two judges is needed to set the verdict. They also compose an *opinion* (i.e., a text) motivating the verdict. The opinion serves as precedent for future cases and as such has a large impact on society and policy. Our empirical strategy rests on three key ingredients: 1) judges do not choose whom to interact with; 2) our measure of their ideology is (reasonably) correct; and 3) legitimacy plays an important role in the Circuit Courts. Point 1 is guaranteed by the random assignment (as explained above) and Points 2 and 3 are motivated in the next subsection.

3.2 Data and main variables

We use a score for judges' ideology that leverages the nature of the judicial appointment process. It is a standard summary measure coming from the Judicial Common Space database (JCS; see Epstein et al. 2007) that was first coded by Giles, Hettinger, and Peppers (2001). This score was referred to by Cross (2007, p. 19) as the "best currently available measure for circuit court judicial ideology" and many papers have been using it (e.g. Peresie 2005, Kim 2009 and Chen, Michaeli, and Spiro 2019).[16] The general idea is that—given that vacancies are rare and that Circuit Courts have a substantial impact on policy—the appointing politicians take the opportunities they get to assign judges of their ideological liking. Moreover, there is a norm of senatorial courtesy by the U.S. President. The score is therefore constructed as follows. If a judge is appointed from a state where the President and at least one home-state Senator are of the same party, the nominee is assigned the score of the home-state Senator (or the average of the home-state Senators if both members of the

[16] This is a unidimensional score, which assumes that various ideological dimensions can be effectively collapsed to only one that goes from "very liberal" to "very conservative". This approach has been argued to be a valid approximation by, e.g., Keith T. Poole (1997), Martin and Quinn (2002), Clinton, Jackman, and Rivers (2004), and Hix, Noury, and Roland (2006), but was criticized by others (e.g. Fischman and Law 2009; Lauderdale and Clark 2012; Lauderdale and Clark 2014; Lauderdale and Clark 2016), who claim that the ordering of judges can change substantially between different areas of the law. While we acknowledge the criticism made, the common remedies might be easily applicable to the Supreme Court—where the composition of judges is relatively stable—but not to our setting of Circuit Courts. Furthermore, unlike other commonly-used unidimensional scoring systems such as the Martin-Quinn scores, the JCS scores are *predetermined*, hence the direction of causality is clear and there is no concern that the ideological score itself is contaminated by panel effects.

delegation are from the President's party).[17] If neither home-state Senator is of the President's party, the judge receives the score of the appointing President. The score thus assumes that the President does favors to senators from the same party while ignoring the preferences of senators from the other party. The score has two additional main advantages. First, it is exogenous since (unlike common measures of Supreme Court judges' ideology based on their votes or the clerks they hire) it assigns the ideology of the judge *before* her behavior at the court is observed, thus enabling us to identify how panels' decisions are affected by the ideology of their members. The second main advantage of this score is its high ability to predict judges' voting patterns in court, as established by Chen, Michaeli, and Spiro (2019). The ideology score takes values in between roughly ± 0.8 (see Figure 7 in Appendix B for a histogram of the distribution of ideology scores in our data).[18]

To measure the ideological flavor of case outcomes, we employ the U.S. Courts of Appeals Database Project, a random sample of roughly 5% of appeals-courts decisions from 1925 to 2002.[19] This database includes hand-coded information on the ideological content of each coded panel decision (whether the verdict and the opinion motivating it were liberal = -1, conservative = 1, or mixed or unable to code = 0).[20] This is our main dependent variable, to which we refer as **Policy Ideology**. We view it as a proxy for a continuous measure of opinion ideology, which can be said to capture v in our model when it is applied to this setting. Our main independent variable, which we use for testing the predictions in Proposition 2, is the **Score Relative to Center of Panel**, which is positive when the judge

[17] The scores of the Senators are located in a two-dimensional space on the basis of the positions that they take in roll-call votes, but only the first of the two dimensions is salient for most purposes. The ideology scores of U.S. Presidents are then estimated along this same dimension based on the public positions that they take on bills before Congress. Hollibaugh Jr and Rothenberg (2018) show that the ideology of the nominee is indeed salient in the President's and Senators' appointment process.

[18] The score is unidimensional, thus assuming that various ideological dimensions can be effectively collapsed to only one axis that goes from "very liberal" to "very conservative". Another popular unidimensional scoring system, the Martin-Quinn scores (Martin and Quinn 2002), as well as other, multidimensional, scores (see e.g. Lauderdale and Clark 2016), are easily applicable to the Supreme Court but not to our setting of Appeal Courts for various reasons. For example, the Martin-Quinn scores require dropping all cases with unanimous decisions, which constitute the majority of decisions in Appeal Courts, and multidimensional scoring systems require that each single judge would sit in sufficiently many cases for each coded dimension.

[19] Documentation and data available at http://www.cas.sc.edu/poli/juri/appctdata.htm.

[20] The Appeals Court Database Project states that for most issue categories, these will correspond to conventional notions of "liberal" and "conservative". The directionality codes parallel closely the directionality codes in the Spaeth Supreme Court database.

is more conservative than the median and negative when the judge is more liberal than the panel median.[21]

The important role that legitimacy plays in Circuit Courts is well established. A very large literature, including judges' writings about their own experience, documents a strive for consensus (see e.g. Edwards and Livermore 2008 and Epstein, Landes, and Posner 2011), suggesting that a consensual decision is preferred to a non-consensual one. Most importantly, the effect of a unanimously signed verdicts and opinions seems to be larger than that of non-unanimous decisions. In particular, they have a higher chance of avoiding being appealed against to the Supreme Court: about 25% of Circuit Cases are appealed, and a dissent adds 13% points to this appeal rate. Furthermore, the Supreme Court takes 3% of the appealed cases, where cases with dissents have 4% points greater likelihood to be heard (and the Supreme Court reverses 71% of the cases it hears). This reduced legitimacy could reflect the notion that minority opinions reveal disagreements that potentially undermine the authority of the ruling (see Corley 2010, p. 54).

4 Empirical Results

Our first empirical prediction is Lemma 1 (answering question Q1), which predicts that agents will be more inclined to sign policies close to their own bliss point. In our empirical setting, this has been established by previous research (Epstein, Landes, and Posner 2013; Chen, Michaeli, and Spiro 2019; see also Wahlbeck, Spriggs, and Maltzman 1999, Spriggs, Maltzman, and Wahlbeck 1999 and Hettinger, Lindquist, and Martinek 2004). Our second empirical prediction is Proposition 4 and Lemma 2, which jointly predict that the median agent will have the strongest—though not the sole—influence on policy. Below we report a test that corroborates this prediction in our setting.[22] The main and novel prediction—both empirically and theoretically—is Proposition 2. We examine the empirical evidence for this prediction after establishing the median-proposer outcome.

[21] Any analysis requiring the panel median includes only panels where there are no tied or missing scores (panels with tied scores are excluded because the identity of the median judge is not uniquely determined). All results presented in the paper are robust to including also tied scores.

[22] In fact, this has already been shown to hold in our empirical setting by previous research (see Cross 2007; Chen, Michaeli, and Spiro 2019 and, e.g., Ambrus, Greiner, and Pathak 2015 for a different setting), but this result is still debated—see discussion in Section 4.1.

4.1 The role of the median in U.S. Circuit Courts

While it is very standard in the literature on courts, in particular U.S. courts, to assume that the median judge of the panel is pivotal in determining the case outcome (Martin, Quinn, and Epstein 2004 note that the median justice model "figures prominently and crucially in a wide array of research on the Court"; see also Ho et al. 2005), some scholars have raised questions about the applicability of a median-decides framework to court settings. In particular, there is some suggestive evidence that the author of the majority opinion is pivotal too (see e.g., Schwartz 1992, Hammond, Bonneau, and Sheehan 2005, Lax and Cameron 2007 and Hangartner, Lauderdale, and Spirig 2019), as well as the median of the *majority coalition* (Spriggs and Hansford 2002; Westerland 2003; Carrubba et al. 2007; Clark and Lauderdale 2010). Generally speaking, we are agnostic about this question since we view our contribution as shedding light on the process that takes place *after* the proposer has been chosen, namely on the quest for legitimacy and its effect on the compromises made by agents and on the final outcome. However, for the purpose of choosing whether to test Propositions 1 and 2 (M proposes) or Proposition 3 (L or R propose), we need a clear prediction. Noting that (i) most opinions in the Circuit Courts are unanimously signed, hence the median of the majority is also the median of the whole panel; and (ii) the data imply that the median judge has a larger effect on case outcomes than that of the non-median judges (see below), we feel sufficiently confident to claim that the data (indirectly) corroborates the premise that M proposes, even if the specific mechanism leading to it—which we treat as a black box—might be a bit different than the one described in Section 2.2.

To check the role of the median in our setting, we run an OLS regression of the Policy Ideology on a judge's Score and its interaction with whether the judge is the median of the panel in terms of ideology score, controlling for the ideology of the median judge in the pool of judges (Center of Judge Pool) and including Circuit (C_c) and year (T_t) fixed effects:[23]

$$\text{(3)} \quad \textbf{Policy Ideology}_{pict} = \alpha + \gamma_1 \textbf{Score}_i + \gamma_2 1\left(i\, is\, median_{pict}\right) + \gamma_3 \textbf{Score}_i * 1\left(i\, is\, median_{pict}\right) + C_c + T_t + \nu_{pict}$$

[23]We replicate here the tests of Chen, Michaeli, and Spiro (2019).

for judge i on panel p in Circuit c and year t.[24] If the ideology of a judge influences the court's verdict, we should expect a positive relationship between the judge's ideology score (where a high value means a very conservative judge) and the likelihood of a conservative verdict. Table I shows that the effect of a judge on the Policy Ideology is more than threefold when the judge is the median of the panel (compare 0.0345 to $0.0345 + 0.0783$). We view this result as indicating that Propositions 1 and 2 (rather than Proposition 3) are the predictions that should be tested empirically.[25]

TABLE I
Ideology of Verdict and Ideology Scores of Panel Members

	(1)
Score	0.0345***
	(0.0124)
Panel Median	0.0025**
	(0.0012)
Score * Panel Median	0.0783***
	(0.0278)
Center of Judge Pool	0.159
Ideology Score	(0.135)
Circuit Fixed Effects	Y
Year Fixed Effects	Y
N	23031
R-sq	0.028

Notes: Robust standard errors clustered at the circuit-year level in parentheses (* p < 0.10; ** p < 0.05; *** p < 0.01). Data come from the U.S. Courts of Appeals Database Project (1925-2002 5% Sample). Sample includes three-judge panels where there are no tied or missing scores. The dependent variable is verdict ideology, which is coded as 1 for conservative, 0 for mixed or not applicable, and -1 for liberal.

4.2 Moving from Median: Flat, then Increasing

According to Proposition 2, we should see that holding constant the ideology of M and L while increasing R, there is no movement of the policy ideology for moderate distances between R and M. This is so because M sees no reason to compromise to gain R's vote. However, as the distance grows to an intermediate distance, the other judges will compromise a bit in order to maintain the legitimacy of the policy (e.g. the policy will move in the

[24] The regression includes only three-judge panels where there are no tied or missing scores and clusters standard errors at the Circuit-year level.

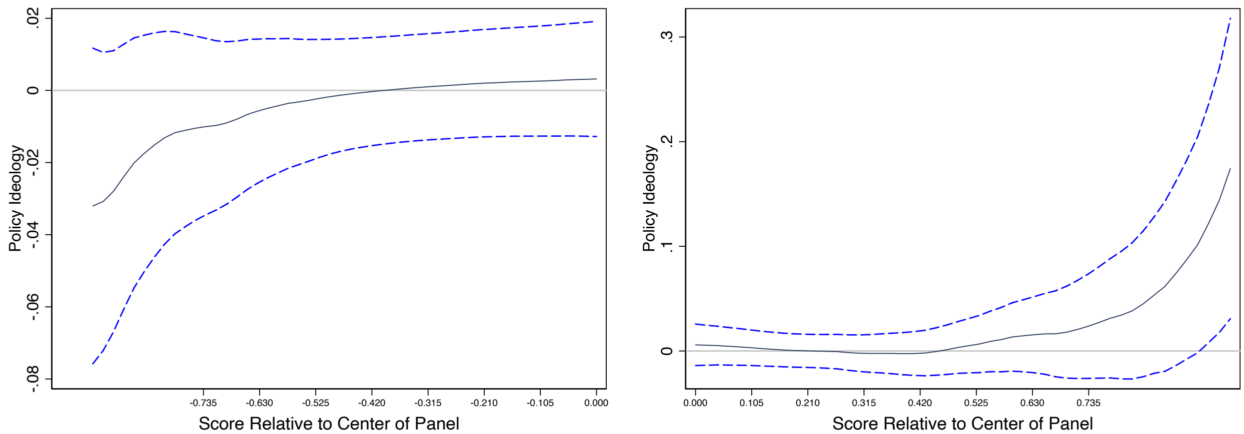
[25] Chen, Michaeli, and Spiro (2019) present robustness checks that further corroborate this result. This edge of the median also characterizes the model of (Carrubba et al. 2012), where the location of the opinion within the "join region" is the closest point to the median's ideal point.

direction of R when R moves further away from M).[26] We again emphasize that since the range of judge ideologies relative to their flexibility (c) is not observable, we do not know whether we should see only the flat part or also the increasing part predicted. What we do know is that we should not (if the model is correct) observe any other pattern, e.g., it should not be increasing right away.

We analyze these predictions in the data in two ways. In this sub-section, Figure 5 presents a separate analysis for judges on the left of the other two panelists and an analysis of judges on the right of the other two panelists. The left figure presents a local polynomial estimator for the relation between two variables. One variable is whether the outcome is a conservative policy. The second variable is the left judge's score relative to the panel center, controlling for the scores of the center judge and the right judge. Both variables are residualized on circuit-by-year fixed effects. We see that as the left judge becomes more distant and reaches an intermediate distance away from the other two judges, the policy is more reflective of the left judge's ideology. The right figure presents the same pattern for the right judge.

[26] Eventually, when R becomes large the effect on the policy is ambiguous.

Figure 5.— Ideology of Policy and Ideology Scores of Panel Members



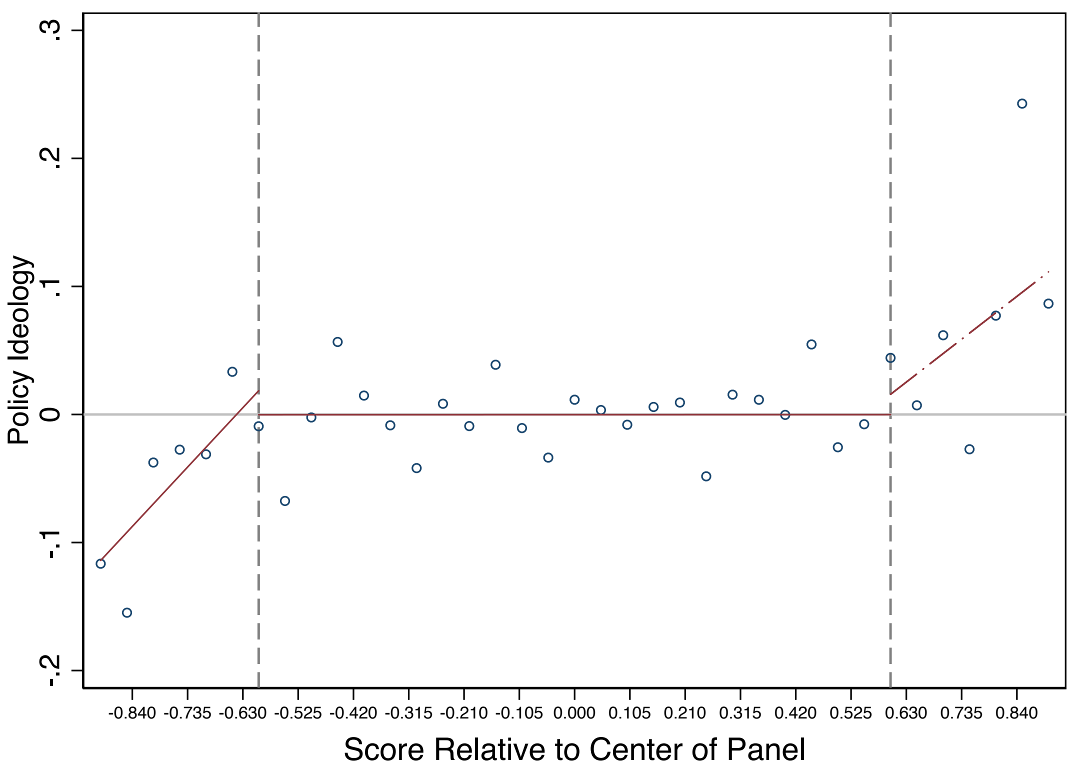
Notes: x-axis: Ideology score of a judge demeaned by the median of the *panel* of judges assigned on the case, where relatively more conservative scores are along the right on the x-axis. y-axis: Policy ideology, which is coded as 1 for conservative, 0 for mixed or not applicable, and -1 for liberal. The figure presents a local polynomial regression with an Epanechnikov kernel, where the dependent variable is policy ideology. The left sub-figure represents judges on the left of the other two panelists, and the right sub-figure represents the same for the judges on the right of the other two panelists. Both the x- and y-axis are residualized by Circuit-by-year fixed effects. The dashed lines depict the 95% confidence interval. Data come from the U.S. Courts of Appeals Database Project (1925-2002 5% Sample). Ideology scores come from the Judicial Common Space database. Sample includes three-judge panels where there are no tied or missing scores.

4.3 Structural Break Test

In this sub-section, we ask whether the regression coefficient is stable over the range of judge ideologies. We test whether the data abruptly changes in ways not predicted by the model by testing for structural breaks in the residuals. Under the null hypothesis of no structural break, the cumulative sum of residuals will have mean zero. Inference is based on a sequence of sums of recursive residuals (in time series, this would be a "one-step-ahead forecast error") computed iterativily from nested subsamples of the data. Values of the sequence outside an expected range suggest a structural change in the model.

Figure 6 presents the raw data in bins for all the judges pooled together (a single observation is a judge in a panel, where each dot represents the average of all policies in a bin of judges with similar ideology scores relative to the panel median). A slope becomes visible to the left and right of the vertical lines. Table II presents a formal test for structural breaks at these vertical lines using the cumulative sum of the recursive residuals. Panel A reports tests where the x-axis is divided into 20 evenly spaced units, and Panel B reports the same for 40 units. In each panel, the first row reports a statistically significant structural break that exists somewhere over the entire range of the x-axis. The second and third rows investigate parameter stability for negative and positive values of the x-axis, respectively. In line with the visualization provided in Figure 6, the structural break is estimated at around 20% from the end on both sides: for the analysis with 20 bins, a trend break statistically significant at the 1% level is observed on both the left and on the right, at 7 bins distance from the center. For the analysis with 40 bins, a trend break is statistically significant at the 1% level for the right but only the 5% level for the left, at 16 bins to the right and 10 to the left from the center.[27]

FIGURE 6.— Ideology of Policy and Ideology Scores of Panel Members



Notes: x-axis: Ideology score of a judge demeaned by the median of the *panel* of judges assigned on the case, where relatively more conservative scores are along the right on the x-axis. y-axis: Policy ideology, which is coded as 1 for conservative, 0 for mixed or not applicable, and -1 for liberal. Each dot represents the average of all policies in a bin of judges with similar ideology scores. The lines represent the linear fit for a section of the data. Data come from the U.S. Courts of Appeals Database Project (1925-2002 5% Sample). Ideology scores come from the Judicial Common Space database. Sample includes three-judge panels where there are no tied or missing scores.

[27] The parameter stability test for positive values of the x-axis uses the cumulative sum of the OLS residuals, which is more useful for detecting structural breaks on the right-side of the sample (see Ploberger and Krämer 1992).

TABLE II

Tests for Structural Breaks (Cumulative sum test for parameter stability)

Panel A: 20 Bins	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Entire Range	1.08	1.14	0.95	0.85
< 0	1.40	1.14	0.95	0.85
> 0	1.94	1.63	1.36	1.22
Estimated Breaks: 7 and -7 relative to center				

Panel B: 40 Bins	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Entire Range	1.50	1.14	0.95	0.85
< 0	1.07	1.14	0.95	0.85
> 0	2.88	1.63	1.36	1.22
Estimated Breaks: 16 and -10 relative to center				

Notes: This table reports a cumulative sum test for parameter stability over the x-axis. The test statistic is constructed from the cumulative sum of the recursive residuals. Panel A reports tests where the x-axis is divided into 20 evenly spaced units, while Panel B reports the same for 40 units. In each panel, the first row reports a statistically significant structural break. The second and third rows investigate parameter stability for negative and positive values of the x-axis, respectively, and the parameter stability test for positive values of the x-axis uses the cumulative sum of the OLS residuals, which is more useful for detecting structural breaks on the right-side of the sample (see Ploberger and Krämer 1992).

5 Conclusions

In this paper we analyze situations in which the number of supporters of a policy, which reflects what we refer to as its legitimacy, affects the policy's impact. Our overarching research question is: What is the effect of legitimacy concerns on the bargaining outcome? Our answer sheds light on an important role of the group's ideological cohesion. In particular, the range of ideologies of the group's members has a non-monotonic effect on the chosen policy. When all ideologies closely align (high cohesion), the policy proposer will get her will fully since all agents sign onto such a policy. At the other edge of the spectrum, when the agents have extreme ideological disagreements (low cohesion), there is no common ground for a policy to be signed by all, hence the proposer will again propose a policy in line with her own ideology, but will attain only few signatures. In between these two cases, when the group is at an intermediate level of cohesion, the policy will deviate from the proposer's bliss point since she can, and is willing to, compromise to gain higher legitimacy. This generates a novel empirical prediction whereby the policy will be independent of a non-proposer's ideology as long as it is not too ideologically far from that of the median, but will become positively affected by the non-proposer's ideology (following a structural break) if the ideologies of these two agents are sufficiently far from each other. We test this prediction in the natural-experimental setting of the US Circuit Courts and find support for it and for other predictions of the model.

Naturally, in our ambition to develop a parsimonious and widely useful model, we have abstracted from many interesting features that have been considered by the theoretical literature on legislative bargaining and by the law literature on the specific setting of collegial courts. Still, we believe that our model delivers an important lesson that pertains to many political settings and to the wide topic of group decision making.

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A Proofs

To make the proofs easier to follow, we introduce two new notations. First, we denote by V_x the set of policies that satisfy $|v - x| \leq \triangle$ (for some $x \in \{L, M, R\}$). Second, we denote by V_3 the set of policies that satisfy $|v - x| \leq c$ for *all* $x \in \{L, M, R\}$.

A.1 Proof of Lemma 1

Proof: By the properties of (1), the payoff of x is increasing in n, hence in x's own signature, if and only if$|v - x| \leq c$. *Q.E.D.*

A.2 Proof of Lemma 2

Proof: First note that M will always propose $v \in V_M$, because otherwise she has a profitable deviation to proposing $v = M$ even if this yields only her own signature. Second, by the definition of Δ, we have that for any $v, v' \in V_M$, $u_M(v, n) \geq u_M(v', n')$ if and only if $n \geq n'$. Hence, M chooses $v \in \Upsilon$. Holding n fixed, for $v \in \Upsilon$, u_M is strictly decreasing in $|M - v|$. Hence M will choose the unique $v \in \Upsilon$ that minimizes $|M - v|$. *Q.E.D.*

A.3 Proof of Proposition 1

Proof: 1) If $R - M \leq c$ and $M - L \leq c$ then, following Lemma 1, both R and L would sign $v = M$ implying, by Lemma 2, that $v_M^*= M$. 2a) If $c < R - M \leq c + \Delta$ and $R - L \leq 2c$ then $M - L \leq c < R - M$ hence, by Lemma 1, $v = M$ would yield only two signatures. At the same time, since $R - L \leq 2c$ and $R - M \leq c + \Delta$ there exist, by Lemmas 1 and 2, another v s.t. $v \in V_M \cap V_3 = \Upsilon$. Since $R - M > c$, by Lemma 1, such v necessarily has $v > M$. Minimizing, by Lemma 2, $|v - M|$ among $v \in \Upsilon$ then implies choosing $v_M^* = R - c$. 2b) Follows the same steps as point 2a. 3a) If $c < R - M \leq c + \Delta$ and $R - M < M - L$ then $R - L > 2c$, implying by Lemma 1 that there exists no policy v that both L and R would sign. Since R is closer to M, and given that $R - M \leq c + \Delta$, Lemma 2 implies that $v_M^* = R - c$ and only R and M sign it. 3b) Follows the same steps as point 3a. 4) Otherwise $V_M \cap V_3 = \emptyset$, either because $R - L > 2c$ (implying $V_3 = \emptyset$), or because $max\{R - M, M - L\} > c + \Delta$. In the first case, if $R - M \leq c$ then M can get R to sign $v = M$, implying that $v_M^*= M$ and both of them sign, where the same holds for L and M if instead $M - L \leq c$; and if, alternatively, both $M - L > c + \Delta$ and $R - M > c + \Delta$, then by Lemmas 1 and 2 we get that $v_M^*= M$ and only M signs. In the second case, i.e. when $R - L \leq 2c$ but $max\{R - M, M - L\} > c + \Delta$, it must be that either $R - M \leq c$ then M can get R to sign $v = M$, implying that $v_M^*= M$ and both of them sign, or the same holds for L and M if instead $M - L \leq c$. *Q.E.D.*

A.4 Proof of Corollary 1

Proof: Proposition 1 implies that v_M^* as a function of R has the following properties:

1. If $M - L > c + \Delta$, then $v_M^* = \begin{cases} M & \text{for } R \leq M + c \\ R - c & \text{for } M + c < R \leq M + c + \Delta \\ M & \text{for } R > M + c + \Delta \end{cases}$, i.e., $v_M^*(R)$ is first constant for a non-zero range, then increasing and then discontinuously drops and is constant thereafter.

2. If $c < M - L \leq c + \Delta$, then $v_M^* = \begin{cases} L + c & \text{for } R \leq L + 2c \\ M & \text{for } L + 2c < R \leq M + c \\ R - c & \text{for } M + c < R \leq 2M - L \\ L + c & \text{for } R > 2M - L \end{cases}$, i.e., $v_M^*(R)$ is first constant for a non-zero range, then discontinuously jumps up, then is constant, then increasing and then discontinuously drops and is constant thereafter.

3. If $M - L \leq c$, then $v_M^* = \begin{cases} M & \text{for } R \leq M + c \\ R - c & \text{for } M + c < R \leq min\{M + c + \Delta, L + 2c\} \\ M & \text{for } R > min\{M + c + \Delta, L + 2c\} \end{cases}$, i.e., $v_M^*(R)$ is first constant for a non-zero range, then increasing and then discontinuously drops and is constant thereafter.

It is thus easy to see that all cases share an overarching pattern, by which $v_M^*(R)$ is first constant for a non-zero range, then weakly increases, then discontinuously drops and then is constant thereafter.

A.5 Proof of Proposition 2

PROOF: (i) If $max\,|R - L| = X \leq c$, then, for any x and any v in the range X, we have $[c - |v - x|] \geq 0$, implying that all three agents sign the proposal. Consequently, it is a dominant strategy for M to propose $v = M$, in which case $v_M^*(R)$ is constant. (ii) If c is such that $c < max\,|R - L| = X \leq c + \Delta$,[28] then the third zone in case (3) in the proof of Corollary 1, where v_M^* drops from $R - c$ to M, is unreachable (because, in that region, $c \geq M - L$ and $R > min\{M + c + \Delta, L + 2c\}$ should both hold, but this requires that either $R - L > 2c$—which is impossible given that $X \leq c + \Delta < 2c$—or $max\,|R - L| \leq c + \Delta < R - M$, which is impossible as well). Similarly, the second zone in case (2) in the proof of Corollary 1 is unreachable too, because it requires $R - L > 2c$. Hence, in any of the three possible regions of $M - L$ (as defined in Corollary 1), v_M^* is either constant (at M in the first region and at $L + c$ in the second), or is weakly increasing (discontinuously for every pair of $\{L, M\}$ in the third region for which r crosses c, and continuously for every

[28] This part is best understood by looking at Figure 3 and focusing on the simplex whose edges are $(0,0), (c + \Delta, 0), (0, c + \Delta)$.

such pair when r continues to increase beyond c and $v_M^* = R - c$). (iii) From a theoretical point of view there are two subcases here. The first subcase is when c is such that $c + \Delta \leq max\,|R - L| = X \leq 2c$.[29] In this case—like in case (2) above—the second zone in case (2) of the proof of Corollary 1 is unreachable. Furthermore, the only way to reach the third zone in case (3) in the proof of Corollary 1, where $v_M^* = M$ because $R > min\{M + c + \Delta, L + 2c\}$, is that $R - M > c + \Delta$ (see also Figure 3). Hence, for pairs of $\{L, M\}$ in the first and second regions v_M^* is constant (at M in the first region and at $L + c$ in the second), while in the third region v_M^* is constant until $r = c$. When r reaches c, the only relevant pairs of $\{L, M\}$ are in the third region, and for all of them v_M^* is increasing discontinuously when r crosses c and then continuously when r continues to increase beyond c (where $v_M^* = R - c$). This continues till r reaches the point where $r = R - M = c + \Delta$. At that point, v_M^* drops (for all remaining pairs of $\{L, M\}$) from $R - c = M + \Delta$ to M, and stays there. The second subcase is when $X > 2c$, hence any zone in Figure 3 is reachable. As long as $r = R - M < c/\Lambda$, $E\left[v_M^*(r)\right]$ is constant, because in each of the three possible regions v_M^* stays constant. Then, when r is in the range $[c/\Lambda, c]$, v_M^* weakly increases (due to discontinuous "jumps" in the second region, where v_M^* switches from $L - c$ to M). At $r = c$ there is another discontinuous increase, due to v_M^* switching from M to $R - c$ for all pairs of $\{L, M\}$ that are in the third region and for which $r = R - M$ can exceed c. Once r crosses the value of c, $v_M^* = R - c$ for all remaining pairs hence $E\left[v_M^*(r)\right]$ continues to increase, but there are pairs of $\{L, M\}$ (also in the third region) for which v_M^* discontinuously drops from $R - c$ to M, which explains why, overall, the pattern is ambiguous at this stage. Finally, after r crosses the point where it equals $c + \Delta$, v_M^* drops (for all remaining pairs of $\{L, M\}$) from $R - c = M + \Delta$ to M, and stays there. *Q.E.D.*

A.6 Proof of Proposition 3

PROOF: 1) When $R - L \leq c$ (implying $M - L \leq c$) then, by Lemma 1 all agents sign $v = L$, and it follows from (1) that L will indeed propose this policy.

2a) When $c < R - L$ and $M - L \leq c$ then, by Lemma 1, only L and M would sign $v = L$. But since $R - L \leq c + \Delta$, L prefers to propose $v = R - c$ instead and get R's signature as well, so that eventually everyone signs.

2b) When $c < M - L$ then, by Lemma 1, only one agent would sign $v = L$. But since $M - L \leq c + \Delta$, L prefers $v = M - c$ with two signatures over $v = L$ with one; and since $\Lambda \geq \frac{\phi(M-c-L)}{\phi(R-c-L)}$, L prefers $v = R - c$ with three signatures over $v = M - c$ with two hence also over $v = L$. Hence $v = R - c$ and all agents sign it.

2c) When $M - L > c + \Delta$, L prefers $v = L$ with one signature over $v = M - c$ with an additional signature of M. Since $R - L \leq c + \Delta_2$, L prefers $v = R - c$ with two additional signatures over $v = L$ with only one, hence this is the outcome.

[29] This part is best understood by looking at Figure 3 and focusing on the simplex whose edges are $(0, 0), (2c, 0), (0, 2c)$.

3) When $M - L \leq c$ then, by Lemma 1, M would sign $v = L$. Since in addition $R - L > c + \Delta$ then, by Lemma 1, there exist no $v \in V_L$ that would be signed by all. Hence, L will propose $v_L^* = L$ and both L and M will sign it.

4) When $c < M - L \leq c + \Delta$ then, by Lemma 1 there exists $v \in V_L$ that would be signed by M, of which $v - M - c$ is the most preferred by L. Since $\Lambda < \frac{\phi(M-c-L)}{\phi(R-c-L)}$, L prefers $v = M - c$ with two signatures (which is thus the outcome) over $v = R - c$ with three.

5) When $M - L > c + \Delta$ then, by Lemma 1, there exist no $v \in V_L$ that would be signed by M. If also $R - L > c + \Delta_2$, then L prefers $v_L^* = L$ with no additional signatures over $v = R - c$ with two additional signatures. *Q.E.D.*

A.7 Proof of Lemma 3

PROOF: We will distinguish between three potential ranges for R, showing that in all three R weakly prefers M over L as a proposer, which implies that at least two agents, R and M, are always better off with M as a proposer than with L. The first case is where $R - c > M + \Delta$, which implies that neither M nor L would be willing, in the role of a proposer, to make a proposal that is acceptable by R. Then, if $M - L \in [c, c + \Delta]$, they ($L$ and M) have a compromise solution in-between their respective blisspoints that they both sign, in which case R is better off with M's proposal (because the proposer pulls the compromise to her direction to the max extent possible); and otherwise the proposer, be it L or M, proposes her bliss point as a policy (and either both L and M sign it if they are close to each other or only the proposer signs if they are far), in which case again R is better off with M's proposal (see Propositions 1 and 3 and their graphic illustrations in Figures 3 and 4). The second case is where $M < R - c \leq M + \Delta$. Propositions 1 and 3 and Figures 3 and 4 reveal that whenever L as a proposer is willing to propose a policy that R is willing to sign ($v = R - c$), M is willing to propose it too (with the same number of signatories), making R indifferent to the identity of the proposer, and otherwise either only M is willing to propose this policy (and L makes a proposal that is not accepted by R hence gives her a negative utility); or none of the proposers is willing to propose a policy that R is willing to sign, in which case we are back to the first case (where M's proposals are closer to R than L's proposals and the number of signatories is identical). The third and final case is when $R - c < M$. Observing Figures 3 and 4, two cases stand out as potentially favoring L as a proposer over M as a proposer (from the point of view of R):[30] (i) when L proposes $v = R - c$ while M proposes her bliss point. However, since $R - c < M$, R in fact prefers M's proposal, which gives her a strictly positive utility (compared to zero utility from $v = R - c$); (ii) when L proposes $v = R - c$ while M proposes $v = L + c$. In both cases all three agents sign (see again Propositions 1 and 3 and Figures 3 and 4), implying that in this case R has a positive utility from $v = L + c$ (again, compared to zero utility from $v = R - c$). *Q.E.D.*

[30] The other subcases are straightforward, for example the preference of R for $v = M$ over $v = L$ when R is one of the signatories.

A.8 Proof of Proposition 4

PROOF: If the agents vote according to their real preferences, then the proposition follows directly from Lemma 3. Let us now consider strategic voting. Suppose w.l.o.g. that L is predetermined to be the agent who gets to propose in case of a tie. Thus, naturally, L prefers a tie over M getting to propose. Then, given Lemma 3, both M and R have the opposite preference. L has a dominant strategy: vote for herself when competing against M and against R, and, in case she won one of these two competitions, vote for the "underdog" among M and R when they compete against each other. M and R then have a best response: vote against L whenever she competes for being the proposer. This guarantees that each of them (M and R) wins her competition against L. Eventually, when they compete against each other, L is better off voting for M, who thus gets to propose. *Q.E.D.*

B Additional Empirical Results

B.1 Summary statistics

TABLE III

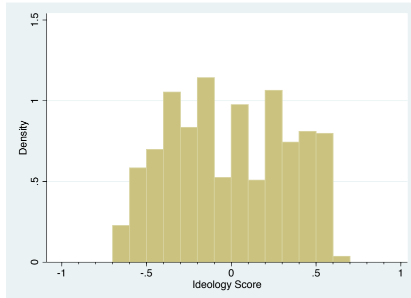
SUMMARY STATISTICS

Vote-Level	Mean	Standard Deviation
Dissent	0.03	0.17
Concur	0.02	0.13
Ideology Score	0.01	0.34
N	541182	
Case-Level (Songer-Auburn sample)		
Policy Ideology (1 = Conservative)	0.19	0.90
Panel Median	0.33	0.47
Ideology Score	-0.03	0.34
N	7677	
Number of Judges per Circuit-Year	16.95	9.65
Number of Circuit-Years	667	

Notes: Data on dissents and concurrences comes from OpenJurist (1950-2007). Data on policy ideology come from the U.S. Courts of Appeals Database Project (1925-2002 5% Sample). Sample includes three-judge panels where there are no tied or missing scores. Policy ideology is coded as 1 for conservative, 0 for mixed or not applicable, and -1 for liberal. Ideology scores come from the Judicial Common Space database (Epstein et al. 2007), which provides a summary measure using the voting patterns of the appointing President and home-state Senators.

B.2 Distribution of ideological scores

Figure 7.— Distribution of Ideology Scores



Notes: Ideology scores from the Judicial Common Space database (Epstein et al. 2007).