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Bargaining and Opinion Assignment on the U.S. Supreme Court

Jeffrey R. Lax
Columbia University, JRL2124@columbia.edu

Charles M. Cameron
Princeton University - Woodrow Wilson School of Public and Department of Political Science, ccameron@princeton.edu

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Jeffrey R. Lax

Department of Political Science

Columbia University

JRL2124@columbia.edu

(corresponding author)

Charles M. Cameron

Department of Politics

Princeton University &

New York University School of Law

ccameron@princeton.edu

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Abstract

We formulate a new game-theoretic model of bargaining on the U.S. Supreme Court. In the model, a degree of monopoly power over policy endogenously accrues to the assigned writer despite an "open rule" for the other justices. We assume justices are motivated ultimately by a concern for judicial policy, but that the policy impact of an opinion depends partly on its persuasiveness, clarity, and craftmanship—its legal quality. The effort-cost of producing a high quality opinion creates a wedge that the assignee can exploit to move an opinion from the median without provoking a winning counter-offer. We use this bargaining model as the foundation for a formal analysis of opinion assignment. Both the bargaining and opinion assignment models display rich and tractable comparative statics, allowing them to explain well-known empirical regularities as well as generate new propositions, within a unified and internally consistent framework.

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1 Introduction

Who writes a majority opinion for the Supreme Court matters for the opinion's policy content—or so most legal experts, judicial scholars, and even justices themselves believe. Consequently, court watchers closely monitor the Chief Justice's assignment choices, and scholars devote much time and effort to uncovering empirical regularities in these choices.

But why does the identity of an opinion writer matter? If the Median Voter Theorem applies (Black 1958), the content of every Supreme Court opinion must devolve to the wishes of the median justice; the identity and preferences of the opinion's author, and therefore the assignment decision, cannot matter. If the identity of the author does matter, therefore, it must be because the bargaining protocol used by the Supreme Court confers a degree of monopoly power on the opinion writer. But, this monopoly power cannot be grounded in an absolute inability of other justices to offer alternative opinions, as assumed in the standard take-it-or-leave-it, monopoly agenda setter model (Romer and Rosenthal 1978, 1979). After all, each justice is always free to write his or her own opinion in a case, and that opinion can become the Court's opinion if a majority desires it. In other words, the Court always considers the assignee's opinion under an "open rule," to use a term from legislative procedure.

From this perspective, the source and scope of the opinion assignee's monopoly power are a foundational issue for a theory of bargaining on the Supreme Court. And, a theory of bargaining incorporating a degree of monopoly power must be an essential precursor for a satisfactory theory of opinion assignment—at least, if assignment is to matter.

In this paper, we formulate a model of bargaining on the U.S. Supreme Court in which a degree of monopoly power for the assigned opinion writer power emerges endogenously, despite an "open rule" for other justices. We then use the bargaining model as the foundation for a formal analysis of opinion assignment. We assume throughout that justices are motivated ultimately by a concern for judicial policy. But we also assume the policy impact of a legal opinion depends partly on its persuasiveness, clarity, and craftsmanship—its legal

quality, as it were. Because an opinion's legal quality affects its reception, justices are induced to care about legal quality, even if policy is ultimately their real concern. We assume that producing higher quality opinions requires costly time and effort both for the opinion writer and counter-writers who contest the opinion. In the model, this effort-cost creates a wedge the assignee can exploit to move an opinion away from the median justice's most preferred policy without provoking a winning counter-opinion. Then, in the assignment model, the Chief Justice (or other assigner) anticipates the outcomes of the bargaining game and strategically assigns opinions in order best to achieve his policy goals.

The bargaining and opinion assignment models display rich and tractable comparative statics. These allow us to explain well-known empirical regularities and generate new propositions, all within a unified, internally consistent framework. In addition, we employ a case-space framework (Kornhauser 1992, Spiller and Spitzer 1992, Cameron, Segal and Songer 2000, Lax 2003, Lax 2006, Kastellec 2006) so that legal concepts like "opinions," "cases," "legal rules," "judgments" and "dispositions" have explicit and clear meanings.

The paper is organized as follows. In the next section we briefly review existing theory, highlighting efforts that explicitly link formal models of bargaining and opinion assignment. Section 3 lays out and solves the bargaining model, concluding with a summary discussion of the model's key comparative statics. Section 4 examines opinion assignment in light of the bargaining game. Section 5 discusses and concludes. All proofs and formal results are gathered into an Appendix, which also presents a more comprehensive set of comparative statics.

2 Theories of Bargaining and Opinion Assignment

We are concerned with foundational aspects of a theory of bargaining and opinion assignment on the U.S. Supreme Court. In our view, these are best elucidated in unified, fully explicit, internally consistent game-theoretic models. From this perspective, two studies stand out:

Hammond, Bonneau, and Sheehan (2005) and Schwartz (1992). In addition, however, several primarily empirical studies do consider foundational issues. Particularly notable is Maltzman, Spriggs, and Wahlbeck (2000), which we discuss briefly.

Hammond et al. assume a set-up familiar from the standard spatial theory of voting in legislative settings: judicial policies are fully characterized as points on the real line, each justice has a most preferred policy, and a justice suffers losses proportional to distance as final policy deviates from his or her most-preferred one. Hammond et al. then consider three distinct bargaining models. Two of these models, "open bidding" bargaining and "median hold-out" bargaining, always yield median policy outcomes. Consequently, authorship and opinion assignment are (as the authors state) "irrelevant" (2005, 161-2). The third bargaining model, the "agenda control" model, explicitly assumes a fixed policy alternative and assumes that the other justices "voluntarily ... ced[e] complete control of the Court's agenda to the majority opinion writer," so none will offer a competing opinion (111), even though opinion writing is assumed to be costless. Consequently, the model yields non-median outcomes consonant with take-it-or-leave-it bargaining (Romer and Rosenthal 1978, 1979). Opinion assignment therefore matters, and the authors assume the agenda control model when considering the Chief's strategic choices in assigning opinions. However, as they note, it remains unclear *why* other justices would cede so much power to the opinion writer (137-138). If other justices can author competing opinions, a median outcome again results.

Schwartz introduces several creative innovations in order to tackle such bargaining issues. First, opinions are characterized by two attributes rather than one. The first is the opinion's policy content (again conceived as a point on the real line), while the second Schwartz calls "precedent." The latter is important because the precedential value of a case determines its "degree of influence" on the decisions of future lower court cases (1992, 223). (Schwartz suggests informally that specificity and scope determine an opinion's precedential value.) Because greater precedential value enhances the policy impact of an opinion,

Schwartz assumes judges desire greater precedential value for opinions with more attractive policy content (this feature is built directly into the judicial utility function). In the bargaining component of the model, the justices are confronted with two exogenous policy alternatives that they may not modify at all: the justices can only select one alternative or the other by affirming or reversing a lower court's opinion. Consequently, non-median policy outcomes typically result. However, the justices may bargain freely over the level of precedent in the option selected by the Court. Given this bargaining protocol, Schwartz then considers opinion assignment and the endogenous level of precedential value that ensues.

Given the current state of theory in this area, sophisticated empiricists have had the choice of assuming fixed policy alternatives (as in Schwartz 1992) or attributing some form of monopoly power to the assignee (as in Hammond et al. 2005). Most have opted for the second route. For example, Maltzman et al. explicitly attribute a degree of agenda control to the assignee,[1] based in part on the costs of opinion writing (2000, 7). However, as Hammond et al. note, the details of bargaining and the Chief's strategic assignment choices depend sensitively on the scope and limits of the assignee's agenda control. In the absence of the critical micro-foundations that might explain this scope, empirical explanations of observed behavior have invoked a rather mixed bag of motivations;[2] neglected conceptually critical bargaining issues like the ability of minority justices to steal the majority opinion; and failed to specify sequentially rational behavior over the course of bargaining, as if the justices could not think ahead.[3]

The model presented below builds on the intuition that costs and agenda setting are key. The driving force is the preemptive shaping of the majority opinion so as to maintain it in

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[1] Other work also relies on this assumption (e.g., Murphy 1964; Ulmer 1970; Rohde 1972; Rohde and Spaeth 1976; Maltzman and Wahlbeck 1996; Epstein and Knight 1998).

[2] These include "egalitarian impulses" (Maltzman and Wahlbeck 1996, 440), the desire to "promote Court harmony" or "foster... good will" (Maltzman et al. 2000, 37-8), and "organizational needs" (Maltzman and Wahlbeck 1996).

[3] For example, Maltzman et al.'s analysis (2000) of the various stages of the judicial process proceeds separately chapter by chapter from studying opinion assignment to dealing with responses to the majority opinion draft. This is chronologically correct, but the "wrong" order from the perspective of strategic analysis.

the face of potential threats. The need for a majority drives policy towards the median, but the costs of writing opinions allow opinion authors to maintain some control, and so the choice of authors affects policy.

This model follows Schwartz in assuming judicial opinions are characterized by two attributes, the first of which is policy content. The second attribute is a valence dimension such as clarity, persuasiveness, completeness, or craftsmanship—legal "quality" for short. The model assumes higher values of the valence dimension reduce the variance in policy outcomes associated with an opinion. Consequently, preferences about judicial policy induce preferences over the valence dimension (in contrast with Schwartz, the model does not build second-dimension preferences directly into the judicial utility function). In contrast with Hammond et al., the model considered here allows justices other than the assignee to write opinions if they wish; in contrast with Schwartz, the model allows writers to determine the policy content of their opinions as they desire. As in Schwartz, opinion writers also determine the opinion's value on the second dimension. But, in contrast with Schwartz, the model assumes greater values of clarity and persuasiveness come only with the expenditure of costly effort. Non-median policy outcomes then emerge endogenously, when the assignee is a justice other than the median herself. In turn, the opinion assigner anticipates non-median outcomes and exploits them, in order to further his own policy goals. Thus, the behavior of all actors is fully sequentially rational.

3   The Bargaining Model

We first lay out the case-space framework and review the Supreme Court's bargaining protocol. We then solve the bargaining game stage-by-stage using backward induction to derive sub-game perfect equilibria in the sub-game commencing with opinion assignment. We conclude by considering the comparative statics of the bargaining game's solution.

3.1 Structure of the Model

The Case-Space Framework. Judicial decision-making has unique characteristics that distinguish it from decision-making in legislative settings.[4] In particular, judges resolve legal disputes, that is, they decide cases which present themselves as bundles of facts (fact patterns). Depending on the facts presented in the case, the judge determines the case's disposition (typically a dichotomous judgment) according to a rule. When appellate courts address judicial policy, they typically do so in opinions that modify existing legal rules or create new ones, perhaps to accommodate new factual situations. Thus, judge-created rules embody the content of judicial policy, and bargaining over judicial policy on collegial courts typically involves bargaining over the content of legal rules. We follow Kornhauser (1992), Spiller and Spitzer (1992), Cameron, Segal, and Songer (2000), Lax (2003), Lax (2006) and Kastellec (2006) in utilizing a case-space framework to study judicial decision-making, a framework that affords a straightforward formalization of these concepts.[5]

Assume a fact or case-space $X = \Re$, so that a case, $x \in X$, is a point in the case space (that is, a particular fact pattern). Judges decide cases through the application of a legal rule, a function $r : X \rightarrow D$, which maps cases (fact patterns) into a judgment or disposition space (typically dichotomous), $D = \{0, 1\}$. Thus, the legal rule defines two equivalence classes (cases such that $r(x) = 0$ and those for which $r(x) = 1$), and indicates the correct judgment for each class. For instance (to use a trivial example), X may denote car speed. A given case x then indicates a specific fact pattern, the speed of a particular automobile at a given time. The judge must determine whether the driver was guilty of speeding or not ($D = \{$guilty of speeding, not guilty of speeding$\}$). The judge does so by applying a legal rule, which in this case takes the form of a cut-point $\bar{r} \in X$. That is, if $r \leq \bar{r}$ (say, 55

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[4]The material in this paragraph is standard fare in the first year of legal education and is elaborated in detail (albeit informally) in basic textbooks on legal reasoning, e.g., Levy (1948).

[5]We note that, in the special case of one-dimensional case spaces and one-dimensional policy spaces, the legally-oriented case-space framework and the standard legislatively-oriented spatial framework are virtually isomorphic for many analytic questions. Thus, all the results that follow have exact analogues in a legislatively-oriented spatial policy setting; a version incorporating this setting is available from the authors on request.

miles per hour) the driver was not guilty of speeding, but if $r > \bar{r}$ the driver was guilty of speeding. In what follows, we focus on cut-point rules of this sort, which comport well with many legal doctrines. For example, consider Fourth Amendment search-and-seizure cases. If a search is too intrusive, if there is insufficient support for finding probable cause or too great a violation of property or privacy interests, the search will be struck down so that the evidence cannot be admitted at trial.

We assume appellate judges have preferences about rules, in particular judge i (J_i) has a most-preferred cut-point (j_i) and suffers a loss of utility when his court establishes a cut-point that differs from his most-preferred rule.[6] Ideal cut-points often comport naturally with an ideological interpretation, so that "liberal" judges may favor low (or high) cut-points and "conservative" judges the opposite. (A more conservative justice would be one that allows more extreme search-and-seizures to stand, so a higher cut-point represents a more conservative rule, whereas a lower, more liberal cut-point would be one that would set stricter limits on searches.)

Let $u_i(\bar{r}; j_i) = -s_i s (j_i - \bar{r})^2$ denote the loss to justice i with preferred cut-point j_i when the Court as a whole adopts a rule with effective cut-point $\bar{r}$ (we clarify the meaning of "effective" momentarily).[7] In this formulation, s and s_i are salience weights for the case or issue area. We employ s as general salience weight shared by all justices while s_i is a justice-specific salience reflecting any personal concern for the area.

In what follows, let the justices be ordered by their preferred cut-points, so that justices J_1 through J_9 have preferred cut-points j_1 through j_9, with $j_1 < j_2 < ... < j_9$. In this setting, J_5 is the median justice. It often proves convenient to distinguish the median justice's most

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[6]A justice's most-preferred cut-point surely reflects his or her commitment to basic ethical or normative principles. It may reflect some sensitivity to the rule's impact on instant litigants. In addition, however, it almost surely reflects a concern with the rule's social implications as other actors—such as lower courts and potential litigants— modify their behavior in light of the rule.

[7]Quadratic loss seems more realistic than a constant-loss utility function here. If a case very close to i's cut-point is incorrectly decided, the loss is arguably small, since with small differences in the case facts, the case would have gone the other way. A case farther away from i's cut-point is arguably quite clear cut given i's preferences, and it is likely to be a greater injustice, all else equal, if it is decided incorrectly. Thus, small differences in a rule near the ideal cut-point matter less than the same absolute distance farther from your cut-point (see Lax 2003 for full discussion of this and some implications).

preferred cut-point as j_M, which we normalize to zero.

Quality. We now introduce the concept of the *quality* of a judicial opinion, which plays a critical role in the analysis that follows. As many legal commentators note, the language of legal opinions is necessarily incomplete, ambiguous, and susceptible to misunderstanding (Twining and Miers 1991, Hadfield 1992). The effective meaning or application of the rule established in an opinion is always somewhat uncertain. After all, no opinion will be able to perfectly and accurately specify a desired outcome in every possible future case. Some of the randomness of a rule's impact lies beyond the control of the appellate court that establishes the rule, because of wholly unanticipated developments. But much of the randomness is due to the way other actors interpret and implement the rule. An appellate court that issues an opinion can itself magnify or limit this source of randomness by the care with which the opinion is drafted. In this sense, an appellate opinion's clarity, precision, thoughtfulness, ingenuity, persuasiveness, and legal craftsmanship have *substantive* policy implications.

We attempt to capture these notions in the following way. Let a rule's effective cut-point $\bar{r}$ be a random variable with mean p and variance $(1-q)$, where $p \in X$ and $q \in [0,1]$.[8] In turn, characterize an appellate opinion as an ordered pair, $o = (p, q)$ (each of these terms is endogenously chosen by the opinion author). This opinion establishes a legal rule with an expected cut-point p (the targeted cut-point) and also incorporates a degree of care in its drafting, captured in the quality parameter q, which in turn affects the variability of the rule's impact. Thus, as in the argument above, the rule is necessarily somewhat ambiguous and incomplete and therefore somewhat random in its impact, but greater care in drafting reduces this randomness.

Unfortunately, drafting superior appellate opinions is hard work. Intense thought, re-

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[8]This mean-variance formulation "blackboxes" the complex post-adjudication implementation and impact of legal rules, e.g., via lower courts, bureaucracies, state and local governments, multiple law enforcement agencies, and private actors. Although the details of implementation and impact are themselves important and interesting, the mean-variance formulation allows us to focus on Supreme Court bargaining, our central concern, rather than implementation per se. (Note: we do not assume that $\bar{r}$ is distributed normally nor symmetrically.)

search, care, and laborious writing and re-writing are often necessary (Coffin 1980). Accordingly, we assume a given level of quality q requires an expenditure of effort equivalent to $k(q)$ units of utility (with $k' > 0$). More specifically, for justice i we assume $k(q_i) = c_i c(1 + q_i)$, where c is a cost parameter common to all justices for production of legal quality in this issue area and c_i is a justice-specific term that may reflect the author's special expertise, experience, or talents. (There is thus a minimum cost to craft a majority opinion and a marginal cost for raising quality.) The greater the effort expended, the greater the quality of the opinion, and the more likely it is that the opinion's rule as enacted will match its intended cut-point.

Let I_i be an indicator variable denoting whether justice i is the author of majority opinion o (that is, $I_i = 1$ if and only if J_i is the author of the opinion). Given the formulation laid out above, the expected utility of a majority opinion o (that is, an opinion that successfully achieves majority support) for justice i is

$$EU_i(o) = \int_{\bar{r}} u_i(\bar{r}; j_i) f(\bar{r}) d\bar{r} - I_i k(q) = -s_i s \left((j_i - p)^2 + 1 - q \right) - I_i \left(c_i c(1 + q) \right) \quad (1)$$

as shown in Lemma 1 in the Appendix.

Note that, if during the course of bargaining justice i drafts an opinion that the majority does *not* adopt, the utility of this "failed" opinion to J_i is simply $-c_i c(1 + q)$, while the utility to other justices is 0. Also note that we directly assume a preference only over the location of the final rule $\bar{r}$ and do not assume a direct preference for higher quality opinions, yet a preference for higher q is induced by ideological preferences over policy.[9] All else equal, then, a lower variance/higher quality is preferred. All else equal, a "closer" target cut-point is preferred. The trade-off between p and q is derived in Lemma 1.

Figure 1 illustrates the comparison of two opinions and the effect of writing costs. Shown in the figure is the (p, q) opinion space. J_i has a most-preferred cut-point at j_i in the p-axis.

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[9]Of course, one could postulate a direct preference for higher quality opinions rather than as an induced preference as in the text. If so, equation 1 results immediately if the policy and quality components are assumed to be additively separable, and to be quadratic and linear respectively.

However, the justice's ideal quality level for any opinion depends on whether he or another justice bears the authorship costs. If another justice bears the costs, J_i prefers the highest possible level of quality ($q = 1$, or variance 0). His ideal point in (p, q) space is $(j_i, 1)$ and the dashed indifference contours indicate sets of utility-equivalent points for J_i. In the figure, J_i prefers o_L to o_R (it lies on a higher indifference contour). On the other hand, if J_i himself must pay the authorship costs, his ideal point in (p, q) space is instead $(j_i, 0)$ and his indifference map is shown with finely dotted lines. In this case, J_i prefers o_R to o_L (it lies on the lower indifference curve). This is a consequence of the costliness of supplying quality.

The Supreme Court's Bargaining Protocol. The Supreme Court is free to adopt any bargaining protocol it desires (on this matter, the Constitution and statutes are silent). However, all "insider" accounts indicate the following protocol is actually employed:

1. *Initial conference vote.* There is a preliminary "straw" vote by the Justices on the disposition of the instant case, which establishes the initial majority.

2. *Opinion assignment.* The Chief Justice, if he is a member of the initial majority, assigns the opinion to a justice in the initial majority. If the Chief is not a member of initial majority, the senior justice in the initial majority assigns it.

3. *Initial majority opinion.* The assignee writes and circulates a draft opinion.[10]

4. *Responses to the majority opinion.* Justices in the minority can respond, writing and circulating an opinion designed to attract a majority away from the initial majority. Or, members of the minority may simply dissent.

5. *Final vote.* The justices "vote" for the assignee's majority opinion draft by joining it or they can join some other opinion (if any). The winning opinion becomes the final

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[10]The rules of the Court allow the majority opinion to be circulated before the other justices respond. The only violation of this sequence of which we are aware is *U.S. v. Nixon* (Woodward and Armstrong 1979).

majority opinion. This action also resolves the dispute in the instant case.

We refer to stages 3-5 as "the bargaining sub-game," stage 2 as "the assignment sub-game," and stage 1 as the "pre-assignment sub-game." As every case works through the assignment and bargaining sub-games, sequentially rational action and sub-game perfect equilibria may be found through backward induction (we assume complete and perfect information).

3.2 Bargaining

We now consider sequentially rational action in the bargaining sub-game, working from Stage 5 back to Stage 3 (we consider the assignment sub-game in Section 4). We focus on interior solutions in the discussion in the text,[11] although the main comparative statics are similar for corner solutions.[12] It will be helpful in presenting results to define the following ratios of cost parameters to salience—let $t_i = c_i/s_i$ and $t = c/s$.

Initially, we simplify the bargaining sub-game slightly, allowing the assignee's opinion to be paired with a single alternative opinion, focusing on the choice of a particular minority writer. As we show, however, this opinion can be thought of as that from the justice with the greatest incentive to write a winning counter-opinion (we make this condition explicit below).

The Final Vote. The final vote pairs the assignee's opinion with a competing opinion drafted by another justice, if any other justice chose to write. Lemma 2 establishes that *the opinion closer to the median justice's ideal point $(0, 1)$ in (p, q) space will prevail in the final vote* (recall that j_m is normalized to zero). If no justice chose to write a counter-opinion, the assignee's opinion automatically prevails.

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[11] Technical assumptions assuring interior solutions are contained in the Appendix.

[12] We focus on an interior solution in that "perfect" (zero-variance) policy-making is likely to be prohibitively costly. The interior solution using a linear cost function is a tractable yet robust approximation for a more general cost function. A linear function allows us to present closed-form solutions.

The logic behind this result is straightforward. First, the voting rule for the justices is simple. Consider two arbitrary opinions $o_L = (p_L, q_L)$ and $o_R = (p_R, q_R)$, with $p_L < p_R$. Since the final vote is the last stage in the bargaining protocol, if $EU_i(o_L) \geq EU_i(o_R)$ then justice i has a (weakly) dominant strategy to vote for opinion o_L over opinion o_R. Each justice prefers whichever opinion is "closer" to her ideal opinion. Second, Lemma 2 proves the following monotonicity property: for any pair of opinions o_L and o_R there exists a point $j^* \in X$ such that for every $j_i < j^*$, $EU_i(o_L) > EU_i(o_R)$, and for every $j_i > j^*$, $EU_i(o_R) > EU_i(o_L)$. In other words, every justice whose most-preferred policy is greater than j^* prefers o_R to o_L while every justice whose most-preferred policy is less than j^* prefers o_L to o_R. This monotonicity property, combined with the voting rule, implies that the median justice's vote is decisive. Consequently, if there are two competing opinions, the one preferred by the median justice will prevail.

Minority counter-opinions. The result in the previous section establishes that any opinion not located at the median justice's ideal point can be beaten by a counter-opinion closer to it. Consequently, given an opinion written by the assignee, a justice considering authoring a counter-opinion must ask herself two questions: First, of the possible successful counter-offers, which one would I most prefer to make? (Investing effort in an opinion that cannot beat the majority is pointless, from the perspective of bargaining, at least.) And second, given the cost of drafting this best winning counter-offer (BWC), is it actually in my interest to do so, rather than accede to the assignee's opinion? Clearly, if the assignee's opinion is to prevail, *every* justice other than the assignee must answer the second question in the negative.

Lemmas 3 and 4 provide precise answers to these two questions. These are easily portrayed graphically, as show in Figure 2. In the figure, Panel 2A illustrates the answer to the first question ("What is my BWC?"); Panel 2B illustrates the answer to the second ("Is writing my BWC worth it?").

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First, consider Panel 2A. Without loss of generality, assume the right wing of the Court is in the initial majority and so some justice J_R with ideal cut-point $j_R \geq 0$ is chosen to write for the majority. Let the assignee's opinion be o_R with $p_R > 0$ (there is a mirror analysis for left-side assignee opinions). Shown in the figure is the median justice's indifference contour passing through o_R. This indifference curve establishes a Winning Counter-Offer Frontier (WCF), since any counter-opinion lying on or above this curve will be (weakly) preferred by the median justice to o_R and hence beat it (formally, this is $q_L \geq p_L^2 + q_R - p_R^2$). Also shown in Figure 2A are three indifference contours indicating the preferences of the potential counter-author, J_L, with $j_L \leq 0$. Because J_L must pay the cost of writing if she wishes to beat the assignee, her ideal point in the policy-quality space is $(j_L, 0)$. Thus, in the figure, J_L's indifference curves lying closer to $(j_L, 0)$ (i.e., toward the south-west) denote higher levels of utility for J_L for writing opinions.

Given this, J_L's best winning counter-offer (BWC) is given by the intersection of the Winning Counter-Offer Frontier and J_L's most south-western indifference curve. This is the point of tangency indicated in the figure as "BWC" (Lemma 3 shows that this point is $o_L^{BWC} = \left(\frac{j_L}{t_L t}, q_R - p_R^2 + \left(\frac{j_L}{t_L t} \right)^2 \right)$).

Now consider Panel 2B, which illustrates the answer to J_L's second question, "Given my BWC, it is worthwhile for me to write?" Shown are o_L^{BWC} and J_L's indifference curve passing through this opinion, given that J_L must pay cost of writing o_L. Also indicated is the assignee's opinion, o_R, as in Panel 2A. Shown close to o_R is another indifference curve for J_L. This curve indicates the *same* level of utility as that yielded by o_L^{BWC}. Note well, however, that the shape of this indifference curve differs dramatically from that passing through o_L^{BWC}, a consequence of the fact that J_L *bears no writing costs for the assignee's opinion o_R*. In the indifference map generated when J_L bears no writing costs, indifference curves lying closer to $(j_L, 1)$ (i.e., towards the north-west) denote higher levels of utility. Since, in the figure, o_R lies to the north-west of the points equivalent to $o_L = BWC$, justice J_L prefers accepting the assignee's opinion to his own best winning counter-opinion, *because*

he must bear the effort-cost of writing a winning counter-opinion. If the assignee's opinion o_R lay further to the south-east (was more extreme or of lower quality), $o_L = BWC$ would lie further to the south-west and hence be more attractive to J_L (o_R is easier to beat). In that case, the BWC might be worth writing.

The Assignee's Opinion. We can now restate the key question slightly: which initial opinions will be stable against a particular potential counter-offering justice J_L? Every non-median opinion is vulnerable to some counter-offer. Only an initial opinion whose associated BWC is not worth the associated costs will be stable (e.g., the initial opinion in Panel 2B). What does the set of such stable opinions look like? This is shown in Panel 2C. Any initial opinion within this set will be accepted by J_L (the associated BWC is too costly relative to the policy gain); any initial opinion outside of it will lead J_L to actually write her BWC and beat the majority. Call the boundary of this set for any particular justice J_L the Winning Offer Frontier (WOF), as shown in the figure (formally, this curve is $q_R = \left(p_R - \frac{j_L}{t_L t}\right)^2 - 1$, as shown in Lemma 4). Along this Frontier, J_L is precisely indifferent between writing herself and accepting the initial majority opinion (we can assume she accepts the initial majority opinion).

With respect to any particular counter-writer, the assignee must write an opinion within the WOF to win. Proposition 1 shows her best choice given this constraint, her Best Winning Offer (BWO). Again, this is easily demonstrated diagrammatically. In Figure 3, Panel 3A, we show a particular WOF. Also shown in the figure are three indifference contours for the assignee (denoted J_R). Because J_R must pay the cost of writing his opinion, his ideal point in the (p, q) space is $(j_R, 0)$, so the contours closer to the southeast corner of the figure are associated with higher utility. The intersection between the assignee's winning offer frontier and his lowest attainable indifference contour—shown by the tangency point labeled BWO in the figure—indicates the assignee's best winning offer. Pulling policy further from the median or investing to a lesser degree in quality will simply induce a winning

counteroffer. This point captures the trade-offs with respect to J_R's own preferences and costs. Proposition 1 also shows (not surprisingly) that the assignee will prefer to make this offer rather than make any losing offer.

However, so far, we have considered only a *single* potential counter-writing justice. As indicated earlier, if the assignee's opinion is to prevail, it must not only deter the composition of the best winning counter-offer for a given justice; it must do so for the best winning counter-offer for *every* justice (including the median justice). In other words, the opinion must be *invulnerable*, to borrow terminology from Schwartz (1992). To be invulnerable, the initial majority opinion must lie within the WOF for each of the potential minority writers (within each of WOF_1 through WOF_5), including the median, none of whom must be willing to pay the costs of beating the initial majority opinion.

Fortunately, this is simpler than it might seem. Lemma 4 also shows that the most constraining of these for interior solutions is the WOF for the potential counter-writer with the most extreme value of $\frac{j_i}{t_i}$. This is the justice with the highest ratio of personal ideology and personal salience to personal costs. If the assignee can deter entry from this justice, she can deter entry from all other potential competitors as well, thereby achieving an invulnerable policy.

Panel 3B, for example, shows the WOFs for all potential counter-writers and the BWO for each. The most constraining of these (the one furthest left) must be met to forestall all counteroffers—call this one the Invulnerable Offer Frontier (IOF). Thus, the Best Invulnerable Offer (BIO) is the point of tangency to the IOF. Thus, if we let J_L be the non-assignee with the most extreme value of $\frac{j_i}{t_i}$, then the BWO shown in Proposition 1 is also the BIO. Formally, the BIO is $o_R^{BIO} = \left(p_R^{BIO}, q_R^{BIO}\right) = \left(\frac{j_R}{t_R t} + \left(1 - \frac{1}{t_R t}\right) \frac{j_L}{t_L t}, \left(\frac{j_R}{t_R t} - \frac{j_L}{(t_R t)(t_L t)}\right)^2 - 1\right)$.

3.3 Comparative Statics in the Bargaining Sub-Game

The comparative statics of the majority opinion follow straight-forwardly from this result. In particular, the *policy content* (p) of the majority opinion and its *legal quality* (q) depend on

three factors: the *characteristics of the assignee*, the *characteristics of the potential counter-writer*, and the *characteristics of the case*. The key characteristics of the assignee and potential counter-writer are their *policy preferences* (ideology), individual interest in the case or issue area (individual *salience* weight), and relevant *expertise* and *ability* (which affect the cost of producing quality). The key characteristics of the case are its overall *importance* and *difficulty* (which again affects the production of quality). In the Appendix, Corollary 2 exhaustively details the comparative statics of the majority opinion formally derived from the bargaining model. Here we highlight a few central results among these.

Characteristics of the assignee. Perhaps the fundamental comparative static is the effect of the assignee's ideology on his opinion's policy content and legal quality. Broadly speaking, an assignee whose ideal policy is close to that of the median justice will write a "centrist" opinion with content close to his most-preferred policy. Not only will the opinion's policy content appeal to the median justice, the opinion's proximity to the median voter leaves little "surplus" to draw the efforts of a counter-writer. Accordingly, the centrist assignee will not need to invest heavily in the opinion's legal quality in order to deter a winning entry by a counter-writer.

In contrast, an extreme assignee will write an opinion with more extreme policy content. The extremity of the opinion makes entry very attractive for a justice on the opposite side of the median, not only because he can moderate the outcome by moving policy toward the court's center, but because he can expropriate some of the policy "surplus" for himself, writing an opinion whose policy content lies on the counter-writer's side of the median. To deter a winning entry from such a justice—in particular, the justice with the greatest incentive to enter—an extremist assignee must craft a very polished, attractive, and high quality (low variance) opinion as compensation. The opinion's quality makes it more attractive to the median justice and thereby raises the cost to the counter-writer of stealing the majority.

Figure 3, Panel 3C illustrates the positive relationship between the assignee's ideology

and the policy content of his opinion, as well as the critical content-quality link that makes possible the positive ideology-content relationship. First, the preferences and skills of the most-motivated potential counter-writer imply a Invulnerable Offer Frontier, labeled IOF in the figure. The assignee must place his opinion on (or to the north-west) of this frontier if it is to remain invulnerable to attack from the other side of the Court. The fact that the IOF is not vertical implies that the assignee has a degree of monopoly power to move the majority opinion toward his ideal policy. But, more extreme assignees must "purchase" this monopoly power by moving their opinion up the Invulnerable Offer Frontier. For example, as shown, J_8 will write a more extreme opinion than J_6 or J_7 but can do only by crafting a higher quality opinion.

Not surprisingly, an assignee with greater interest in the case (higher s_i) or greater expertise (lower c_i) will be more willing or better able to place his opinion closer to his most preferred policy (given the cost of so doing). An assignee not so advantaged will be less able to compensate with quality and will have to compromise ideologically. An assignee with a lesser concern for the case will not be willing to compensate with costly quality and will instead compromise ideologically. For example, in Panel 3C, J_6 and J_7 have the same ideal cut-point, but suppose $c_7 < c_6$ (or, equivalently, that $s_7 > s_6$). Then, as shown, J_7 will write a more extreme opinion, one closer to her ideal policy, with higher quality to compensate.

The following point is more subtle, however. As detailed in Corollary 2, the effects of assignee ideology and ability or interest are *interactive*. That is, lower writing costs (c_i) or increased interest in the case (s_i) for the assignee boost the sensitivity of the opinion's content to the assignee's ideology.[13] The same effect holds for general writing cost and salience, so that the sensitivity of the majority opinion's policy content to the author's ideology increases in more important cases and less difficult cases. Indeed, as detailed in Corollary 2, many variables have interactive effects on content and quality.

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[13]Equivalently, the effects of salience and writing cost are magnified as the assignee becomes more extreme ideologically.

Characteristics of the counter-writer. Perhaps the key effect involving the counter-writer is the constraining effect of her ideology on the majority opinion. All else equal, more extreme opponents impose tighter constraints on the assignee, under-cutting his ability to pull policy in his preferred direction. This result may seem counter-intuitive if one's intuitions have been shaped by standard models of monopoly agenda setting (Romer and Rosenthal 1978, 1979). In those models, a more extreme status quo can allow the agenda setter to pull policy in his preferred direction since the chooser faces a less desirable outcome if he rejects the setter's offer. In the bargaining game studied here, however, an extreme opponent (say, on the left) suffers an intense loss as an assignee (say, on the right) positions a majority opinion far away on the distant side of the median justice. This loss makes an extreme opponent more willing to bear high writing costs in order to craft a winning counter-opinion, to the left of the median. The greater willingness of a more extreme opponent to contest the assignee's opinion forces the assignee to craft a more moderate, higher quality opinion than he otherwise would.

This effect is easily seen in Figure 3, Panel 3B. Suppose Justice 2 were bound to be the writer of the potential counter-offer. Given Justice 2's preferences and abilities, the indicated WOF maps out the possible opinions J_R may offer and win. Of these, his best opinion is indicated. Now suppose instead Justice 1 were the counter-writer, noting that Justice 1's preferences are more extreme. Ceteris paribus, the WOF "shifts" to the left, as indicated, and the assignee is compelled to offer a more moderate and higher quality opinion, lest he lose the majority. Straightforwardly, an opponent with lower writing costs or high individual salience (all else equal) will impose greater constraints on the assignee and lead to more moderate and higher quality opinions.

Note that the quality of the majority opinion increases as *either* side becomes more extreme. An increased level of competition between the assignee and the potential counter-writer (a more polarized Court) thus manifests itself in a higher quality opinion.

Characteristics of the case. Suppose a case is more important or more complex across the board—what happens to opinion policy content and quality? As indicated in Corollary 2, the effects of greater importance s or decreased complexity c on content are complex, perhaps not surprisingly. After all, greater saliency or decreased complexity increases the willingness or ability of the assignee to pull policy toward his most preferred position, but they also enhance the willingness of the potential counter-writers to contest the assignee's opinion. A priori, the effects on *policy* of greater importance and decreased complexity are ambiguous, depending delicately on the exact balance of parameters. The situation is quite different for opinion *quality*, however: more salient and less complex cases result unambiguously in higher quality opinions. Not surprisingly, justices value quality more in more important cases (the loss due to more variable policy outcomes is magnified, so that quality is relatively cheaper). Lowering the "price" of quality (c) has a similar effect as a decrease in complexity. All justices find it cheaper to invest in quality, but the effect on policy again depends on the delicate balance of parameters.

4   Opinion Assignment

If the Chief Justice is a member of the initial majority coalition (empirically, this is by far the most common occurrence), he assigns the opinion; if not, the senior justice in the majority does so. In either case, the bargaining model has strong implications for opinion assignment. We first discuss implications that come directly from the bargaining model's formal comparative statics. Then, less formally, we briefly consider additional implications involving workload. All results are gathered in Corollaries 2 and 3. Let the Chief Justice be J_C with ideal cut-point $j_C \geq 0$ (that is, we assume he is on the side of the initial majority), with cost and salience terms c_C and s_C.

In considering opinion assignment, the following points are central. First, the opinion assignor always prefers larger values of the valence dimension (e.g., smaller variance) and

more ideologically proximate opinions (relative to his own ideal policy). Hence, when the opinion assignor is ideologically extreme relative to the median justice, both preferences encourage assignment to extreme opinion writers (extreme in the same direction as the assignor, of course). This is because such a writer will work hard to craft a high quality opinion that can pull the case's ideological placement from the median.

However, if the assignor is more moderate ideologically than many other justices, the two incentives can pull in opposite directions. That is, assignment to an ideologically proximate (moderate) justice will yield an ideologically attractive opinion, but at lower levels of quality than would result from assignment to a justice more distant from the median. (The details of this trade-off follow from Corollaries 2 and 3.) In what follows, we focus on the former case—that is, relatively extreme assignors—as recent Chief Justices meet this description. We would expect weaker or mixed results when the Chief Justice is more centrist. (This hypothesis itself is new to the literature.)

4.1 Direct Implications of the Bargaining Model

Self-assignment. If the Chief Justice assigns an opinion to himself, he must pay the authorship cost required to retain a majority. On the other hand, if he assigns the opinion to another justice, he can avoid these authorship costs. Comparing his utility function under both of these scenarios (shown in Corollary 3), it is easy to see that Chief Justices will typically prefer to assign to other justices rather than themselves, so long as some assignee's ideal point lies close enough to the Chief Justice's own. (Indeed, if the Chief Justice has a clone in terms of ideology and ability, then assignment to that justice will yield the very same policy outcome without the cost of self-assignment.) Accordingly, all else equal, the probability that an extreme Chief Justice assigns to himself should be lower than the probability he assigns to others.

This hypothesis stands in opposition to the conventional wisdom, which holds that the Chief Justice should disproportionately assign to himself (Slotnick 1978, Brenner 1993,

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Maltzman and Wahlbeck 1996, Maltzman et al. 2000). However, Maltzman et al. (2000) provide empirical evidence that, in fact, Chief Justice Burger did eschew self-assignment.

Assignment to the wings. Strikingly, the bargaining model predicts that an opinion's ideological location will lie between the ideal point of the writer and that of the median justice. In addition, as discussed earlier, more extreme writers must invest more heavily in judicial craftsmanship, in order to hold the majority. Both of these features will lead the Chief Justice (or other assigner) to favor writers who are more extreme ideologically than he is himself.

By assigning to a more extreme justice, the assignor can ensure that the ideological placement of the opinion can be closes to his ideal point of the assigner, given the moderating influence of bargaining; in addition, the assigner will benefit from a higher quality opinion than if he assigned to a more centrally located justice. Thus, a direct implication of the bargaining model is that the Chief Justice should assign disproportionately to justices in his "wing" of the Court who are more extreme than he himself is, all else equal.

In contrast, most of the existing literature has adopted a straightforward proximity hypothesis in which assignors such as the Chief Justice disproportionately assign to ideological allies (Murphy 1964; Ulmer 1970; Rohde 1972; Rohde and Spaeth 1976; Maltzman and Wahlbeck 1996; Maltzman et al. 2000).[14] In the model studied here, the assigner will favor more proximate justices rather than more distant ones among the justices lying between himself and the median. Thus, a straightforward proximity hypothesis applies to these justices. However, the prediction that the assigner will be even more inclined to assign to justices who lie further out on his wing of the Court than he himself appears to be new to the literature. Existing empirical work has not examined this asymmetric effect of ideological distance (this might explain mixed findings as to the proximity hypothesis—e.g., Maltzman and Wahlbeck 1996; Maltzman et al. 2000).

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[14]The underlying assumption for this hypothesis would then have to be that the author will write at or very close to his own ideal point so that this ideal point is a close proxy for a bargaining outcome, but this assumption suggests bargaining does not occur or does not affect policy.

Expert writers, highly productive writers, and freshmen writers. Justices with particular expertise or experience in an issue area face lower costs for investing in judicial craftsmanship—it is easier for them to write high quality (low variance) opinions. Thus, these writers produce higher quality opinions and need not compromise so heavily toward the ideological preferences of the median justice. Accordingly, relatively extreme assignors will favor such justices. Similar logic suggests that relatively extreme assignors will favor justices who are highly productive across the board (that is, they lower writing costs), and will tend to disfavor freshman justices who typically face higher writing costs as they learn the ways of the Court. (Recall Panel 3C, showing that a justice with a lower cost (J_7, as compared to J_6) will produce a more extreme, higher quality opinion, all else equal.)

Many scholars have suggested that the Chief Justice will favor expert writers and productive writers and tend to disfavor freshman (e.g., Brenner 1984, Brenner and Hagle 1996, Brenner and Palmer 1988, Brenner and Spaeth 1988, Hagle 1993, Howard 1968, Segal and Spaeth 1993, Maltzman and Wahlbeck 1996, Epstein and Knight 1998, Maltzman et al. 2000, Wood et al. 1998). The empirical evidence seems clearly to favor the hypotheses. However, the existing literature typically explains the observed behavior on the basis of organizational needs, efficiency, the goodwill of the justices, acceptance in the legal community, legitimacy, and so on, rather than the policy interests of the assignor in tandem with the bargaining strengths and weaknesses of the assignee.

Case Importance. The formal comparative statics detailed in Corollaries 2 and 3 also indicate a subtle role for case importance: greater case importance magnifies the effect of variables that increase or decrease the attractiveness of justices as assignees. That is, importance interacts with variables like expertise, productivity, ideological proximity among justices toward the median, asymmetric assignment among more extreme justices in the assignee's wing, and so on. The most important the case, the greater the incentive for the assignor to find an assignee with "attractive" qualities (ideological or in terms of ability).

For example, finding an issue expert is more important in more important cases, as the effect on policy placement are larger in such cases. Numerous studies suggest that case importance may dispose the assignor to favor more proximate assignees (Ulmer 1970, Rohde 1972, Slotnick 1978, Brenner 1993, Maltzman and Wahlbeck 1996, Maltzman et al. 2000). However, the pervasive interaction of case salience (importance) with the other variables, such as expertise and productivity, is new to the literature.

Characteristics of Minority Justices. The more extreme the opponent or the greater his expertise, the greater the effects of assignee expertise and ideology, so that the assignor will have greater incentives to find an effective assignee. This set of hypotheses, derived in Corollary 2, is new to the literature.

4.2 Workload Effects

Up to this point, we have assumed each opinion is separable from all others. This assumption greatly simplifies the analysis, allowing each case to be analyzed without reference to others. Clearly, however, effort devoted to one case cannot be devoted to another. Thus, each justice must decide how to allocate effort across all the cases in her current portfolio of cases, and the Chief or other justice who assigns an opinion must consider the consequences of a heavier workload not only for the resolution of the instant case but for all the others in the assignee's portfolio. Deriving closed form solutions to this effort allocation-case assignment problem involves solving a formidable integer programming problem, a task beyond this article. However, a number of implications are straightforward, and we briefly discuss these here.

In considering workload effects, perhaps the most direct approach is to assume that a heavier workload raises the effort-cost of writing. The consequences for the instant case are immediate (see Corollary 2): as workload increases and thus effort-costs rise, a justice moderates her opinion in the instant case ideologically (the opinion shifts toward the median)

and crafts the opinion with less diligence (its quality falls). And, the effects of the justice's ideology become more muted and the effects of case salience decrease. Thus, a relatively extreme Chief Justice may avoid assigning to a justice who would otherwise be an attractive assignee if her workload were lighter—because she will place the case too close to the median justice and will devote so little effort to crafting it well as compared to an assignee less attractive otherwise but with a lighter workload. Empirically, this would mean that the higher the workload of a justice, all else equal, the less likely it is that she should be assigned an additional case on the margin.

The assignment allocation problem, then, has two main implications. First, it highlights the need to balance workload—as a purely selfish strategic choice. The Chief Justice's own ideological payoff suffers if he loads any one attractive assignee with too many opinions to write. (In contrast, in the existing literature, as mentioned earlier, workload hypotheses are typically rationalized as egalitarian impulses or organizational needs.) Second, given the dampening effect of workload on individual case incentives, this analysis highlights the distinction between important and less important cases.

In fact, given this dynamic, it is easy to see that a strategic Chief Justice may "reserve" the most attractive assignees (those whose ideology is even more extreme than her own, or, if not, those who are most proximate; those who are issue experts; those with more experience; etc.) for the cases the Chief values the most. This implies that, not only might observed assignment patterns be dampened in unimportant cases, but the Chief Justice might very well assign unimportant cases to justices *far* from her own ideal point, while disproportionately assigning important cases to proximal or otherwise desirable justices. Important cases can so dominate the assignment calculus as to push unimportant cases to ideologically unattractive assignees. This means that clean and decisive empirical tests for ideological assignment must rest on important cases. Interestingly, contrary to their expectations, the empirical results in Maltzman et al. (2000, 51) show that Chief Justice Burger assigned low salience cases to ideologically *distant* justices.

5   Discussion and Conclusion

We have presented a formal game-theoretic model of bargaining on the U.S. Supreme Court. The model's point of departure is a distinctive feature of Ango-American appellate court practice, the extensive written commentary that constitutes an "opinion." The model shows how the costliness of producing well-crafted opinions allows assignees to pen ideologically non-centrist opinions that prevail despite the opportunity for other justices to offer rival opinions, thus explaining an important foundational puzzle. As a result, opinion assignment becomes a critical element of judicial strategy, as has long been suggested by acute observers of the Court (Murphy 1964).[15]   Furthermore, this model helps to explain why legal expertise and quality might matter, even from the viewpoint of self-interested policy-making. Indeed, one normative implication of the model is that while ideological competition can lead to non-centrist policy outcomes, it also can lead to a greater investment in legal quality and a reduction of policy uncertainty.

Direct empirical tests of the bargaining model require better or more nuanced data on the policy content and craftsmanship of opinions than is presently available.   However, the model's implications for opinion assignment are generally straightforward and testable. As we discuss, the model affords a logically consistent explanation for many well-known findings in the empirical literature on opinion assignment. In addition, it suggests a variety of new, potentially testable propositions.   Among these are the desirably of avoiding self-assignment, the attractiveness of assigning to the "wings" of the Court rather than on the basis of simple ideological proximity, the interactive impact of case importance (salience) on other key variables, and the impact of the minority's characteristics, such as ideological extremity and expertise.

In contrast with the extensive literature applying modern game theoretic methods to decision-making in legislatures, the equivalent literature on decision-making on collegial

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[15]The model may be extended to address earlier parts of the Supreme Court's bargaining protocol, such as the initial conference vote and, possibly, cert decisions. Space limitations preclude attention to these questions here.

courts remains sparse. How best to model the distinctive elements of the judicial process, such as analogical reasoning, legal rules, dissents, and concurrences remain an open question. Indeed, it remains unclear which elements are truly significant. The analysis presented here suggests that one distinctive element, the desirability of producing well-crafted opinions, can have substantive implications for the content of Supreme Court policy. Which other elements do as well remains a topic for future research.

6 Appendix: Formal Results

Cost Assumptions For an interior solution, we assume the following, which reflect that quality is costly and that perfect quality/zero variance is not achieved): $t_i t > 1 \forall i$, $t_L t \geq -2j_L$, $t_R \geq \frac{j_R t_L t - j_L}{j_L}$, and $\frac{j_R t_L t - j_L}{t_L t^2 \sqrt{2}} \leq t_R \leq \frac{j_R t_L t - j_L}{t_L t^2}$.

Lemma 1 *The expected utility of an opinion with mean p and variance $(1-q)$ is $E(-s_i s(j_i - \bar{r})^2) = -s_i s \left((j_i - p)^2 + 1 - q \right)$.*

Proof. The outcome $\bar{r}$ is drawn from random variable $X \sim (p, 1 - q)$, so that the expected utility is $E(-s_i s(j_i - \bar{r})^2)$. Note that $p = E(X)$ and variance $(1 - q) = E(X^2) - (E(X))^2 = E(X^2) - p^2$, and so $E(X^2) = (1 - q) + p^2$. Then, $E(-s_i s(j_i - X)^2) = -s_i s E(j_i^2 + X^2 - 2j_i X) = -s_i s [E(j_i^2) + E(X^2) - 2j_i E(X)] = -s_i s(j_i^2 + (1 - q) + p^2 - 2j_i p) = -s_i s \left((j_i - p)^2 + 1 - q \right)$.
∎

Lemma 2 *(1) J_i weakly prefers o_L to o_R if and only if $q_L - (j_i - p_L)^2 \geq q_R - (j_i - p_R)^2$. (2) If $p_L < p_R$, J_i weakly prefers o_L if $j_i \leq j^*$, where $j^* = \left(q_L - q_R + 2j_i p_L + p_R^2 - p_L^2 \right) / 2(p_R - p_L)$. (3) The vote of J_M will be decisive, so that o_L will win by majority vote if and only if $q_L - p_L^2 \geq q_R - p_R^2$.*

Proof. (1) o_L is preferred to o_R by J_i if $-s_i s \left((j_i - p_L)^2 + 1 - q_L \right) \geq -s_i s \left((j_i - p_R)^2 + 1 - q_R \right)$, which is equivalent to $q_L - (j_i - p_L)^2 \geq q_R - (j_i - p_R)^2$. (2) Solving for j_i, this is equivalent to $j_i \leq \left(q_L - q_R + 2j_i p_L + p_R^2 - p_L^2 \right) / 2(p_R - p_L) = j^*$, if $p_L < p_R$. (3) If $j_5 \leq j^*$ then,

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since $j_{i\in(1,4)} \leq j_5$, $j_{i\in(1,5)} \leq j^*$, and so o_L will have majority support. If $j_5 > j^*$, then, since $j_{i\in(6,9)} \geq j_5$, $j_{i\in(1,5)} > j^*$, and so o_R will be strictly preferred by a majority. Since $j_5 = j_m = 0$, the condition above reduces to $q_L - p_L^2 \geq q_R - p_R^2$ (the WCF) and $u_m(o)$ is maximized at $(0,1)$. ∎

Lemma 3 *The Best Winning Counteroffer (BWC) is*

$$o_L^{BWC} = \begin{cases} \left(-\sqrt{1 + p_R^2 - q_R}, 1\right) & \text{if } p_R^2 - q_R < \left(\frac{j_L}{t_L t}\right)^2 - 1 & \text{— Region 1} \\ \left(\frac{j_L}{t_L t}, q_R - p_R^2 + \left(\frac{j_L}{t_L t}\right)^2\right) & \text{if } p_R^2 - q_R \in \left[\left(\frac{j_L}{t_L t}\right)^2 - 1, \left(\frac{j_L}{t_L t}\right)^2\right] & \text{— Region 2} \\ \left(-\sqrt{p_R^2 - q_R}, 0\right) & \text{if } p_R^2 - q_R \in \left(\left(\frac{j_L}{t_L t}\right)^2, j_L^2\right] & \text{— Region 3} \\ (j_L, 0) & \text{if } p_R^2 - q_R > j_L^2 & \text{— Region 4} \end{cases}$$

Proof. J_L's payoff for making a winning counteroffer is $s_L s \left(q_L - (j_L - p_L)^2 - 1\right) - c_L c(1 + q_L)$, with slope $\frac{dq_L}{dp_L} = \frac{-2(p_L - j_L)}{t_L t - 1}$. For an interior solution, in equilibrium, the slope of this must equal the slope of the WCF, $\frac{dq_L}{dp_L} = 2p_L$, and so $p_L^{BWC} = \frac{j_L}{t_L t}$. To win, given the WCF, $q_L^{BWC} - \left(p_L^{BWC}\right)^2 \geq q_R - p_R^2$, and so $q_L^{BWC} = q_R - p_R^2 + \left(\frac{j_L}{t_L t}\right)^2$. This quality will only be an interior solution, within $[0,1]$, if $p_R^2 - q_R \in \left[\left(\frac{j_L}{t_L t}\right)^2 - 1, \left(\frac{j_L}{t_L t}\right)^2\right]$, Region 2. Region 1 captures the corner solution at perfect quality and Region 3 shows the corner solution for minimum quality. For Region 4 offers, J_L's ideal counteroffer itself is within the WCF. Note that, if the J_L is the median justice, J_M, only Regions 2 and 4 are possible. ∎

Lemma 4 J_L *will not make his BWC if the following conditions hold, which define the Winning Offer Frontier for justice J_L (WOF_L):*

$$WOF: \begin{cases} q_R \geq 1 - \frac{t_L t}{j_L^2}\left(2j_L p_R + t_L t\right) & \text{if } o_R \in \text{Region 1} \\ q_R \geq \left(p_R - \frac{j_L}{t_L t}\right)^2 - 1 & \text{if } o_R \in \text{Region 2} \\ q_R \geq \frac{t_L t p_R}{j_L} - \left(\frac{t_L t}{2j_L}\right)^2 & \text{if } o_R \in \text{Region 3} \\ q_R \geq (p_R - j_L)^2 - t_L t & \text{if } o_R \in \text{Region 4} \end{cases}$$

If J_L is the justice with most extreme value of $\frac{j_i}{t_i}$, then this is also the Invulnerable Offer Frontier (IOF).

Proof. In Region 2, for J_L to prefer not to make his BWC, $u_L^{BWC} = c_L c(-1 + p_R^2 - q_R) - s_L s(1 + j_L^2 + p_R^2 - q_R) + \frac{(j_L s_L s)^2}{c_L c}$ must be less than the utility for accepting o_R which is $s_L s(q_R - 1 - (p_R - j_L)^2)$, and so $q_R \geq \left(p_R - \frac{j_L}{t_L t}\right)^2 - 1$ (equivalently, $\frac{j_L}{t_L} < t\left(p_R - \sqrt{1 + q_R}\right)$). The WOF for other regions can be found similarly. If $\frac{j_i}{t_i} < t\left(p_R - \sqrt{1 + q_R}\right)$ for all $i \leq 5$, then no minority justice nor the median will make a counteroffer and the initial majority opinion will win. ∎

Proposition 1 *J_R's will make her Best Winning Offer (BWO), which is*

$$
o_R^{BWO} = \begin{cases} \left(j_R + \frac{t_L t(t_R t - 1)}{j_L}, 1 - \frac{2 j_R t_L t}{j_L} - \left(\frac{t_L t}{j_L}\right)^2 (2 t_R t - 1)\right) & \text{if } o_R \in \text{Region 1} \\[2mm] \left(\frac{j_R}{t_R t} + \left(1 - \frac{1}{t_R t}\right) \frac{j_L}{t_L t}, \left(\frac{j_R}{t_R t} - \frac{j_L}{(t_R t)(t_L t)}\right)^2 - 1\right) & \text{if } o_R \in \text{Region 2} \\[2mm] \left(j_R + \frac{t_L t(t_R t - 1)}{2 j_L}, -\frac{j_R t_L t}{j_L} - \left(\frac{t_L t}{j_L}\right)^2 \left(\frac{2 t_R t - 1}{4}\right)\right) & \text{if } o_R \in \text{Region 3} \\[2mm] \left(\frac{j_R + j_L(t_R t - 1)}{t_R t}, -t_L t + \left(\frac{j_R - j_L}{t_R t}\right)^2\right) & \text{if } o_R \in \text{Region 4} \end{cases}
$$

If J_L is the justice with most extreme value of $\frac{j_i}{t_i}$, then this is also the Best Invulnerable Offer (BIO).

Proof. J_R's payoff for making a winning offer is $s_R s\left(q_R - (j_R - p_R)^2 - 1\right) - c_R c(1 + q_R)$, with slope $\frac{dq_R}{dp_R} = \frac{-2(p_R - j_R)}{t_R t - 1}$. For an interior solution (Region 2), in equilibrium, the slope of this must equal the slope of the WOF, $\frac{dq_R}{dp_R} = 2 p_R - \frac{2 j_L}{t_L t}$. So, $p_R^{BWO} = \frac{j_R}{t_R t} + \left(1 - \frac{1}{t_R t}\right)$, and since the BWO must be on the WOF, with $q_R^{BWO} = \left(p_R^{BWO} - \frac{j_L}{t_L t}\right)^2 - 1$, $q_R^{BWO} = \left(\frac{j_R}{t_R t} - \frac{j_L}{(t_R t)(t_L t)}\right)^2 - 1$. Other regions yield similar results. If J_R's ideal point for making offers $(j_R, 0)$ is itself within the WOF, then she can simply make this offer. To show that, for an interior solution, J_R will make her BWO (and not purposely make a losing offer), we assume that $(t_L t)^2 > j_L^2$, so that $(0,0)$ is in Region 2 of the offer space. Among the set of losing offers (those outside of the WOF), what is the best J_R can do? Given a losing offer in Region 2, and the BWC response to this losing offer, the payoff to J_R is $\left(-\frac{1}{c_L c}\right) \cdot \left(c^2 c_L c_R(1 + q_R) + c_L c s_R s\left(1 + j_R^2 + p_R^2 - q_R\right) - 2 j_L j_R s^2 s_L s_R\right)$. The derivatives of this is with respect to p_R and to q_R are negative, so that any losing offer with lower p_R and q_R is preferred. The best losing offer thus approaches the WOF at $q_R = 0$, which

happens at $p_R = 1 + \frac{j_L}{t_L t}$. The limit of such losing offers as $p_R \rightarrow \left(1 + \frac{j_L}{t_L t}\right)$ yields a payoff of $\left(-\frac{1}{c_L^2 c^2}\right) \cdot (c^3 c_L^2 c_R (1 + q_R) + c_L c s_R s \left(1 + j_R^2 + p_R^2 - q_R\right) - 2 j_L j_R s^2 s_L s_R$, which is less than the utility of the winning offer $\left(1 + \frac{j_L}{t_L t}, 0\right)$, which is $s_R s \left(-1 - \left(1 - j_R + \frac{j_L s_L s}{c_L c}\right)^2\right) - c_R c$. This winning offer yields a weakly lower payoff than the BWO, by definition, and so J_R will make her BWO over any losing offer. Given Lemma 4, if J_L has the most extreme value of $\frac{j_i}{t_i}$, then no other justice will respond either, making the initial offer invulnerable. ∎

Corollary 2 *(1) For an interior solution, the mean of the BWO, p_R^{BWO}, increases as j_R, j_L, and t_L increase and it decreases as t_R increases. Increases in t increase p_R^{BWO} if and only if $(t_R t - 2)(-j_L) > j_R t_R t$. The quality of the BWO, q_R^{BWO}, increases as j_R increases, and it decreases as j_L, t_R, t_L, and t increase. (2) The effects of j_R (author ideology) on the winning offer are magnified for lower t, t_R, and t_L, and for a more extreme j_L. The effects of t_R and of t are magnified by higher j_R. The effects of t_R are magnified for lower t and t_L and for more extreme j_L. The effects of c_R are magnified by higher s_R, and the effects of s_R are magnified by lower c_R.*

Proof. (1) The first set of comparative statics follow from the signs of the first derivatives of the bargaining solution in Region 2 with respect to the parameters. $\frac{\partial}{\partial j_R} p_R^{BWO} = \frac{1}{t_R t}$ (+), $\frac{\partial}{\partial j_L} p_R^{BWO} = \frac{t_R t - 1}{t_R t_L t^2}$ (+), $\frac{\partial}{\partial t_R} p_R^{BWO} = \frac{j_L - t_L t j_R}{t_R^2 t^2 t_L}$ (-), $\frac{\partial}{\partial t_L} p_R^{BWO} = \frac{j_L (1 - t_R t)}{t_L^2 t^2 t_R}$ (+), and $\frac{\partial}{\partial t} p_R^{BWO} = -\frac{j_R t_L t + j_L (t_R t - 2)}{t_R t_L t^3}$. The latter is positive if the above condition holds. $\frac{\partial}{\partial j_R} q_R^{BWO} = -\frac{2(j_L - j_R t_L t)}{t_L t_R^2 t^3}$ (+), $\frac{\partial}{\partial j_L} q_R^{BWO} = \frac{2(j_L - j_R t_L t)}{t_L^2 t_R^2 t^4}$ (-), $\frac{\partial}{\partial t_R} q_R^{BWO} = \frac{-2(j_L - j_R t_L t)^2}{t_L t_R^3 t^4}$ (-), $\frac{\partial}{\partial t_L} q_R^{BWO} = -\frac{2(j_L - j_R t_L t)}{t_L^3 t_R^2 t^4}$ (-), and $\frac{\partial}{\partial t} q_R^{BWO} = -\frac{2(-2 j_L + j_R t_L t)(-j_L + j_R t_L t)}{t_R^2 t_L^2 t^5}$ (-). (2) The second set of comparative statics follow from the sign of the second derivatives as compared to the first derivative, that is, whether the sensitivity of the bargaining outcome is increased in an absolute sense or dampened. $\frac{\partial}{\partial t_R} \left(\frac{\partial}{\partial j_R} p_R^{BWO}\right) = \frac{-1}{t_R^2 t}$ (-), $\frac{\partial}{\partial t_R} \left(\frac{\partial}{\partial j_R} q_R^{BWO}\right) = \frac{4(j_L - j_R t_L t)}{t_R^3 t^3 t_L}$ (-), $\frac{\partial}{\partial t} \left(\frac{\partial}{\partial j_R} p_R^{BWO}\right) = \frac{-1}{t_R t^2}$ (-), $\frac{\partial}{\partial t} \left(\frac{\partial}{\partial j_R} q_R^{BWO}\right) = \frac{6 j_L - 4 j_R t_L t}{t_R^2 t^4 t_L}$ (-), $\frac{\partial}{\partial t} \left(\frac{\partial}{\partial t_R} p_R^{BWO}\right) = \frac{-2 j_L + j_R t_L t}{t_L t_R^2 t^3}$ (+), $\frac{\partial}{\partial t} \left(\frac{\partial}{\partial t_R} q_R^{BWO}\right) = \frac{4(-2 j_L + j_R t_L t)(-j_L + j_R t_L t)}{t_R^3 t^5 t_L^2}$ (+), $\frac{\partial}{\partial c} \left(\frac{\partial}{\partial s} p_R^{BWO}\right) = \frac{j_L - j_R t_L t}{c_R^2 t^2 t_L}$ (-), $\frac{\partial}{\partial c} \left(\frac{\partial}{\partial s} q_R^{BWO}\right) = -\frac{4 s_R (j_L - j_R t_L t)^2}{t_L^2 c_R^3 t^4}$ (-), $\frac{\partial}{\partial j_L} \left(\frac{\partial}{\partial j_R} p_R^{BWO}\right) = 0$, $\frac{\partial}{\partial j_L} \left(\frac{\partial}{\partial j_R} q_R^{BWO}\right) = -\frac{2}{t_R^2 t^3 t_L}$ (-), $\frac{\partial}{\partial t_L} \left(\frac{\partial}{\partial j_R} p_R^{BWO}\right) = 0$, $\frac{\partial}{\partial t_L} \left(\frac{\partial}{\partial j_R} q_R^{BWO}\right) = \frac{2 j_L}{t_R^2 t^3 t_L^2}$

(-), $\frac{\partial}{\partial j_L}(\frac{\partial}{\partial t_R} p_R^{BWO}) = \frac{1}{t^2 t_L t_R^2}$ (+), $\frac{\partial}{\partial j_L}(\frac{\partial}{\partial t_R} q_R^{BWO}) = -\frac{4(j_L - j_R t_L t)}{t_R^3 t^4 t_L^2}$ (+), $\frac{\partial}{\partial t_L}(\frac{\partial}{\partial t_R} p_R^{BWO}) = \frac{-j_L}{t^2 t_L^2 t_R}$ (+), $\frac{\partial}{\partial t_L}(\frac{\partial}{\partial t_R} q_R^{BWO}) = \frac{4j_L(j_L - j_R t_L t)}{t_R^3 t^4 t_L^3}$ (+). ∎

Corollary 3 *All else equal, the Chief Justice's utility is higher if he does not self-assign. All else equal, a relatively extreme Chief Justice favors more extreme assignees and those with lower t_i terms. A moderate Chief Justice faces cross-cutting incentives.*

Proof. If he assigns the opinion to J_R, his utility is $s_C s \left(q_R^{BWO} - (j_C - p_R^{BWO})^2 - 1 \right)$. If he self assigns, his utility is $s_C s \left(q_C^{BWO} - (j_C - p_C^{BWO})^2 - 1 \right) - c_C c(1 + q_C^{BWO})$, as he must himself pay the cost of the opinion. All else equal, the latter contains an addition cost of $-c_C c(1 + q_C^{BWO})$. Given an interior solution, the derivative of the J_C's utility function with respect to the position of the assignee j_R is $\frac{2s_C s(j_C t_L t - j_L)}{t_L t_R t^2}$ so that a more extreme author is preferred. If $(j_R, 0)$ itself is inside the IOF, then this will win and the derivative is $2(j_C - j_R)s_C s$ such that a closer author is preferred. The rest follows from the bargaining solution's comparative statics (for example, higher assignee costs moderate policy and decrease quality. ∎
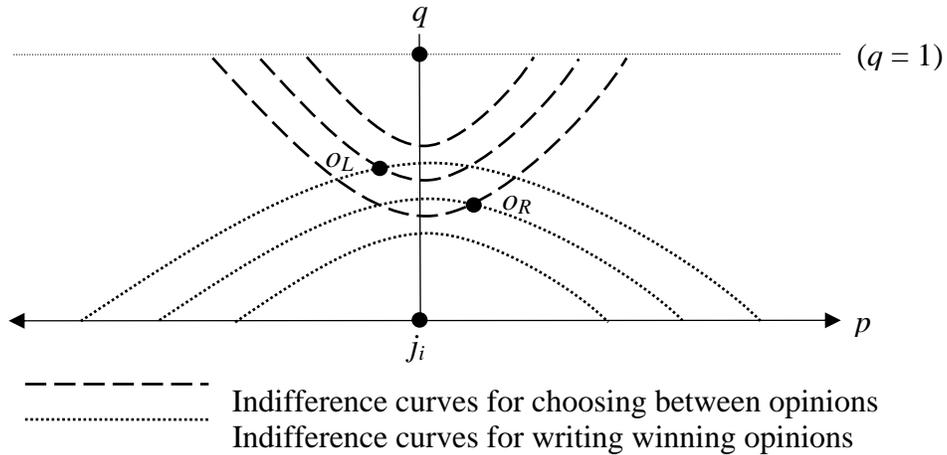
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Figure 1: Comparing Opinions in an Opinion Space

Indifference curves for choosing between opinions
Indifference curves for writing winning opinions

The top set of indifference curves does not take into account the costs of writing, so that the justice's ideal opinion is $(j_i,0)$. The bottom set does take these into account, so her ideal opinion then lies at $(j_i,1)$. J_i would vote for o_L over o_R, as the former is closer to her ideal opinion at $(j_i,1)$. If she had to pay the costs to write these opinions, however, she would rather write the latter, as it is closer to $(j_i,0)$.

Figure 2: Counteroffers

## Panel 2A: What is the best counteroffer J_L can make?

------- The winning counteroffer frontier, *WCF*.

.... Indifference curves for J_L to beat o_R
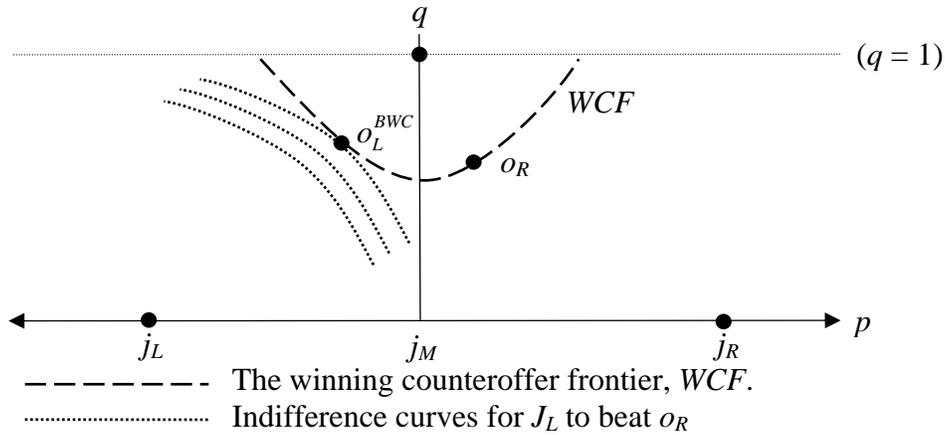
J_L must meet the indifference curve of J_M given o_R, which is the winning counteroffer frontier (*WCF*). The best winning counteroffer (*BWC*) is the point of tangency given J_L's own indifference curves.

Panel 2B: Should J_L make the best counteroffer?

------- Indifference curve for accepting offers

.... Indifference curve for making counteroffers
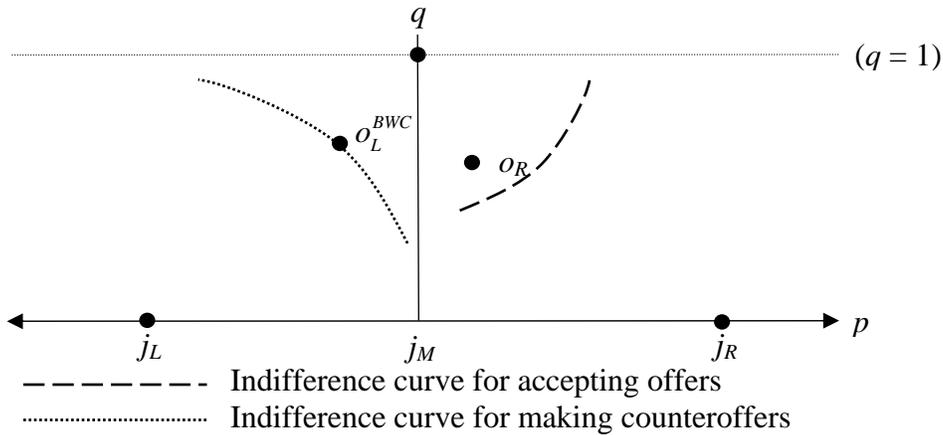
The two indifference curves indicate the same level of utility to J_L. Since o_R lies above this curve, it is better for J_L to accept it, rather than pay the costs of writing the BWC.

Panel 2C: When will J_L make a (best) counteroffer?
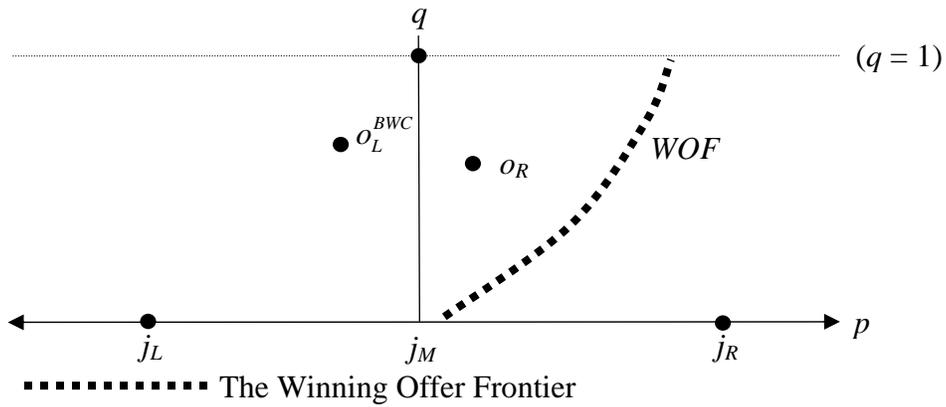
Any initial opinion to the left of this curve, including o_R, is sufficiently attractive to J_L that she will not pay the costs of making a counteroffer. Any initial opinion to the right of this curve is sufficiently unattractive that J_L will find it worthwhile to make the associated BWC.

Figure 3: Initial Offers

Panel 3A: What is the best winning offer J_R can make against J_L?

q

$(q = 1)$

O_R^{BWO}

WOF

j_L j_M j_R p
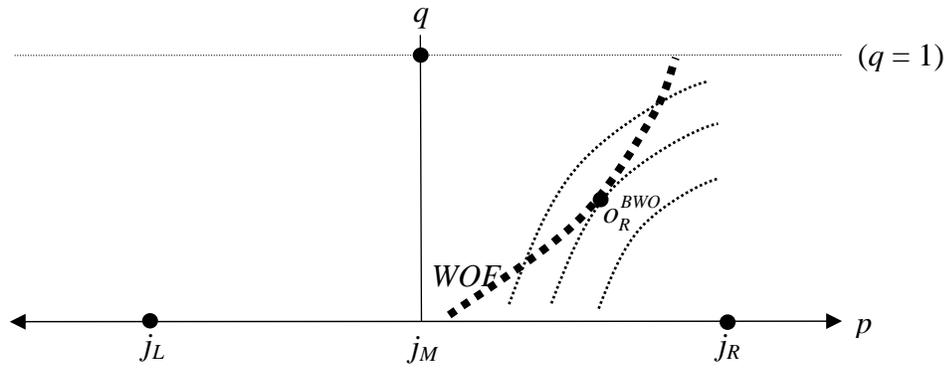
- - - - - - - - - - - The winning offer frontier (WOF)
.... Indifference curves for J_R to write a winning opinion

J_R must meet the winning offer frontier. The best winning offer (BWO) is the point of tangency given her own indifference curves.

Panel 3B: What is J_R's best invulnerable offer?

q

$(q = 1)$

IOF, WOF_1 WOF_2 $WOF_{3,4}$

BIO

j_1 j_2 j_3 j_4 j_M j_R p
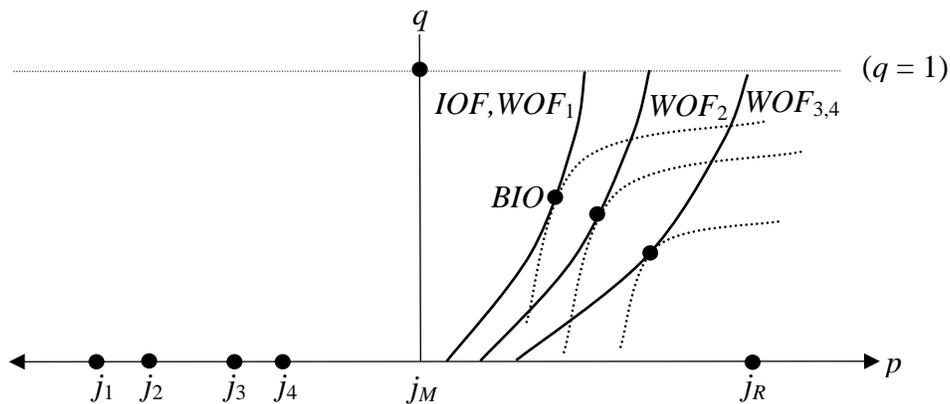
——————— Winning Offer Frontiers for J_1, J_2, J_3, and J_4
.... Indifference curves for the majority assignee

The winning offer frontiers for four minority counter-offer writers are shown. In this example, J_1 has the most extreme WOF, so it is the most constraining. Therefore, WOF$_1$ is the Invulnerable Offer Frontier (IOF) and the tangency point to J_R's indifference curve is the best invulnerable offer (BIO). J_3 has a more extreme ideal point than J_4, but the former's costs are assumed higher, so they share the same *WOF*.

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Panel 3C: What initial invulnerable offer will different assignees make?
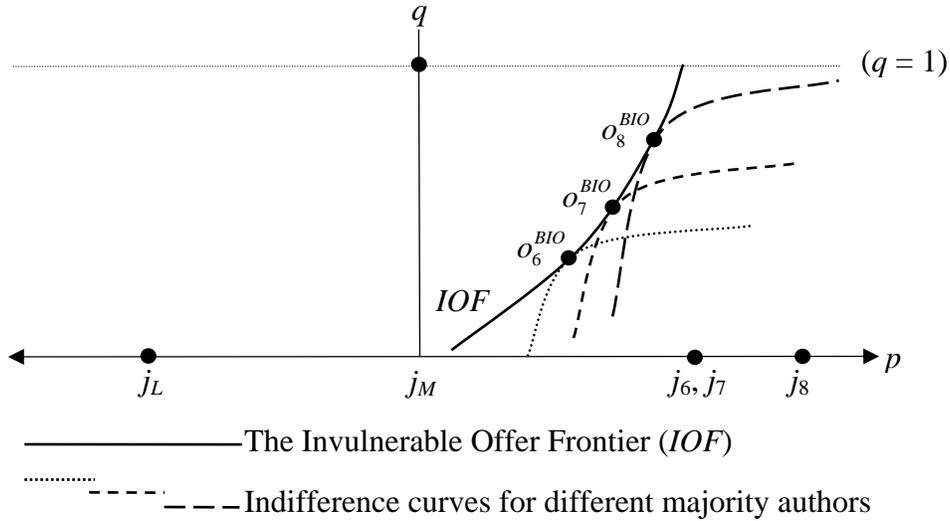
The best invulnerable offers are shown for three possible majority assignees, J_6, J_7, and J_8. The first two of these, J_6 and J_7, have the same ideal point, but the latter is assumed to have lower writing costs (or, higher salience) so that she prefers to write an opinion higher on the Invulnerable Offer Frontier (more extreme, but higher quality).