The Judging Game

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Abstract

We ask whether the decisions of a rational and impartial judge can be distinguished from a coin toss. The question is inspired by the logic of the selection effect: Cases that have a clear outcome tend to be settled out of court. But that means that the cases that tend to go to court are often decided by small shocks on perceptions, the equivalent of a coin toss. That conclusion changes when judges are biased in their prior beliefs. In that event, outcomes will be determined exclusively by the judge's prior beliefs. Either way the outcome of the case tends to be decided as if it is unaffected by the merits of the arguments presented in court. However, taken to its logical conclusion, the selection effect leads to something we refer to as the paradox of open methods: if rational judges decide to evaluate the merits of the cases that go to court, they will come to regret this as wasteful effort and strictly prefer to ignore the merits of the case. But if judges ignore the merits of the case, and this becomes generally known and taken into account by the litigants, judges will come to regret doing so and end up strictly preferring to attend to the merits of cases. This paradoxical seesaw can only be resolved in a full game-theoretical model of strategic interaction between the judge and the litigants. We refer to this game as the Judging Game. The strength of the selection effect and the fraction of judges who evaluate the merits of cases can thus be determined by the equilibrium of the Judging Game.

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1. Introduction

There are two prevalent views of the behavior of courts. Richard Posner has called them the "legalist" and the "realist" view, H.L.A. Hart, "the noble dream" and "the nightmare." The first view sees courts as interpreters of law; the second view sees them as makers of law, mini-legislators, and not mere referees who just "call them as they see them," as in Chief Justice Roberts's formulation at his confirmation hearings. And various hybrids of these views are held as well (Stephenson 2009). However, a rather different view emerges if one thinks of judges as rational actors engaged in strategic interactions with the litigants. If one does that, judges will be seen to decide cases either randomly (when unbiased) or in accordance with their prior beliefs (when biased) in ways that are unrelated to the merits of the case. Moreover, this can be the hallmark of a well-functioning judicial system, where judges decide cases rationally for the side they think more likely to be correct. It should be noted, however, that our analysis is normative rather than descriptive and that we are not claiming that rational judges decide all cases either randomly or by the bias in their prior beliefs, but rather that under suitable conditions, the probability that they will do so can be high, even if the costs (to the judges) of properly evaluating the merits of the case are low.

We develop our model in several steps. We start with a decision-theoretic model in sections 2 and 3. In this embryonic model, litigants rationally decide whether to settle or go to court. Then, due to the selection effect (to which Priest and Klein were among the first to so emphatically draw attention) there will be a tendency for easy cases to settle and only some hard cases to be sent before a judge. In easy cases, the merits of the arguments are unevenly balanced and judges, if they process these arguments, rule for one side (the side with the stronger claim), even if their prior beliefs favor the other side. In hard cases, however, the merits of the arguments are more evenly balanced, and, hence, the judge's posterior belief, conditional on properly processing these arguments, will be similar to the judge's prior belief. This leads to a paradox, shown in section 4, that we call the paradox of open methods: If judges were to always evaluate the merits of arguments presented to them, at some cost, then the selection effect ensures that they would come to regard that as wasteful. This follows because, by the selection effect, only hard cases would tend to come to court. On the other hand, once judges cease evaluating the merits of the arguments before them, they will ultimately come to regret that as well, because then they will receive many unbalanced cases, resulting in frequent and preventable judicial errors. In sum, the logic of the selection effect suggests not only the familiar conclusion that rational litigants will tend to save costs by settling out of court when they expect similar results in court and in settlement, but also, less familiarly, that rational judges will tend to save the costs associated with processing information that they have reason to believe will have negligible impact of their decision.

The paradox of open methods leads us to move from a decision-theoretic model that focuses on the strategic behavior of litigants to a game-theoretic model in which *both* litigants and judges behave strategically. The litigants strategically decide whether to incur the costs of going to court and, simultaneously, the judges strategically decide whether to incur the costs of evaluating the merits of the case. We refer to this game theoretic interaction as the Judging Game.

In Sections 5 and 6, we explore the Judging Game to determine the odds that, in equilibrium, judges rule by merit (i.e., evaluate the merits of the arguments before them) and the strength of the selection effect (i.e., the relative odds that easy and hard cases go to court). These variables determine other quantities of interest such as the odds that unbiased judges rule at random, and the likelihood that judges make preventable judicial errors (i.e., ruling for one side when the arguments of the other side are stronger). Depending on the parameters of the model, the odds that an easy case goes to court can be slightly higher than the odds that a hard case goes to court (weak selection effect), or the reverse (strong selection effect). Somewhat surprisingly, the odds that a judge rules by merit turn out to be largely independent of the strength of the selection effect: A rational and unbiased judge can rule at random with high probability both when the selection effect is strong and when the selection effect is weak. Under proper conditions – namely when the law is highly determinate in the sense that most cases, in the overall population of cases, are easy, the judge's cost of evaluating the merits of the case is small, the judge's disutility of making preventable judicial errors is high, and most judges are unbiased – a rational, unbiased judge will rule at random with arbitrarily high probability.

As the cost (to the judge) of evaluating arguments decreases, the odds that judges actually evaluate arguments stay the same, but unbiased judges are more likely to rule at random and less likely to make judicial errors. Thus, as costs of evaluating arguments change, there is an inverse correlation between deciding cases at random and making judicial errors. These results may seem counterintuitive at first, but they are the logical consequence of the cumulation of direct decision-theoretic effects and indirect game-theoretic effects that arise from strategic interaction between judges and litigants. As the costs of evaluating arguments decrease, judges do have a greater incentive to evaluate arguments. This is the direct decision-theoretic effect. However, when judges evaluate arguments of an easy case, their ruling is predictable. This incentivizes litigants to settle easy cases to save litigation costs. A higher fraction of hard cases in court de-incentivizes rational judges to evaluate arguments. Thus, indirect game-theoretic effects can counterbalance direct decision-theoretic effects.

Section 7 addresses the assumptions of our model, most notably a discussion of the assumption that litigants may "agree to disagree" when they go to court. Section 8 contains a summary of prior work in law, especially key precursors to our thesis: Priest and Klein 1984 and Epstein, Landes, and Posner 2013. Section 9 concludes. Proofs are in the appendix.

2. The Basic Model

There is a plaintiff, a defendant and a matter in dispute. A judge may mandate a transfer from the defendant to the plaintiff. If so, the plaintiff receives utility $u > 0$ and the defendant receives disutility u. The judge may instead rule in favor of the defendant. If so, there are no transfers between the plaintiff and the defendant. There is a cost of going to court. It gives disutility $c \in (0, u/4)$ to each side. So, litigation cost is a modest fraction of what is at stake.

The defendant can make a transfer to the plaintiff and settle the case out of court. If there is a transfer that both litigants prefer over going to court, the case is settled out of court. If there isn't such transfer, the case goes to court. Let us formalize this as follows: Let p^f (and p^d) be the probability with which the plaintiff (and the defendant) believes the judge will rule in favor of the plaintiff. The plaintiff's expected utility for going to court is $p^f u - c$. The defendant's expected disutility of going to court $p^d u + c$. Hence, assuming that both sides have the same preferences and attitudes towards risk, there is a transfer acceptable by both sides to settle the case if and only if $p^d u + c \geq p^f u - c$. Thus,

Settlement Efficiency The case goes to court if $p^f u - c > p^d u + c$ and it is settled out of court if $p^f u - c \leq p^d u + c$.

In short, if the defendant expects to lose more by going to court than the plaintiff expects to gain, they settle the case out of court.

Settlement efficiency means that cases that should not go to court (because both parties would prefer, or be indifferent, to settle the case at some transfer) do not go to court. Hence, settlement efficiency rules out Pareto dominated outcomes in the settlement process. We make this assumption although we recognize that bargaining inefficiencies can occur (see Bebchuk 1984, Reinganum and Wilde 1986 and Myerson and Satterthwaite 1983). But that is less likely if a mediator makes it clear to the parties that a mutually desired bargain is available to them. Moreover, we are investigating what rational judges should do when they only receive cases that should have gone to court. A useful implication of settlement efficiency is given by corollary 1.

Corollary 1 If the litigants have the same beliefs, i.e., if $p^f = p^d$, then the case settles out of court.

2.1. A Rational Court

We assume that cases are either easy or hard. In easy cases, the litigant who has the stronger claim on the case, presents in court arguments that are, on balance, strictly stronger than the opponent's arguments. In hard cases, litigants produce arguments that seem evenly balanced. A case is easy with probability $\kappa \in (0, 1)$.

We assume that easy cases will come out as they should come out. However, in a hard case, neither party, nor the judge, who are all assumed to be equally knowledgeable about the law, can say which side's argument is stronger. In sum, a judge who evaluates the merits of cases does not rule incorrectly in easy cases, but may rule incorrectly in hard cases (and realizes this), just as might happen to anyone facing a difficult task, say, a radiologist trying to render a negative or positive verdict based on a hard-to-interpret scan.

A word of clarification about what we mean by "arguments". What we have principally in mind are arguments presented before a court of appeals. This includes arguments based strictly on legal doctrine, but also those often referred to as arguments of policy, including those that invite the court to do what is often critically referred to as legislating rather than merely applying or interpreting the law.

Let $\pi \in (0, 1)$ be the *judge's prior belief* that the ruling should be in favor of the plaintiff. After hearing the arguments of both sides, let $\pi^p \in (0, 1)$ be the *judge's*

Bayesian posterior belief that the ruling should be in favor of the plaintiff.

Behavioral assumption on the judge's decisions: If $\pi^p > 0.5$, then the judge rules in favors of the plaintiff; if $\pi^p < 0.5$, then the judge rules in favors of the defendant; if $\pi^p = 0.5$, then the judge rules in favor of either side, with equal odds

Thus, we assume that the judge rules rationally and freely for the side the judge believes more likely to be correct, conditional on the arguments presented in court.

In an easy case, $\pi^p \in \{0, 1\}$ for any $\pi \in (0, 1)$. That is, the arguments of an easy case swamp unfavorable prior beliefs. After considering these arguments, the judge knows the disposition of the case and, hence, the judge's posterior belief π^p is either zero or one (i.e., $\pi^p = 1$ when the arguments of the plaintiff are, overall, stronger than the arguments of the defendant; and $\pi^p = 0$ when the arguments of the defendant are, overall, stronger than the arguments of the plaintiff).

The arguments of a hard case are evenly balanced and so in the end they do not tilt the judge's belief. Thus, the judge's posterior belief π^p is the same as the judge's prior belief π. This follows directly from Bayes' rule. The odds of a hard case are $1 - \kappa$ and the odds of a hard case that should come out for the plaintiff are $\pi (1 - \kappa)$. By Bayes' rule, the probability π^p that the case should be decided for the plaintiff, conditional on being a hard case, is $\frac{\pi(1-\kappa)}{1-\kappa} = \pi$. Thus, in a hard case, $\pi^p = \pi$.

We could include intermediary cases where after reviewing the arguments of the case, the judge's posterior beliefs differs from the judge's prior belief, but the judge is still uncertain about which side has the stronger argument. Including intermediary cases would be one of the many ways in which the model could be made more complex than it is now. For easy of exposition, we present a simple model first and discuss in Section 6 how the model can be extended in different ways.

2.2. The Selection Effect

The selection effect is the idea that easy cases tend to settle out of court. The argument is straightforward. Consider an easy case. Assuming that the litigants expect the judge to rule correctly, they are both sure and in agreement on what the outcome of a trial would be. Thus, in an easy case, $p^f = p^d \in \{0, 1\}$. By corollary 1, easy cases are settled out of court. But some hard cases too may settle out of court.

Consider a judge with an unbiased prior belief, i.e., $\pi = 0.5$. If the case is hard, then $\pi^p = \pi = 0.5$ and the judge rules in favor of either side, with equal odds. If this is correctly anticipated by the litigants, then $p^f = p^d = 0.5$. So, the litigants have the same beliefs and, by corollary 1, the case also settles out of court.

In order for some cases to go to trial, the litigants must have, at least sometimes, divergent beliefs. We assume that the litigants may diverge in their beliefs regarding the judge's prior. Parties will go to court only if the case is hard, one side believes the judge has a prior belief in its favor and the other party does not share that belief.

This is formalized as follows: Assume that the judge's prior π comes from a random variable $\tilde{\pi}$ such that for some $b \in (0, 0.5)$ and $\sigma \in (0, 1)$, $\pi =$

$$\begin{array}{cc} 0.5 - b & \text{with probability } \sigma/2; \\ 0.5 & \text{with probability } 1 - \sigma; \\ 0.5 + b & \text{with probability } \sigma/2. \end{array} \tag{2.1}$$

The distribution of $\tilde{\pi}$ above is the simplest one that delivers our results. However, similar results are available from the authors with any symmetric distribution around 0.5 random variable $\tilde{\pi}$. Some cases will go to court when litigants have different views about the judge's priors. An *uninformed* litigant knows that the judge's prior π comes from $\tilde{\pi}$, but does not know the realization π of $\tilde{\pi}$. An *informed* litigant knows, or at least believes that he knows, the judge's prior π. Suppose that we have a hard case, as well as an uninformed defendant and an informed plaintiff who believes that the judge's prior π is favorable to him (i.e., $\pi = 0.5 + b$). The plaintiff believes that the judge will rule in his favor, i.e., $p^f = 1$ (because $\pi^p = \pi = 0.5 + b > 0.5$), whereas the defendant believes the judge will rule in favor of either side with equal odds. That is, $p^d = 0.5$. Thus, $p^f u - c > p^d u + c$. This follows because $c < u/4$ implies that $u - c > 0.5u + c$. By settlement efficiency, this case goes to court and, hence, some cases go to court. By contrast, if the case is easy, then the judge's prior does not affect the outcome of the trial. Both informed and uniformed litigants have the same beliefs, and the case settles out the court. This delivers the selection effect.

The Selection Effect Proposition Assume settlement efficiency and $c < u/4$. Then, easy cases settle out of court. Some, but not all, hard cases go to court.

The selection effect has been obtained in different forms by several authors (see our literature review in section 8). Our model where litigants "agree to disagree" (see section 6.1 on breaking common knowledge of rationality) is a simple way to derive it. There is also a side benefit to modelling as we do rather than assuming asymmetric information about the merits of the case (and not about the judge's prior as in this paper). In courts of appeal, all arguments about the case are known to the litigants, or at least to their lawyers, and in lower courts disclosure requirements often serve to eliminate such asymmetries. Different assessments about a judge's prior can however arise at every level of the judicial process.

2.3. Concerns with the Selection Effect

The selection effect applies whether judges are "legalistic" and stay close to the black-letter law, or as realists picture them, freewheeling in their recourse to policy and morality. If the two sides see that their arguments, all things considered, including factors going beyond blackletter law, are clearly in favor of one side, they can be expected to settle out of court. The converse point regarding hard cases bears emphasizing because it seems not to be widely appreciated. While it is understood that in hard cases the law tends to "run out," it is often suggested that judges will then have policy or morality to fall back on. But the selection effect ensures that these recourses are going to run out as well. A case becomes hard when the arguments of the litigants, *including those based on policy and morality*, are not, all things considered, significantly tilted one way or the other.

It might be objected that when a judge finds a case hard, it is not necessarily because the arguments are evenly balanced. The arguments might be incommensurable, which is revealed if small additional considerations do not suffice to tip the balance. But incommensurability typically arises between matters that are at least close to equal. Judges are usually in no better a position to resolve incommensurable arguments than the litigants, making their decision functionally equivalent to a coin toss or a judgment based on priors. And we do not need the arguments of a hard case to be exactly balanced. The merits of the arguments need only to be close enough so that they will be swept away by even mildly biased priors. This would merely require introducing in the model nearly hard cases where, by Bayes' rule, the judge's posterior belief will be quite close to the judge's prior belief.

In this embryonic model, the selection effect is complete. All easy cases settle out of court and all cases in court are hard. Thus, a natural concern with the selection effect is that in fact we know that sometimes easy cases do go to court (see section 7 for empirical results on the selection effect). However, the fact that easy cases go to court does not mean that actual judges aren't being rational because we have not so far fully taken account of the strategic interaction between judges and litigants.

3. Ruling *As If* Arguments Made in Court Are Ignored

In a hard case, the judge's prior π and posterior belief π^p coincide. Thus, in a hard case, the judge rules *as if by bias:* if the judge's prior π is biased towards the plaintiff ($\pi = 0.5 + b$), the judge rules for the plaintiff. If the judge's prior π is biased towards the defendant ($\pi = 0.5 - b$), the judge rules for the defendant. If the judge's prior is unbiased ($\pi = 0.5$), the judge decides the case at random.

The Ignored Argument Proposition Assume settlement efficiency and $c < u/4$. Then, the selection effect holds and the judge rules as if by bias. In particular, an unbiased judge picks a winning side at random.

The Ignored Argument Proposition assumes that the settlement process is efficient and that the judge decides the case contingent on the arguments presented in court. It concludes that the judge rules *as if* the judge's prior belief is the only factor that matters, and the arguments presented in court are ignored. The ignored argument proposition follows because under settlement efficiency, only hard cases go to court. Thus, after evaluating the merits of the arguments presented in court, the judge reaches the same conclusion that the judge would have reached if the judge had not evaluated the merits of the case. Thus, the judge rules as if by bias. In the case of an unbiased judge, the ruling is equivalent to a coin toss.

3.1. Concerns with the Ignored Argument Proposition

A critic of the ignored argument proposition might point out that judges must justify their position and random devices cannot do that. Judges have to issue opinions, state holdings, and back these up with arguments and analysis. But that is not inconsistent with a randomizing mode of decision-making. After a random shock decides which side should prevail, judges can turn to the winning side's briefs and base their opinions on the arguments there offered, which is what most opinions do.

A critic might also point out that judges do not perceive themselves as tossing coins or just acting on priors. Nevertheless, it is not hard to reconcile judges' self-perception with our model. A case arrives before an unbiased judge. The case seems hard because the arguments seem so evenly balanced. Deciding by lot is the last thing judges want to do. So they agonize, continue to scrutinize the case looking for decisive reasons. They will have trouble finding any, though at some point they experience what one might call a random perceptual shock. It will momentarily appear that one side has the stronger case and they will proceed to hold for that side. It won't feel like a random decision, because they will have had a reason, but a different reason might easily have occurred to them at a different time and tilted them in the opposite direction. The fact that they spent a great deal of time finding a reason will give them the sense of having reasoned their way to an answer.

Ordinary decisions are routinely determined by miniscule random perceptual shocks. In the celebrated (Harsany 1973) purification theorem, mixed strategies are explained as the limit of pure strategies as payoff-shocks shrink. Thus, a rational random choice can be seen as the product of a small shock in perception. As for judges with biased priors, they merely need to convince themselves, justifiably or not, that their priors somehow go to the merits, and reflect a basic instinct for justice.

To be sure, we do not deny that great judges like Holmes, Cardozo, Friendly and Posner might look at a case the parties thought evenly balanced, and find that the arguments are far from balanced. Our theory is a theory of the run-of-the-mill. We theorize that most of the time judges will see no more in a case than the lawyers who bring it before them. In this case, a judge cannot do much more than randomize or act based on prior belief. And we are not the first to suggest as much. Many years ago, Gordon Tullock wrote in his book Trials on Trial: "If a contract is ambiguous, there is no truly correct interpretation. Similarly, if the law is unclear, it is unclear . . . . The points where the contract [or the law] is unclear are points where judicial arbitrariness is desirable . . . . [T]his is likely to be considered by most lawyers a most extraordinary recommendation. Certainly, it is directly contrary to our present procedure, where the court characteristically devotes great amounts of time and attention to matters of this sort and, indeed, may ask the parties on both sides to submit special briefs . . . I regard this as perverse."' (Tullock 1980).

The ignored argument proposition shows that there is no incentive for judges to evaluate the merits of the cases that come to them. So, rational judges would only evaluate the merits of the case if it is costless for them to do so. If there is any cost to evaluating the merits of the case, rational judges would ignore the arguments presented in court and decide the case according to their prior beliefs. However, the ignored argument proposition assumes something quite implausible: that if judges chose to ignore the merits of the case and decide either randomly or based on their prior beliefs, this would remain secret for long. Moreover, if ignoring the merits of the case does not remain secret, as is likely, everything changes. Once it became widely known that judges ignore the arguments presented in court, the type of case that goes to court would change. It would now make sense for some easy cases to be put to the court. Thus, the selection effect would cease to operate, or at least be diminished, and if the judges continue to decide according to their prior belief, many cases would be decided wrongly. In light of this, one would expect judges, in time, to resume evaluating the merits of the case, which in turn would mean that only hard cases go to court, which would make judges regret bothering with an examination of the arguments of the case. We call this the paradox of open methods. The next section expresses these ideas more formally.

4. The Effect of Judicial Openness about their Methods

To formalize the paradox of open methods, let us formally distinguish between judges who rule by merit and judges who rule by bias.

Rule by Merit A judge *rules by merit* when the judge rules in favor of the plaintiff if $\pi^p > 0.5$; in favor of the defendant if $\pi^p < 0.5$; in favor of either side, with equal odds, if $\pi^p = 0.5$.

A judge who rules by merit evaluates the arguments presented in court and then rules based on posterior belief, π^p, contingent on arguments presented in court. So far, we have assumed that all judges rule by merit. We now introduce judges who rule by bias.

Rule by Bias A judge *rules by bias* when the judge rules in favor of the plaintiff if $\pi > 0.5$; in favor of the defendant if $\pi < 0.5$; in favor of either side, with equal odds, if $\pi = 0.5$.

A judge who rules by bias does not evaluate the arguments presented in court, even if the case is easy. A judge who rules by bias decides the case based on prior belief alone. In hard cases, to rule by merit or by bias produces the same outcome because prior and posterior belief coincide. Hence, in a hard case. a judge who rules by merit rules *as if* by bias. In easy cases, ruling by merit or by bias can differ.

A judge chooses to rule by merit or by bias based on two factors. The first is the effort required to evaluate the merits of arguments. We assume that such effort produces disutility $e > 0$ to the judge. The second factor is the disutility judges suffer when they make a preventable error. Such an error occurs when, in an easy case, the judge rules for one side, but should have ruled for the other side. The judge's disutility from making a preventable error is $v > 0$. In hard cases, errors are not preventable. There may or may not be a disutility for errors in hard cases. Our results stay the same because ruling by bias or by merit coincide in hard cases. Thus, to simplify the language, we may refer to a preventable error as simply *an error*. The judge's method of ruling– by merit or by bias –is known to the litigants.

Consider an easy case. Then, judges who rule by merit do not make errors. As for judges who rule by bias, they expect to rule incorrectly in half of all easy cases when their prior belief is unbiased. If their prior belief is biased, say 60/40 in favor of the plaintiff, they will decide in favor of the plaintiff and, by their prior belief, expect to decide 40 percent of all easy cases incorrectly. Hence, a judge who rules by bias expects to make an error with probability 0.5 if unbiased ($\pi = 0.5$). If the judge's prior is $\pi = 0.5 + b$, then the judge rules for the plaintiff and expects to make an error (because the defendant had a stronger case) with probability $0.5 - b$. If the judge's prior is $\pi = 0.5 - b$, then the judge rules for the defendant and expects to make an error, with probability $0.5 - b$ as well.

If judges are known to rule by bias, litigants expect judges to not evaluate the case. Then, there is no selection effect. Easy and hard cases go to court with the same odds. It follows that a case that goes to court is an easy case with probability κ. [Recall that the unconditional odds of an easy case is $\kappa \in (0, 1)$]. Thus, the expected disutility of making preventable judicial errors is $\kappa 0.5 v$ if the judge is unbiased, and $\kappa (0.5 - b) v$ if the judge is biased. Either way, assuming that $\kappa (0.5 - b) v > e$, the disutility of making preventable errors is strictly greater than the cost e of evaluating the merits of the case. Then, the judge strictly prefers to rule by merit.

The Paradox of Open Methods Assume that the settlement process is efficient, $c < u/4$ and $e < \kappa (0.5 - b) v$. If judges choose to rule by merit, then a judge strictly prefers to rule by bias. If judges choose to rule by bias, then a judge strictly prefers to rule by merit.

The paradox of open methods shows that no matter which ruling method judges choose (by merit or by bias), they will come to regret it and prefer the alternative method. This proposition follows from the selection effect. Assume first that judges decide to rule by merit. Then, by the selection effect, only hard cases go to court because the parties prefer to save litigation costs and settle easy cases. If only hard cases reach the court, the judge can save himself the cost of evaluating the merits of the case because ignoring arguments and ruling by bias produces the same outcome as ruling by merit. Thus, ruling by merit creates a free-rider problem that incentivizes judges to rule by bias. Ruling by bias creates a different problem: preventable judicial errors. If judges rule by bias, some easy cases go to court. Given that arguments presented in court are ignored, preventable judicial errors will be made in easy cases that now reach the court. This incentivizes judges to rule by merit.

The situation that emerges is one where all judges ruling by merit or all judges ruling by bias is not sustainable. To determine what kind of situation would be sustainable, i.e. an equilibrium, requires a game theoretic model where the judge's decision about whether to rule by bias or by merit and the litigants' decision to settle or go to court are allowed to interact. Such an equilibrium entails, as we now show, that some judges rule by merit and some by bias (or a representative judge rules by bias and by merit with strictly positive probability.)

5. The Judging Game

To keep things simple, we will posit a single representative judge. (The case of a continuum of judges is equivalent). A mediator ensures that any Pareto-improving bargain between the parties is struck. Thus, we have a game between judge and mediator whose actions are determined by whether the parties decide to settle or to go to court.

A (mixed) strategy of the judge is a probability $\Phi_\pi \in [0,1]$ that the judge rules by merit (which may depend on the judge's prior belief π). So, $\Phi_{0.5}$ is the probability that an unbiased judge rules by merit, $\Phi_{0.5-b}$ and $\Phi_{0.5+b}$ are the probabilities that biased judges (in favor of the defendant and plaintiff, respectively) rule by merit. In the special case that Φ_π is 0 or 1, the representative judge is using a pure strategy and always rules by bias or by merit. However, by the paradox of open methods, the equilibrium of the Judging Game cannot be in pure strategies. It must be in mixed-strategies, where judges rule by merit and by bias with strictly positive probability.

A (mixed) strategy of the mediator is the probability that a case goes to trial (which may depend on whether the case is easy, and the type of each litigant: uninformed or informed). A case goes to trial

$$\begin{array}{rl} \text{with probability } 0 & \text{if } p^f u - c < p^d u + c, \\ \text{with some probability } \mu \in [0,1] & \text{if } p^f u - c = p^d u + c, \\ \text{with probability } 1 & \text{if } p^f u - c > p^d u + c. \end{array} \tag{5.1}$$

By (5.1), the case goes to court if there is no transfer between the litigants that both parties prefer to going to court; the case settles out of court if there is a transfer that both parties prefer to going to court; the case goes to court with some odds if some transfer makes both parties indifferent over going to court. Equation (5.1) follows directly from the efficiency settlement proposition in Section 2. If the defendant expects to lose more by going to court than the plaintiff expects to gain, the parties settle the case out of court. Otherwise, the litigants go to court. In the case of a tie between the expected loss of the defendant ($p^d u + c$) and the expected gain of the plaintiff ($p^f u - c$), the case goes to court with some probability $\mu \in [0,1]$.

Let φ be the fraction of easy cases, among the cases that go to court [so, φ is *not* the odds that an easy case goes to court, φ is the odds that a case in court is easy]. A judge with biased prior belief $\pi \in \{0.5 - b,\, 0.5 + b\}$ rules by merit

$$\begin{array}{rl} \text{with probability } \Phi_\pi = 0 & \text{if } \varphi\,(0.5 - b)\,v < e, \\ \text{with some probability } \Phi_\pi \in [0,1] & \text{if } \varphi\,(0.5 - b)\,v = e, \\ \text{with probability } \Phi_\pi = 1 & \text{if } \varphi\,(0.5 - b)\,v > e. \end{array} \tag{5.2}$$

A judge with unbiased prior belief $\pi = 0.5$ rules by merit

$$\begin{array}{rl} \text{with probability } \Phi_{0.5} = 0 & \text{if } \varphi 0.5 v < e, \\ \text{with some probability } \Phi_{0.5} \in [0,1] & \text{if } \varphi 0.5 v = e, \\ \text{with probability } \Phi_{0.5} = 1 & \text{if } \varphi 0.5 v > e. \end{array} \tag{5.3}$$

As shown in section 3, the expected disutility of judicial errors is $\varphi\,(0.5 - b)\,v$ and $\varphi 0.5 v$ for a biased and unbiased judge, respectively. The judge rules by bias if the expected disutility of judicial errors is smaller than the cost e of evaluating arguments. The judge rules by merit if the expected disutility of judicial errors is greater than the cost e of evaluating arguments. The judge rules by merit with some probability if the expected disutility of judicial errors is equal to the cost e of evaluating arguments.

Definition A *(Bayesian-Nash) equilibrium of the Judging Game* is a strategy for the judge and a strategy for the mediator, such that (5.1), (5.2) and (5.3) hold.

In equilibrium, there are no profitable deviations for either mediator or judge. Hence, the judge and the litigants are strategically best responding to each other. Recall (see (2.1)) that σ is the probability that a judge is biased. By Bayes' rule, the overall probability ρ that a judge rules by merit is

$$\rho \equiv \frac{\sigma}{2}\Phi_{0.5-b} + \frac{\sigma}{2}\Phi_{0.5+b} + (1-\sigma)\Phi_{0.5};$$

The Judging Game Theorem. Assume an efficient settlement process, $c < u/4$ and $e < \kappa\,(0.5-b)\,v$. Then, an equilibrium exists in the Judge Game. Moreover, in any equilibrium of the Judge Game,

$$\text{the judge rules by merit with probability } \bar{\rho} \ = 1 - \frac{4c}{u}; \tag{5.4}$$

$$\text{in court, the fraction of easy cases is } \bar{\varphi} = \begin{cases} \frac{e}{0.5v} \text{ if } \sigma \leq \frac{4c}{u}, \\ \frac{e}{(0.5-b)v} \text{ if } \sigma > \frac{4c}{u}. \end{cases} \tag{5.5}$$

While we discuss our assumptions in greater detail in section 6, we anticipate that we assume $c < u/4$ and $e < \kappa\,(0.5-b)\,v$ in the Judge Game Theorem to ensure that litigations costs c are small enough so that some cases reaches the court, and that the costs e of evaluating arguments are sufficiently small so that biased judges may sometimes rule by merit.

6. Properties of the Equilibrium of the Judging Game

For ease of exposition, we divide this section into three parts. In the first part, we discuss why some parameters (e.g., the fraction κ of easy cases) do not affect the odds $\bar{\rho}$ that, in equilibrium, the judges rule by merit and the fraction $\bar{\varphi}$ of easy cases in court. In the second part, we discuss a near perfect court. In the third part, we describe how cost-ratios $\frac{e}{v}$ and $\frac{c}{u}$ are critical to determine the odds that the judges rules by merit, the fraction of easy cases in court, and, by extension, the odds that unbiased judges rule at random and the odds of making preventable judicial errors.

6.1. Parameter Independence

Fraction σ of biased judges In any equilibrium of the Judging Game, unbiased judges are more likely to rule by merit than biased judges (i.e., $\bar{\Phi}_{0.5} > \bar{\Phi}_{0.5-b}$ and $\bar{\Phi}_{0.5} > \bar{\Phi}_{0.5+b}$). However, by (5.4), decreasing (or increasing) the fraction σ of biased judges does not change the overall odds $\bar{\rho}$ that a judge rules by merit.

As shown in section 4, an unbiased judge who rules by bias expects to decide an easy case incorrectly with probability 0.5. If biased, the same judge expects to make such error with probability smaller than 0.5. Thus, to avoid errors, unbiased judges have greater incentive to evaluate arguments than biased judges. So, unbiased judges are more likely to rule by merit than biased judges. However, as judges become less likely to be biased (i.e., as σ decreases), the overall odds $\bar{\rho}$ that the judge rules by merit remain the same. This follows because the greater tendency of unbiased judges to evaluate arguments exacerbates the free-rider problem and, hence, de-incentivizes judges to evaluate arguments. In sum, as the fraction σ of biased judges decreases, there is a direct effect and an indirect effect on the odds ρ of ruling by merit. The direct effect is the greater fraction of judges who have a greater tendency to rule by merit. The indirect effect leads to an overall decrease of the tendency to rule by merit. By (5.4), in equilibrium, the two effects counterbalance each other and the odds $\bar{\rho}$ of ruling by merit stay constant.

By (5.4), in equilibrium (provided that $c < u/4$ and $e < \kappa\,(0.5 - b)\,v$), the overall odds $\bar{\rho}$ of ruling by merit remain the same even if several other key variables change. For example, the overall odds of ruling by merit does not depend on the costs e of processing arguments, on the disutility v of making errors, and on the ex-ante fraction κ of easy cases. Moreover, in equilibrium, the fraction $\bar{\varphi}$ of easy cases in court also remains constant even if several variables change. For example, by (5.5), the fraction of easy cases in court does not depend on the costs c of going to court, on the utility u of wining in court, and on the ex-ante fraction κ of easy cases. The logic underlying these results are based on game-theoretic effects counterbalancing direct effects. For ease of exposition, we will from now on omit the qualifier "in any equilibrium of the Judging Game" when describing the next equilibrium properties.

The degree κ of how law determinate the law is As the fraction κ of easy cases change, by (5.5), the fraction $\bar{\varphi}$ of easy cases in court does not change.

An overall fraction κ of easy cases close to one is quite different from a fraction κ close to zero. As κ goes to one, the law becomes nearly determinate, most cases are easy and have a clear disposition. Hence, when κ is close to one, *if* the judge were to pick a case at random and process the arguments of the case, the judge would likely be able to determine which side has the stronger claim. In contrast, when κ is close to zero, *if* the judge were to pick a case at random the judge would likely be unable to determine which side has a stronger claim. However, a judge does not pick a case at random. Instead, a judge will only encounter cases that did not settle. By (5.5), in equilibrium, the proportion of easy and hard cases in court is independent of the overall proportion κ of easy and hard cases (provided that $e < \kappa\,(0.5 - b)\,v$). In particular, if $e < (0.5 - b)\,v$, then the fraction $\bar{\varphi}$ of easy cases in court is the same whether the law is highly determinate (i.e., κ close to one) or whether it is highly indeterminate (i.e., κ close to zero).

In equilibrium, the selection effect always operates to some degree, and easy cases are less likely to go to court than hard cases. However, not all easy cases settle out of court and not all hard cases go to court. Moreover, the selection effect can be stronger or weaker depending on the parameters of the model. The selection effect is weak when the odds that easy and hard cases go to court are similar, and the selection effect is strong when hard cases are far more likely to go to court than easy cases. As the law becomes more determinate, i.e., as κ increases, there is a direct and an indirect effect. The direct effect is that, by definition, the fraction of easy cases increase. The indirect effect is that the selection effect is stronger and each easy case is less likely to go to court. The final result is a fixed proportion $\bar{\varphi}$ of easy cases in court. The intuition behind the indirect effect is that as the law becomes more determinate, there is a higher incentive for the judges to evaluate the merits of the case and, hence, a higher incentive for the litigants to settle easy cases out of court.

There is, however, one important effect of increasing the fraction κ of easy cases: More cases tend to settle out of court and the overall odds that a case goes to court decreases. In fact, as κ goes to one, a case goes to court with vanishing probability. This follows directly from (5.5). By definition, most cases are easy when κ is close to one. However, by (5.5), the proportion of easy and hard case in court stay the same. It follows that the probability that an easy case goes to court must go to zero, as κ goes to one. Thus, when the law is highly determinate (i.e., κ is close to one), courts perform their most valuable function by what they stand ready to do, but only rarely do: actually apply the law. It is in the judges' readiness to evaluate cases that lies the judges' chief contribution to the proper functioning of the legal system.

Formally, as κ goes to one, by (5.4) and (5.5), the odds that a judge rules by merit do not change and the fraction of easy cases in court remains the same. Thus, the overall odds that a judge makes a judicial error also remain the same. However, most cases do not go court and, instead, settle out of court.

The adjudication cost-ratio $\frac{e}{\nu}$ When the adjudication cost-ratio $\frac{e}{\nu}$ changes, by (5.4), judges rule by merit with the same odds $\bar{\rho}$.

In decision-theoretic models, decreasing costs of doing something (e.g., evaluating arguments) typically incentivizes that activity and, hence, more of that activity is produced. But, by (5.4), the likelihood $\bar{\rho}$ that a judge evaluates arguments does not depend on the cost e of evaluating these arguments. This counter-intuitive conclusion follows from the game-theoretic interaction between judges and litigators. Assume that the cost of evaluating arguments e is reduced. This *does* give greater direct incentives to the judge to evaluate arguments. But this direct effect causes an indirect effect of also giving greater incentives to litigants to settle easy cases out of court. This makes the selection effect stronger and cases in court are now more likely to be hard. This de-incentivizes rational judges to evaluate arguments. In equilibrium, the direct and the indirect effect counterbalance each other. As e decreases, the judge's overall propensity to evaluate arguments stays the same. The fact that direct, decision-theoretic effects can be canceled out by indirect, game-theoretic effects helps explain a key counterintuitive conclusion that is critical to understand the equilibrium properties of the Judge Game: *In equilibrium, what determines the judge's tendency to evaluate arguments are not the parameters that affect the judge directly (i.e., the cost e of evaluating arguments and disutility ν of judicial errors), but rather, the parameters that affect the litigators directly (i.e., the litigation costs c and the utility u of a transfer). Moreover, parameters that affect the judge directly (i.e., e and ν) are critical to determine the odds that litigants will see that cases that reach the court are either easy or hard.*

6.2. A Near Perfect Court

A Near Perfect Court *If the adjudication cost-ratio $\frac{e}{\nu}$ is small, by (5.5), judges are likely to rule as if by bias. Formally,* $\bar{\varphi}$ goes to zero as $\frac{e}{\nu}$ goes to zero.

In this example, we picture a near perfect court. The judge's cost e to evaluate the merits of cases is small. Judges strongly dislike making errors, as v is high. Other parameters are left unspecified because they do not affect the conclusion, and so one might assume that in a near perfect court most judges are unbiased (σ is arbitrarily high), the judge's bias b, when it exists, is arbitrarily small and that the law is highly determinate (κ is arbitrarily close to one). In this court, the judge is likely to rule the same way, whether the merits of the case are evaluated or ignored. When unbiased, the judge is likely to rule randomly. By (5.5), this follows because, in this near perfect court, the selection effect is strong and the majority of cases that go to court are hard.

Consider a damning charge of judicial performance, namely that judges are fundamentally biased and rule by factors extraneous to the merits of the case. Our example shows that ruling by extraneous factors, such as personal priors, or at random, can happen routinely in a well-functioning judicial system, in which judges want to avoid predictable errors, subject to arbitrarily mild biases. In this example, this follows because the cases that reach the court are those that could only be decided randomly or by prior belief, law and policy considerations being evenly balanced.

The selection effect does not rebut a charge that judges in the Supreme Court and the courts of appeal are what they are frequently charged with being–fundamentally biased. Judges might be as biased as alleged or they may not be, but our example shows that even if judges consistently rule based on factors extraneous to the merits of the case, they might still be rational and only mildly biased.

There is another criticism of courts that the selection effect might help deflect, namely that of hypocrisy. A court that professes adherence to a specific judicial philosophy, say, originalism, is often criticized for not providing decisions that are dictated by that methodology because that methodology does not generate an outcome in most disputes. Since the methodology does not deliver a verdict in the cases the court is most often involved in, critics say that the professed adherence to that philosophy must be a pretense. However, if the selection effect is strong enough, the cases sent to the court must be the ones where the judge's preferred judicial philosophy fails and, hence, the judge must fall back on his prior or a coin toss. That does not mean that the judge's judicial philosophy is irrelevant, because it is relevant to the parties's predictions as to what the court will do and, hence, to their classification of a case as easy or hard. Thus, the judicial philosophy can be significant in determining the type of case that goes to court.

6.3. The litigation cost-ratio $\frac{c}{u}$ and the adjudication cost-ratio $\frac{e}{v}$

An unbiased judge rules at random (i.e., rules for the plaintiff and the defendant with probability 0.5 for each side) when the judge rules by bias or when the case is hard. Thus, an unbiased judge rules at random with probability $1-\Phi_{0.5}+\Phi_{0.5}(1-\bar{\varphi})$ and expects to make a preventable error with probability $(1-\Phi_{0.5})0.5\bar{\varphi}$ (because an error occurs when a case in court is easy, the judge rules by bias and against the litigant with the stronger argument). In the appendix, we show that like $\bar{\rho}$, the odds that unbiased and biased judges rule by merit (i.e., $\Phi_{0.5}$, $\Phi_{0.5-b}$ and $\Phi_{0.5+b}$) are all independent of e and v. Thus, in equilibrium,

Judicial errors and random rulings As the adjudication cost-ratio $\frac{e}{v}$ decreases, an unbiased judge decides the case at random with higher probability and expects to make preventable judicial errors with smaller probability.

In equilibrium, as the cost-ratio $\frac{e}{v}$ decreases, unbiased judges rule at random more often and expect to make fewer preventable judicial errors. This counter-intuitive conclusion follows from game-theoretic indirect effects. First, by (5.4), the likelihood that a judge rules by merit does not change with the adjudication cost-ratio $\frac{e}{v}$. As mentioned, even though decreasing costs of evaluating arguments incentivize judges to evaluate arguments, in equilibrium, due to counterbalancing indirect effects, the odds that a judge evaluates arguments remain the same. In addition, by (5.5), the selection effect is now stronger and the cases in court are more likely to be hard when the cost-ratio $\frac{e}{v}$ decreases (i.e., by (5.5), $\bar{\varphi}$ decreases when $\frac{e}{v}$ decreases). Moreover, an unbiased judge rules at random when the judge rules by bias or when the case is hard. Finally, an unbiased judge makes an error (with probability 0.5) only when the case is easy and the judge rules by bias. Thus, given that the probability that the judge rules by bias remains the same and the odds that a case in court is easy decreases, the probability that an unbiased judge rules at random increases and the probability that the judge makes a preventable judicial error decreases.

We now subdivide cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ into four categories: when both cost-ratios are high, when both cost-ratios are low, and when one is high and the other is low.

Low cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ of litigation and adjudication When the cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ go to zero, by (5.4) and (5.5), $\bar{\rho}$ and $1-\bar{\varphi}$ go to one. Thus, the judge is likely to rule by merit and *as if* by bias. Unbiased judges typically rule at random. The selection effect is strong. Preventable judicial errors are unlikely.

When cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ are low, the conclusions of the judging game theorem and the ignored argument proposition are similar. The judge is likely to incur in the costs of evaluating arguments, even though these efforts are unlikely to change the final ruling. As the cost-ratio of litigation $\frac{c}{u}$ decreases, by (5.4), the judge is more likely to rule by merit. As the cost-ratio $\frac{e}{v}$ of adjudication decreases, by (5.5), the selection effect becomes stronger and most cases in court are hard. Thus, the judge typically evaluates the merits of hard cases and typically rules as if by bias.

High cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ of litigation and adjudication Assume that $\frac{c}{u}$ goes to 0.25 and $\frac{e}{v}$ goes to $(0.5 - b)\kappa$. By (5.4) and (5.5), $\bar{\rho}$ goes to zero and $\bar{\varphi}$ goes to κ. That is, the judge is likely to rule by bias, an unbiased judges typically rules at random and the selection effect is weak. The odds of preventable judicial errors are non-negligible.

When cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ are high, judges tend to rule by bias and the selection effect is weak. So, easy and hard cases tend to go to court with near equal odds. Thus, a rational and unbiased judge can typically rule at random both when the selection effect is strong and when the selection effect is weak. That is, an unbiased judge is likely to rule at random both when cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ are high and when cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ are low. However, the reasons for this conclusion differ. In the former case, the conclusion follows because judges tend to rule by bias and in the latter case because most cases in court are hard.

When cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ are high, preventable judicial errors can be common. This follows because two things happen simultaneously: First, the selection effect is weak and, hence, there will be a significant fraction of easy cases in court. More precisely, the proposition of easy case in court $\bar{\varphi}$ is now similar to the overall proportion κ of easy cases. In addition, judges typically rule by bias. The combination of judges ignoring arguments and receiving easy cases leads to preventable judicial errors. More precisely, as $\frac{c}{u}$ goes to 0.25 and $\frac{e}{v}$ goes to $(0.5 - b)\kappa$, an unbiased judge makes a preventable judicial error with probability close to 0.5κ. So, when *both* cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ are high, there are non-negligible odds of preventable judicial errors.

Decreasing litigation costs and adjudication costs leads to less preventable judicial errors. But perhaps surprisingly, to obtain a low fraction of judicial errors, it suffices to decrease either litigation costs or adjudication costs. We now show that preventable judicial errors are rare, provided that one of the cost-ratios $\frac{c}{u}$ and $\frac{e}{v}$ are low.

High litigation cost-ratio $\frac{c}{u}$ and low adjudication cost-ratio $\frac{e}{v}$ Assume that $\frac{c}{u}$ goes to 0.25 and $\frac{e}{v}$ goes to zero. By (5.4) and (5.5), $\bar{\rho}$ and $\bar{\varphi}$ go to zero. Then, judges typically rule by bias, unbiased judges rule at random, the selection effect is strong and preventable judicial errors are unlikely to occur.

When the adjudication cost-ratio $\frac{e}{v}$ is low, the selection effect is strong. Thus, most cases that go to court are hard. Therefore, when $\frac{e}{v}$ goes to 0, the odds of a preventable judicial error go to zero. Thus, if the litigation cost-ratio $\frac{c}{u}$ is high and the adjudication cost-ratio $\frac{e}{v}$ is low, the judge typically receives hard cases and rules by bias. In particular, unbiased judges typically rule at random, *even if the costs of evaluating arguments are arbitrarily low.*

Low litigation cost-ratio $\frac{c}{u}$, high adjudication cost-ratio $\frac{e}{v}$ When $\frac{c}{u}$ goes to 0 and $\frac{e}{v}$ goes to $(0.5-b)\kappa$, by (5.4) and (5.5), $\bar{\rho}$ goes to one and $\bar{\varphi}$ goes to κ. Thus, the judge is likely to rule by merit, the selection effect is weak, and preventable errors are unlikely to occur.

When the cost-ratio $\frac{c}{u}$ of litigation is low, judges tend to evaluate arguments, *even if the costs of evaluating these arguments are high.* Thus, as $\frac{c}{u}$ goes to 0, the odds of a preventable judicial error goes to zero, even if the selection effect is weak.

Low litigation cost-ratio $\frac{c}{u}$ and high adjudication cost-ratio $\frac{e}{v}$ is the scenario where unbiased judges may *not* typically rule at random. Instead, judges evaluates arguments and easy and hard cases go to court with similar odds. Thus, the fraction $\bar{\varphi}$ of easy cases in court approach κ and, whenever a judge receives an easy case, the judge rules deterministically in favor of the litigant who has a stronger claim.

An informal summary of how rational judges rule, with high probability, in equilibrium of the Judging Game, can be found in the table below. The precise meaning of these informal statements is described above.

	Low $\frac{e}{v}$	High $\frac{e}{v}$
Low $\frac{c}{u}$	Unbiased judges rule at random Biased judges rule as if by bias Low level of judicial errors Strong selection effect	Biased Judges rule by merit Unbiased Judges rule by merit Low level of judicial errors Weak selection effect
High $\frac{c}{u}$	Unbiased judges rule at random Biased judges rule by bias Low level of judicial errors Strong selection effect	Unbiased judges rule at random Biased judges rule by bias Significant level of judicial errors Weak selection effect

7. Assumptions of the Model

It is beyond the scope of this paper to relax all our assumptions, but let us consider a few such relaxations. Consider the assumption that the parties have the same stakes u in the outcome. Assume, instead, that the plaintiff receives utility $u^f > 0$ for winning in court and the defendant receives disutility $u^d > 0$ for losing in court. The stakes can now be severely unequal. Settlement efficiency, the situation where parties go to court when the plaintiff's gains from going to court are greater than the defendant's loss, now means that the parties go to court if and only if $p^f u^f - c > p^d u^d + c$.

Remark 1 The ignored argument proposition still holds if $c \in (\frac{u^f - u^d}{2}, \frac{u^f - 0.5u^d}{2})$.

It is instructive to see what happens when the costs c of litigation fall outside this interval and the ignored argument proposition fails. If c is larger than $\frac{u^f - 0.5u^d}{2}$ (and $\frac{u^f - 0.5u^d}{2} = \frac{u}{4}$ when $u^f = u^d = u$), then the costs of litigation are so high that no case goes to trial. The more interesting case occurs when c is less than $\frac{u^f - u^d}{2}$. Consider for instance a case that does not involve monetary transfers and the defendant's disutility for losing in court u^d is zero, i.e., $u^d = 0$. The plaintiff greatly values winning in court and gets utility $u^f > 2c$, if vindicated in court. Suppose further that this is an easy case that should come out in favor of the plaintiff. So, $p^f = p^d = 1$. This easy case goes to court despite the parties' agreement about its outcome because the plaintiff gets $u^f - c$ for going to court, which is greater than the maximum value c the defendant is willing to give to avoid settling the case out of court. Thus, the selection effect fails and, hence, the ignored argument proposition also fails. But this exception would be eliminated if an admission of guilt and/or an apology from the defendant would be of similar significance to the plaintiff as winning in court. The condition $u^f - u^d > 2c$ means that there is nothing the defendant is willing to do that would give as much satisfaction to the plaintiff as winning in court and, moreover, the difference $u^f - u^d$ in utility exceeds the joint costs of litigation. This would be a peculiar situation. The case where litigants have different costs of litigation can be dealt with analogously to the case where the litigants have different stakes in the outcome of the trial.

We could also relax the assumption that there are only easy and hard cases. We could allow intermediate cases, where the judge's prior and posterior belief would differ, but the posterior belief is not just zero or one. As long as, in these intermediate cases, the prior and the posterior belief are similar, the selection effect remains sufficiently intact to give the judge little incentive to examine the case. Analogously, we assume that judges are Bayesians, but our results stay the same if judges were not Bayesians and their posterior belief were a linear combination of their prior and the Bayesian posterior belief, provided that the bias in prior belief b is small enough.

Finally, let us suppose that the assumption $e < \kappa (0.5 - b) v$ fails and $e > \kappa (0.5 - b) v$ instead. Then, the cost e of evaluating arguments is so high that judges *always* prefer to rule by bias, even if this is known to the litigants. Thus, $e < \kappa (0.5 - b) v$ ensures small enough costs of evaluating arguments to incentivize judges to rule by merit.

7.1. Common Knowledge of Rationality

For there to be any cases that go to court, there must be some disagreement among the litigants. Hence, formal models of litigation and settlement often involve asymmetric information (see, among many contributions, Baker and Mezzetti 2001, Spier 1992, Samuelson 1998 and Shavell 1996). We chose a variant of a model of asymmetric information (as opposed to say, overconfident litigants about their chances of winning in court, see Prescott et al. 2014 and Bar-Gill 2006) because we want to explore the consequences of rational behavior. However, while all agents are rational in our model (i.e., are Bayesians who take best responses to their beliefs), rationality is not common-knowledge because asymmetric information may not produce belief disagreement under common-knowledge of rationality (in the sense of Aumann (1976)). Intuitively, under common-knowledge of rationality, uninformed agents could infer the relevant information from the decisions of informed agents. For example, an uninformed litigant might infer that the private information of his opponent must be favorable to his opponent, if his opponent decides to go to court. Therefore, an uninformed litigant will be hesitant to go to court against an informed litigant. As a result, under common-knowledge of rationality, cases do not go to court. These types of inferences are what underlies Milgrom and Stokey's (1982) no-trade theorem which shows that, under common knowledge of rationality, there is no trade based on asymmetric information. It is also what underlies the impossibility of wars in formal political science models under common knowledge of rationality (see Fearon (1995)). In formal models of litigation and settlement, common-knowledge of rationality is often not assumed (or, more directly, some form of bounded rationality, such as overconfidence, is assumed) to ensure that some cases go to trial. This follows whether the asymmetric information is about the prior of the judge or is about some other aspect of the case. However, common knowledge of rationality can be relaxed in different ways (see Landes 1971, Gould 1973, Shavell 1996 and Prescott and Spier 2019 for models where litigants agree to disagree). One of the simplest and more parsimonious, we believe, is the one chosen in our model. The selection effect here does not depend on whether informed litigants are actually informed or merely believe themselves to be informed.

Consider a hard case where the defendant is uninformed and the plaintiff believes, correctly or not, that the prior of the judge is favorable to him. As long as the defendant does not believe that the plaintiff is actually informed, a rational defendant will not infer that he, the defendant, will loose in court from the decision of the plaintiff to go to trial. Thus, the key implicit assumption in our model is that uninformed litigants believe, correctly or not, that informed litigants only believe themselves to be informed, but are not actually informed. This produces an irreconcilable difference in beliefs between the litigants. As long as *sometimes* litigants agree to disagree, some cases will go to court. Thus, when rationality is not common knowledge some cases will go to court, even though both litigants (and the judge) are rational.

8. Prior Work in Law

8.1. Priest and Klein and the Selection Effect

Priest and Klein 1984 drew attention to the selection effect. They suggested in their famous article that one should expect plaintiffs and defendants to prevail equally often. Lopsided cases would be settled. Since then their thesis has been qualified, partially corroborated and partially contradicted. Among many contributions, see Bebchuk 1984, Friedman and Wittman 2007, Klerman and Lee 2018, Lee and Klerman 2016, Waldfogel 1995, and Gelbach 2018**.** See also Shavell 1996 who show that the odds of one side winning may rise beyond fifty percent, and Klerman et al. 2018 who reconcile Priest and Klein's 1984 close cases with Bebchuk's 1984 one-sided bias.

Priest and Klein's most fundamental hypothesis is that disputes selected for litigation are not a representative sample of all disputes, because easy cases settle out of court. There are, however, several well-known and intuitive reasons why easy cases could be litigated. They include inefficiencies in the settlement process, overconfident litigants, and validation from winning in court (above validation from winning in settlement). We show that easy cases can be litigated, *even in the absence of any of these frictions*. The underlying reason stems from the paradox of open methods. If only hard cases go to court, then judges randomize or rule based on priors. The merits of the case would be irrelevant to determine whether a case is litigated. Hence, disputes selected for litigation would be a representative sample of all disputes. When taken to its logical conclusion, Priest and Klein's hypothesis leads to a contradiction that can only be resolved in a full game theoretical model of the interaction between judges and litigants. In the equilibrium of this model, some easy cases do go to court. The proportion of easy cases in court can be anything between 0 and 1, and no assumptions were made as to the probability that an easy case should be decided in favor of either side. Thus, Priest and Klein's 50-percent bias hypothesis does not speak directly to the issue this paper. Finally, we refer the reader to Daughety and Reinganum 1994, Waldfogel 1998, Yousefi and Black 2016 and Helland et al. 2018, among many contributions, on the empirical analysis of settlement and litigation. See also Danziger et al. 2011 and Weinshall-Margel and Shapard 2011 on whether judges are more lenient at the start of the day or after lunch.

8.2. Strategic Judges

Epstein, Landes and Posner's landmark study The Behavior of Judges, as well as the prior studies they summarize therein, show that judicial behavior can be well predicted by characteristics extraneous to the merits of a case, namely personal characteristics of the judge, such as political affiliations. This is consistent with our model. They also note that as a case percolates through the judicial system, the law tend to "run out" and judges tend to fall back on policy and personal priors. However, the way in which this happens, and the fact that what they call "policy" may also be selected out, is not something they explore (See Helland 2019; Tokson 2015; Boyd 2010; Fischmann 2008; Ruger 2004; Giles 2001, for the role of judicial bias).

The concept of judges as strategic actors can be traced back at least to Epstein and Knight's celebrated The Choices Justices Make. But to understand judges' behavior one must determine what judges want. Several motivating factors have been proposed. They include ideology (Grendstad et al., 2015); internal satisfaction of doing proper work (Baum 2006); power, reputation and career concerns (Drahozal, 1998 and Whitman, 2000); salary and leisure (Drahozal, 1998 and Baum, 2006), and promotion (Taha, 2004). Our model is parsimonious in this regard. It assumes that judges are rational, want to reach a correct decision, and have a disutility for effort.

Consider the question of whether judges are ideologically motivated. If judges' priors are based on their ideological stance, then, when the costs of processing arguments is small, our model predicts that rational judges rule as if their rulings are ideologically-based. This is consistent with empirical evidence (e.g., Grendstad et al., 2015). However, these empirical studies also show limitations in ideological motivations. In response to that, several papers show that judges' behavior is also consistent with alternative motives. More than twenty types of motivators have been considered, ranging from discretion to income (see, among many contributions, Drahozal, 1998; Baum 2006; and Whitman, 2000). While these papers give a richer and more realistic view of the behavior of judges, the multiplication of motivating factors also leads to a concern that generalizable models of judicial behavior could ultimately be undermined (Epstein and Knight, 2019). Under pure Bayesian updating, our paper shows that whether the case is easy or hard is a basic factor determining whether the ruling of a rational judge agrees with the judge's prior belief.

The literature on strategic behavior of judges is developed and includes many types of interactions such as agenda manipulation (Black, Schutte and Johnson, 2013; Epstein and Shvetsova 2002; Goelzhauser 2011, Staudt 2004); reversal avoidance (Cross and Tiller, 1998; Hinkle et al., 2012); bargaining (Lax and Radner, 2015; Spriggs et al., 1999); forward thinking (Black and Owens, 2009; Benesh, Brenner and Spaeth, 2002; Caldeira, Wright and Zorn, 1999); strategic auditing (Spitzer and Talley 2000); dissidence aversion (Kastellec, 2007) and opinion assignment (Lax and Cameron, 2007; Farhang, Kastellec, and Wawro 2015; Lazarus 2015). These strategic interactions add complexity and realism to models of strategic behavior of judges. They may also, in some cases, induce judges to deviate from optimal ruling. In our model, judges are strategic, but in a limited sense. They decide if it is worth the cost of examining the merits of the case, given the type of cases that typically go to their court. However, they rule rationally and freely. Therefore, we abstract away from forces such as pressure from public opinion, desire to conform to other judges or elected officials, fear of removal or even physical violence (see Eskridge 1991, Farejohn and Weingast 1992, Segal 1997, and Helmke 2005). Judges are not always free to rule as they deem right. But we believe that our stark assumptions make our results all the more remarkable. In future work, we hope that the interaction between judges and litigators that we developed in this model will be combined with the strategic interactions that have been already studied in the literature.

Caldeira, Wright and Zorn (1999) show that justices in the Supreme Court are more likely to hear a case when they think they will be on the winning side. So, a judge's prior belief can be instrumental in deciding whether a case goes to court, but through an entirely different mechanism of selection than considered in this paper (see also Black and Owens 2009, and Benesh et al. 2002).

8.3. The Bayesian Paradigm

In this paper, we assume that judges are rational (i.e., Bayesian) maximizers. Large experiments show that judges tend to rule in favor of those that they sympathize with (see Rachilinki and Johnson, 2009 and Wistrich et al., 2015). Even though judges sometimes argue that these experiments do not mimic actual cases well, field experiments confirm this type of bias (Tabarrok and Helland, 1999). It is now commonplace to accept that judges will rely on quick intuitions to make their decisions, and that the extent to which judges rely on their intuitions and prejudices undermine models of rational behavior and complicate the efforts to understand the behavior of judges. In contrast, our paper shows that a rational ruling can be very similar whether judges process information in a Bayesian way or merely act based on their prior beliefs.

9. Conclusion

We consider a game-theoretic analysis of the interaction between litigants and judges that we refer to as the Judging Game. By the selection effect, easy cases tend to settle because rational litigants want to save the litigation costs of cases with a clear disposition. Analogously, rational judges may want to save the costs of evaluating arguments they expect to be evenly balanced and, hence, not have a significant impact on their final ruling. We derive a mixed strategy equilibrium of the Judging Game in which some easy cases and some hard cases go to court, some judges evaluate the merits of the case and some judges ignore the merits of the case. In particular, some cases with a clear disposition will go to court, even if both litigants are rational and none of the parties have better information about the case than the other side.

The equilibrium of the Judging Game determines the fraction of cases in court that have a clear disposition and, therefore, it determines how strong the selection effect is. The equilibrium of the Judging Game also determines the fraction of judges that evaluate the merits of the case. Combining the fraction of cases in court that have a clear disposition and the odds that an unbiased judge evaluates the merits of the case, it is possible to determine the likelihood that an unbiased and rational judge rules at random (i.e., decides for both sides with equal odds) and the likelihood that judges make preventable judicial errors. Unbiased judges typically rule at random, except when litigation cost-ratios are low and adjudication cost-ratios are high. In particular, rational and unbiased judges may typically rule at random in situations where the selection effect is high and in situations where the selection effect is low. Rational and unbiased judges also typically rule at random in near perfect courts where all judges are either unbiased or almost unbiased, most judges are unbiased, judges highly dislike making judicial errors, judges can evaluate the merits of any case at low cost, and the law is near determinate in the sense that, ex-ante, most cases have a clear disposition. Finally, even if unbiased and rational judges rule at random, rational judges rarely make preventable judicial errors in this model, unless *both* litigation cost-ratios and adjudication cost-ratios are high.

10. Appendix

The proofs of the Ignored Argument Proposition and the Paradox of Open Methods follow directly from the arguments presented in the main text.

Proof of the Judging Game Theorem Step 1: If the litigants are of the same type (informed or uninformed), then $p^d = p^f$ and, thus, $p^f u - c < p^d u + c$.

Step 2: If the case is hard and an informed litigant believes that the judge's prior is unbiased or biased in favor of the other side, then $p^f u - c < p^d u + c$.

If the case is hard, then prior and posterior belief of the judge coincide. Thus, the judge rules as if by bias. By step 1, we can assume that one litigant is informed the other is uninformed. Assume that the plaintiff is informed. Then, the plaintiff believes that the likelihood of victory is 0 (if the judge is biased against the plaintiff) or 0.5 (if the judge is unbiased). The defendant is uninformed and so, $p^d = 0.5$ and $p^f \leq 0.5$. Thus, $p^f u - c < p^d u + c$. If the defendant is the informed litigant, then, by analogous argument, $p^f = 0.5$ and $p^d \geq 0.5$. Hence, $p^f u - c < p^d u + c$.

Step 3: If the case is hard, one litigant is uninformed and the other litigant believes that the judge's prior is favorable, then $p^f u - c > p^d u + c$.

As shown in step 2, the judge rules as if by bias. If the plaintiff is the informed litigant, then $p^f = 1$ and $p^d = 0.5$. Thus, $p^f u - c > p^d u + c$. If the defendant is the informed litigant, then $p^f = 0.5$ and $p^d = 0$. Therefore, $p^f u - c > p^d u + c$.

Step 4: If an informed litigant believes that the judge is either unbiased or biased towards the other side, then $p^f u - c < p^d u + c$.

By step 1 we can assume that the other litigant is uninformed. By step 2 we can assume that the case is easy. Consider an informed plaintiff and uninformed defendant. Assume first that the judge rules by bias. Then, $p^f = 0$ (if the judge is biased against the plaintiff) or $p^f = 0.5$ (if the judge is unbiased). So, $p^d = 0.5$ and $p^f \leq 0.5$. Therefore, $p^f u - c < p^d u + c$. Now assume that the judge rules by merit. Then, $p^d = p^f$ and, hence, $p^f u - c < p^d u + c$. The case where the plaintiff is uninformed and the defendant is informed is entirely analogous.

Let ρ be the probability that a judge rules by merit. Let $\bar{\rho} = 1 - \frac{4c}{u}$.

Step 5: Assume that the case is easy, one litigant is informed and believes the judge's prior is favorable to him. The other litigant is uninformed. Then,

$$\text{if } \rho < \bar{\rho}, \text{ then } p^f u - c > p^d u + c;$$

$$\text{if } \rho = \bar{\rho}, \text{ then } p^f u - c = p^d u + c;$$

$$\text{if } \rho > \bar{\rho}, \text{ then } p^f u - c < p^d u + c.$$

Assume that the plaintiff believes the judge's prior is favorable to him. The defendant is uninformed. In a case that should be decided in favor of the plaintiff, $p^f = 1$ and $p^d = \rho + (1 - \rho)\, 0.5$. In a case that should be decided in favor of the defendant, $p^f = 1 - \rho$ and $p^d = (1-\rho)\,0.5$. Either way, the conclusion holds.

It is an analogous situation if the plaintiff is uninformed and the defendant believes the judge's prior is favorable to him. In a case that should be decided in favor of the plaintiff, $p^f = \rho + (1-\rho)\,0.5$ and $p^d = \rho$. In a case that should be decided in favor of the defendant, $p^f = (1-\rho)\,0.5$ and $p^d = 0$. Either way, the conclusion holds.

Step 6: In any equilibrium, $\rho = \bar{\rho}$; if $\sigma \leq \frac{4c}{u}$, then $\Phi_{0.5-b} = \Phi_{0.5+b} = 0$, $\Phi_{0.5} = \frac{\bar{\rho}}{1-\sigma}$ and $\varphi = \frac{2e}{v}$; if $\sigma > \frac{4c}{u}$, then $\Phi_{0.5} = 1$, $\Phi_{0.5-b} + \Phi_{0.5+b} = \frac{2[\bar{\rho}-(1-\sigma)]}{\sigma}$ and $\varphi = \frac{e}{(0.5-b)v}$.

If $\rho < \bar{\rho}$, then, by steps $1-5$, easy and hard cases go to court when one litigant believes the judge's prior is favorable to him and the other is uninformed. Thus, a case that goes to court is easy with probability κ, and judges prefer to rule by merit. Thus, no easy case goes to court (because only hard cases lead to litigants difference in beliefs). If $\rho > \bar{\rho}$, then by steps $1-5$, only hard cases go to court and the judge prefers to rule by bias. Thus, easy and hard cases go to court with equal probability.

By (5.2) and (5.3), if either $\Phi_{0.5-b} > 0$ or $\Phi_{0.5+b} > 0$, then $\varphi\,(0.5-b)\,v \geq e$. Thus, $\varphi 0.5v > e$ and, hence, $\Phi_{0.5} = 1$. Conversely, if $\Phi_{0.5} < 1$, then $\varphi 0.5v \leq e$. Thus, $\varphi\,(0.5-b)\,v < e$ and, hence, $\Phi_{0.5-b} = \Phi_{0.5+b} = 0$. Now, $\rho = \frac{\sigma}{2}(\Phi_{0.5-b} + \Phi_{0.5+b}) + (1-\sigma)\Phi_{0.5} = \bar{\rho}$. First assume that $(1-\sigma) \geq \bar{\rho}$. If $\Phi_{0.5-b} > 0$ or $\Phi_{0.5+b} > 0$, then $\Phi_{0.5} = 1$ and, hence, $\rho > \bar{\rho}$. Thus, $\Phi_{0.5-b} = \Phi_{0.5+b} = 0$, $\Phi_{0.5} = \frac{\bar{\rho}}{1-\sigma}$ and, by (5.3), $\varphi 0.5v = e$.

Now assume that $(1-\sigma) < \bar{\rho}$. If $\Phi_{0.5} < 1$, then $\Phi_{0.5-b} = \Phi_{0.5+b} = 0$ and, hence, $\rho < \bar{\rho}$. Thus, $\Phi_{0.5} = 1$, $\Phi_{0.5-b} + \Phi_{0.5+b} = \frac{2[\bar{\rho}-(1-\sigma)]}{\sigma}$ and, by (5.2), $\varphi\,(0.5-b)\,v = e$.

Step 7: Assume that cases only go to court when one litigant believes the judge's prior is favorable and the other litigant is uninformed. Also assume that if a litigant believes the judge's prior is favorable and the other litigant is uninformed, then hard cases go to court and easy cases go to court with probability μ. It follows that a case that goes to court is easy with probability $\varphi = \frac{\mu\kappa}{\mu\kappa+(1-\kappa)}$.

The unconditional probability of an easy case is κ. Let's say that the odds that a litigant believes the judge's prior is favorable and the other litigant is uninformed is q. So, conditional on an easy case, the odds of going to court is $q\mu$ and conditional on a hard case, the odds of going to court is q. The conclusion follows by Bayes' rule.

The proof can now be concluded as follows: Let $\bar{\mu}$ be such that $\frac{\bar{\mu}\kappa}{\bar{\mu}\kappa+(1-\kappa)} = \frac{2e}{v}$ if $\sigma \leq \frac{4c}{u}$, and $\frac{\bar{\mu}\kappa}{\bar{\mu}\kappa+(1-\kappa)} = \frac{e}{(0.5-b)v}$ if $\sigma > \frac{4c}{u}$. Given that $e < \kappa\,(0.5-b)\,v$ and, hence, $2e < \kappa v$, this is well-defined. Consider now a strategy of judge given by step 6. That is, if $\sigma \leq \frac{4c}{u}$, then $\Phi_{0.5-b} = \Phi_{0.5+b} = 0$, $\Phi_{0.5} = \frac{\bar{\rho}}{1-\sigma}$; if $\sigma > \frac{4c}{u}$, then $\Phi_{0.5} = 1$. The strategy of the mediator is to send to the case to court if the case is hard, one litigant believes the judge's prior is favorable and the other litigant is uninformed; to send the case to court with probability $\bar{\mu}$ if the case is easy, one litigant believes the judge's prior is favorable and the other litigant is uninformed; otherwise the case settles out of court. By steps 1− 5, (5.1) holds. By step 7, $\varphi 0.5v = e$ if $\sigma \leq \frac{4c}{u}$ and $\varphi (0.5 - b)\, v = e$ if $\sigma > \frac{4c}{u}$. Thus, (5.2) and (5.3) hold. The uniqueness conclusion follow directly from step 6.■

Proof of the Properties of the Judging Game. The properties of the Judge Game follow directly from the Judge Game Theorem. The fact that $\bar{\rho}$ does not depend on σ and $\frac{e}{v}$ follows directly from (5.4). The fact that $\bar{\varphi}$ does not depend on κ follows directly from (5.5). Moreover, as $\frac{e}{v}$ goes to zero, by (5.5), $\bar{\varphi}$ goes to zero. As $\frac{e}{v}$ goes to zero, the probability that an unbiased judge rules at random goes to one because an unbiased judge rules at random with probability $1 - \Phi_{0.5} + \Phi_{0.5}(1 - \bar{\varphi})$, $\bar{\varphi}$ goes to zero, and $\Phi_{0.5}$ does not depend on $\frac{e}{v}$. In addition, an unbiased judge expects to make a preventable error with probability $(1 - \Phi_{0.5})0.5\bar{\varphi}$ which goes to zero as $\frac{e}{v}$ goes to zero. The other arguments on the how $\bar{\rho}$ and $\bar{\varphi}$ depend on $\frac{c}{u}$ and $\frac{e}{v}$ also follow directly from (5.4) and (5.5).■

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