

Lawyer Advice and Evidence Disclosure ^{*}

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ABSTRACT: This paper examines how the advice that lawyers provide to their clients affects the disclosure of evidence and the outcome of adjudication, and how the adjudicator should allocate the burden of proof in light of the effect. Despite lawyers' expertise in assessing the evidence, their advice is found to have no effect on adjudication, if legal advice is costless and the lawyers follow undominated strategies in disclosure. A lawyer's advice *can* influence the outcome to his client's favor, either if he can credibly advise his client to suppress some favorable evidence or if there is a cost associated with legal advice. The effect is socially undesirable in the former case, but it is desirable in the latter case. These results provide a general perspective for understanding the role of advising in disclosure.

KEYWORDS: Legal advice, disclosure of evidence, burden of proof, regulating adjudicators' inferences, signalling

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1 Introduction

Lawyers play a highly prominent role in the modern day adjudication process. An important aspect of their role involves advising clients regarding disclosing information to the court. Lawyers can advise their clients to withhold unfavorable information and disclose favorable one. Although lawyers often (particularly, in civil cases) have a disclosure duty before the tribunal, the rules of confidentiality and attorney-client privilege enable them to suppress evidence during discovery and trial, particularly when the opposing party and the tribunal are unaware of the existence of the evidence.¹ Further, as Kaplow and Shavell (1989) noted, “the combination of carefully crafted responses, limited testimony and the adversary’s inability to conceive of (or expend the resources to ask) every possible question may well result in a significant gap between the information learned by the adversary’s lawyer and that possessed by the client.” To the extent that lawyers can affect the amount and nature of information reaching the court, they could affect the outcome of a trial. Our objective is to understand this effect.

To this end, we develop a model of dispute adjudication in which two disputing parties, say defendant and a plaintiff, are tried by an adjudicator, called “judge.” In the trial, each party presents his privately-held evidence, and the judge rules either to “convict” or “acquit” the defendant based on the disclosed evidence. The party’s evidence is “hard” in that he cannot manipulate it, but he can withhold it. Hence, the main decision facing each party is whether to disclose his evidence or not.

This decision is not trivial, however, since the judge’s ruling depends not just on the evidence itself but also on another piece of information reflecting the legal rules and standards that are applied to interpret that evidence and the other public evidence surrounding that case. We assume that the lawyers can assess this latter information better than the parties, so a lawyer can assess whether a party’s evidence is favorable or unfavorable and how strong his case would be without its disclosure. A lawyer-represented party can thus make a more informed decision about disclosure. We study this particular role of lawyers.

At first glance, lawyers’ expertise appears to leave no doubt about the value of their advice, at least to their clients. Armed with the knowledge of the law, a lawyer should be able to improve her client’s disclosure decision. Surprisingly, however, this benefit does not always materialize. We find legal advice to be irrelevant — both privately and socially — when it can be obtained for free and the parties employ undominated strategies in disclosure (i.e., strategies of disclosing evidence if and only if it is favorable). In that case, legal advice indeed affects one’s disclosure behavior, but it does *not* affect the outcome of adjudication. This irrelevance holds regardless of

¹The attorney-client privilege protects privileged information in testimony at trial. Federal Rules of Civil Procedure (Rules 26(b)(1) and 26(b)(3)) limit discovery of privileged information and trial preparation materials.

whether one or both parties obtain legal advice, and whether the adjudicator makes a Bayesian inference based on the parties' disclosure strategies or she simply follows an ad-hoc rule satisfying some reasonable properties.

Our basic model is extended to identify two sets of circumstances in which legal advice on disclosure is relevant. First, a lawyer advice matters if (s)he can credibly follow a (weakly dominated) strategy of suppressing some favorable evidence. Such a strategy can skew the inference by the court, and thus the adjudication outcome, in favor of his client. This role of lawyers generates a private incentive for hiring lawyers, but the aggregate welfare falls if both parties hire lawyers, which suggests a "prisoners' dilemma" type explanation for the prevalence of lawyer representation. Moreover, this role of lawyers distorts parties' disclosure in a socially undesirable way. We show that this harm can be remedied if the adjudicator commits ex ante to the way in which she assigns the burden of the proof and thus the way in which she draws an inference about the guilt. This last result provides some rationale for restrictions the law places on how judges and juries should interpret evidence or lack thereof.

Lawyer representation can also affect the adjudication outcome when it comes at a cost. The cost of representation provides a means with which parties without additional information — either incriminating or exculpatory — can credibly signal their lack of evidence and avoid a prejudicial inference by the adjudicator. Although a party with extremely unfavorable evidence mimics the same behavior (i.e., hires a lawyer and withholds evidence), other parties who possess less unfavorable evidence — but still unfavorable enough that they would have withheld it had legal advice been free — choose not to hire a lawyer and disclose their evidence. In essence, hiring a lawyer buys one "the right to be silent without prejudice." Overall, the cost of legal advice increases the disclosure of private information, which in turn improves the quality of adjudication — in fact, more so as the cost increases.

Our analysis of legal representation has several broad implications. First, our model provides a useful framework for analyzing the advisory role of lawyers in dispute resolution. Of course, lawyer representation in the real world includes many important aspects, not all captured in our simple model. Yet, the advisory role of lawyers in disclosure remains an important one, and our model identifies ways in which this role may (or may not) affect the outcome of adjudication. In this sense, our model can serve ultimately as a useful benchmark — a useful building block for studying various aspects of lawyer representation.

Our paper also yields useful insights into various rules and restrictions on the inferences that adjudicators are allowed to draw from nondisclosure of evidence. First, we show that no such restrictions are warranted with or without legal representation, when the adjudicator is Bayesian and the lawyers disclose all favorable evidence. In this case, the equilibrium outcome is socially

optimal. However, this conclusion no longer holds when the lawyers can credibly use strategies of withholding some favorable evidence. In this case, the extent of potential harm to social welfare can be reduced by committing the adjudicator to a rule which allocates all burden of proof to one party. These results contribute to the understanding of evidentiary rules and procedures adopted by courts.

Our modeling framework and the results may be useful for understanding the role of advising more broadly, namely in settings other than dispute resolution. The insights obtained in this paper pertain generally to any situation in which a decision that has significant consequence for an agent has to be made based on the information provided by that agent. Promotion and grant allocation, college admission and job application, product introduction and promotion are some relevant examples. An agent facing a decision in such context (e.g. writing a grant proposal or preparing a case for promotion, choosing a strategy of college or job application, or a strategy of product introduction and promotion) often seeks or is encouraged to seek advice from mentors, counselors or consultants regarding strategies of information revelation. Our results offer some basic necessary condition for the advising to be relevant.

The issue of legal advice has received very little formal treatment in the literature. Legal scholars have recognized the factors favoring and disfavoring lawyer-aided adversarial system but disagree on the relative importance of those factors. Proponents argue that a vigorous adversarial competition among lawyers leads the court to focus on relevant evidence, thus making judicial fact-finding efficient (Luban, 1983; Bundy and Elhauge, 1992 and 1993). Critics point out that lawyers can mislead as much as inform the court (Frank, 1973). In particular, Kaplow and Shavell (1989) point out, via illustrative examples, that while the lawyers' ability to suppress evidence based on legal expertise undoubtedly benefits their clients, its social implications are ambiguous, thus casting doubt on its social benefit. Although the current paper is similar in spirit to the last study, there are several important distinctions. First, these studies do not perform a full-fledged equilibrium analysis of the disclosure game, focusing rather on the effect of legal advice when possible outcomes are exogenously fixed. Further, the issue of adjudicator's inferences is not considered in the literature. In contrast, we explicitly analyze the interplay of incentives of different actors in our model. Many interesting issues of policy relevance can be addressed only with an approach such as ours that treats the adjudicator's inference as a policy choice variable. Finally, the previous studies restrict their attention to the social value of legal advice, largely taking private incentives for granted. However, as we demonstrate, the issue of private value of legal advice is not trivial and warrants a careful examination.

This paper is also closely related to the economics literature on disclosure of non-falsifiable information. Grossman (1981), Milgrom (1981), Milgrom and Roberts (1986) and Lipman and Seppi

(1995) find that conflicting interests can lead to full revelation of commonly shared information by the agents. Shin (1994, 1998) studies information revelation when the possession of information is not common knowledge, which makes the inference (or “burden of proof”) nontrivial. In particular, our basic model is related to Shin (1998), who compares adversarial and inquisitorial litigation systems. Froeb and Kobayashi (1996), (2001) and Daughety and Reinganum (2000b) assess the implications of endogenous evidence production arising from the adversarial system. Sobel (1985), Hay and Spier (1997), Sanchirico (1997, 1998, 2001), and Bernardo et al. (2000) explore the allocation of the burden of proof and evidence production from the standpoint of litigation costs and/or deterrence.² Seidmann (2005) and Mialon (2005) investigate the effect of the defendant’s right to silence, with and without adverse inference by the adjudicator after such right is exercised, on the adjudication outcomes and welfare. None of these papers deal with the role of lawyers in disclosure — the focus of the current paper.

2 Model

Two parties, 1 and 2, are in dispute, which is adjudicated by a judge/jury in a tribunal. It is convenient to interpret parties 1 and 2 as a defendant and a plaintiff in a litigation, so we will invoke this interpretation throughout the paper. However, our model is fairly general and can apply equally well to a number of different settings. The adjudicator in our model can be either a judge or a jury or a combined entity, whom we shall call simply “the judge,” throughout. Lawyers provide legal advice, if hired by the parties.

There are two pieces of judgment-relevant information that pertain to the case. First, there is evidence $s \in [0, 1] =: S$ which may only be observed by the parties to the dispute. The evidence is observed with probability p_{00} by neither party, with probability p_{11} by both parties; and with probability p_{10} (resp. p_{01}) by party 1 only (resp. party 2 only).³ Obviously, $\sum_{i,j=0,1} p_{ij} = 1$, and we assume that $p_{ij} > 0$ for all $i, j = 0, 1$. Note that we allow for possible correlation in the parties’ abilities to observe the evidence. No others observe this evidence directly. The evidence is “hard” in the sense that, while it can be concealed, it cannot be fabricated or manipulated. For instance, the evidence can take the form of an unforgeable document or a non-perjuring witness. Equivalently, the evidence may be soft but perjury laws prevent the possessor of the evidence

²Dewatripont and Tirole (1999) study the desirability of adversarial system in a broad organization design context. Levy (2005) studies the effect of career concerns on judges’ decision making. Also related, albeit with less relevance in the litigation setting, is the literature on cheap talk (or communication of falsifiable information), which includes Crawford and Sobel (1982) and Krishna and Morgan (2001).

³“Observing” s means either possessing that evidence or having proof of its existence (perhaps in the opponent’s possession).

from falsifying it.

The other piece of judgment-relevant information, $\theta \in [0, 1] =: \Theta$ can only be observed by the lawyers and the judge. The variable θ represents the judge’s interpretation of the laws and legal standards in application to the current case. Further, θ may also reflect the court’s view regarding the evidence, as well as its interpretation of external circumstances surrounding the case, such as basic uncontested facts, police reports, the testimony by neighbors, etc. Thus, when s is disclosed (not disclosed), the judge’s ruling depends on both s and θ (only on θ)⁴. The disputing parties have limited knowledge of the law and incomplete understanding of the legal process, so they can observe θ only by hiring lawyers. Lawyers understand the body of the law in the jurisdiction where they practice, as well as the judge’s interpretation of the law and her possible biases. For instance, the lawyer and the judge may be able to assess more accurately how strong or weak the mitigating circumstances are for a litigant. Ultimately, the lawyers’ ability — and the litigants’ inability — to observe θ serves a modeling purpose of introducing productive role for the lawyers.

We assume that (s, θ) is drawn from $S \times \Theta$ according to an absolutely continuous cdf, $F(s, \theta)$ which has a positive density $f(s, \theta)$ in the interior of $S \times \Theta$. From the ex-ante perspective, θ is random because it describes the realized state of the law and legal standards -one out of many possibilities, as well as a particular realization of commonly known evidence. Since s and θ reflect the nature of underlying case, they may be correlated. We assume that s and θ satisfy the (weak) Monotone Likelihood Ratio Property (MLRP):

ASSUMPTION 1 (**MLRP**) For all $s' \geq s$ and $\theta' \geq \theta$, $f(s', \theta')/f(s, \theta') \geq f(s', \theta)/f(s, \theta)$.

To understand the value of legal advice, we will compare two regimes. In the first regime, the parties are not represented by lawyers and do not receive any legal advice. In the second regime, both parties are represented by lawyers, at no cost to them. Self representation serves as a benchmark necessary for our analysis, but it is not without practical relevance. Although few parties represent themselves in civil or criminal trials in state or federal courts in the U.S., many litigants do so in municipal courts and administrative trial procedures. Also, in small claims courts — which comprise a significant share of trials in the U.S. — legal representation is expressly forbidden in most states (California, New York, Arizona, and others).⁵ Further, our comparison should not be narrowly interpreted as pertaining only to the two regimes; rather, it applies to any increase in the quality of lawyer representation. For instance, one could view the two regimes as

⁴Posner (1999) discusses a class of ‘bare bones cases’ in which very little evidence is presented by the parties, and the adjudicator has to rule on the basis of the law and a few uncontested facts. Such ‘bare bones’ cases fit the description of situations where s is not disclosed.

⁵See Spurrier (1980) for detail. The problem of withholding evidence is particularly relevant in this case, since the discovery process is very limited and the trials focus on a few key elements of evidence.

involving lawyer representation but differing only in the quality of representation.

The time line of the events in both regimes is as follows. At date 0, (s, θ) is realized. At date 1, parties 1 and 2 observe the evidence s with probabilities $p_{10} + p_{11}$ and $p_{01} + p_{11}$, respectively, while the judge and the lawyers learn θ . At date 2 (trial), party 1 and party 2 simultaneously and independently decide whether to disclose the evidence s to a judge, provided that the respective party has observed it. In the representation regime, this decision is taken with the help of a lawyer providing legal advice. At date 3, the judge rules either for party 1 or for party 2. The decision whether to hire a lawyer will at first be left outside the model. Later, we introduce the possibility of the parties deciding on the basis of their private evidence whether to obtain legal representation at a cost.

• **Evidence disclosure behavior:**

If a party is not represented by a lawyer, then his decision whether to disclose s is based solely on s . In contrast, if a party is represented by a lawyer, the lawyer can provide advice based on his knowledge of θ . In particular, a lawyer can advise the client whether disclosing s is beneficial to him for given θ .

We assume that a lawyer would prefer his client to prevail in court, and that there are no agency issues in the attorney-client relationship. Given the congruence of interests between the lawyer and the client, the client will have full incentives to communicate s to his lawyer, and likewise the lawyers will have the incentives to explain the legal issues, i.e. to communicate θ to the client truthfully. Therefore, the represented party can simply be viewed as informed of both s (if he observes s) and θ .

Thus, the difference between representation and no representation in our model boils down to the information available to the party when he makes the disclosure decision. In the regime of no representation, the disclosure decision is made solely on the basis of s itself, while in the regime of representation it is based on both s and θ . Formally, party i 's disclosure strategy is a function ρ_i that maps $S \times (\Theta \cup \phi)$ to $[0, 1]$, with $\rho_i(s, \theta)$ representing the probability that party $i = 1, 2$'s discloses s , in state θ . If the party is not represented, he does not observe $\theta \in \Theta$, which is captured by setting θ equal to ϕ in this case.

• **Judge's Adjudication behavior:**

In the last stage of the game, the judge makes a binary decision, ruling either for party 1 or party 2. For instance, in a criminal trial, the judge convicts or acquits the defendant.⁶

⁶Our binary model is more general than appears at first glance. For instance, there may be no ambiguity about the size of damages in case the plaintiff prevails, leaving the liability as the only source of contention. The binary feature can also be justified in an idealistic Beckerian world in which any defendant found liable is subject to a

The judge’s ruling depends on (s, θ) if s has been disclosed, and on θ only if s has not been disclosed. If θ is disclosed, the judge’s decision depends on her criterion of party 1 (defendant)’s culpability, $g(s, \theta)$. Specifically, if $g(s, \theta) > 0$, then the judge finds party 1 culpable and thus rules for party 2. If $g(s, \theta) < 0$, the judge finds party 1 innocent and rules for him. The judge is indifferent if $g(s, \theta) = 0$, but since the distribution $F(s, \theta)$ is absolutely continuous, how a tie is broken in this case has no real consequence.

We assume that the function $g(s, \theta)$ is increasing and continuous in both arguments. Thus, lower s and θ [resp. higher s and θ] are more beneficial for party 1 [resp. party 2]. In the litigation example, a higher value of s means that the defendant (party 1) is more likely to have caused a certain event, while a higher value of θ indicates that the law and legal standards are more unfavorable toward the defendant. To make the judge’s decision problem nontrivial, we assume that $\int g(s, 1)f(s|1)ds > 0$ and $\int g(s, 0)f(s|0)ds < 0$, which means that publicly available information and legal standards have enough inherent variability that the judge’s unconditional belief about the culpability swings from one side to the other as θ changes from the most favorable to party 1 (i.e., $\theta = 0$) to the most unfavorable (i.e., $\theta = 1$).⁷ Since $g(s, \theta)$ is monotonically increasing in both arguments, there exists a strictly decreasing continuous function $s = h(\theta)$ such that $g(h(\theta), \theta) = 0$ for all $\theta \in [\underline{\theta}, \bar{\theta}]$, where $\bar{\theta} := \max\{\theta | \exists s' \in S \text{ s.t. } g(s', \theta) = 0\}$ and $\underline{\theta} := \min\{\theta | \exists s'' \in S \text{ s.t. } g(s'', \theta) = 0\}$. This function partitions the evidence/legal environment space into two regions where the judge rules for party 1 and party 2 respectively when she observes both s and θ , as depicted in Figure 1.⁸

The adjudication criterion $g(s, \theta)$ can be justified by a judge’s objective. Suppose the judge wishes to minimize the cost of making a wrong decisions, i.e. “convicting the innocent or exonerating the guilty,” with appropriate costs assigned to each type of mistake. Let c_1 (resp. c_2) be the judge’s personal or perceived societal cost of ruling mistakenly for party 1 (resp. party 2), i.e. “exonerating the guilty” (“convicting the innocent”), and let $\pi(s, \theta)$ be the probability that for given (s, θ) the party 1, the defendant, is guilty. Then, if the judge convicts party 1 (i.e., the defendant) with probability z , the expected cost of a mistake is

$$(1 - \pi(s, \theta))c_2z + \pi(s, \theta)c_1(1 - z).$$

To minimize this cost, the judge should choose $z = 1$ if $\pi(s, \theta) - \frac{c_2}{c_1+c_2} > 0$ and should choose $z = 0$ otherwise. Our model accommodates this behavior if we let $g(s, \theta) := \pi(s, \theta) - \frac{c_2}{c_1+c_2}$.⁹

sanction equaling his maximum wealth limit.

⁷This assumption is mainly to simplify exposition. Its only use is to allow for nontrivial analysis in Section 5.

⁸The two regions have nonempty interiors given the above assumption.

⁹Different standards of proof and evidence adopted by the courts are consistent with this model. Indeed, let $\alpha := \frac{c_2}{c_1+c_2}$. If $\alpha = 0.51$, then the judge can be said to follow the rule of preponderance of evidence. The interval

We assume that the judge’s adjudication criterion $g(\cdot, \cdot)$ is common knowledge to all players, including the lawyers and parties 1 and 2. This assumption does not rule out the possibility that the judge may be biased, as long as the bias is common knowledge. For example, the judge may adopt a standard of proof, as represented by $\frac{c_2}{c_1+c_2}$, which may differ from the one she is supposed to apply.¹⁰

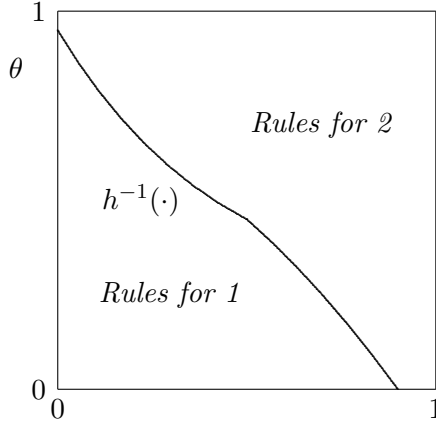


Figure 1

If no party discloses s , then the adjudicator rules on the basis of θ and, possibly, her inference about the parties’ disclosure decisions. The adjudicator’s decision rule in this case, henceforth referred to as *default ruling strategy*, is described by the function $\delta : \Theta \mapsto [0, 1]$, where $\delta(\theta)$ denotes the probability with which (s)he rules for party 2 if she observes signal θ and no evidence is disclosed. The judge’s strategy depends on her *posterior assessment of party 1’s culpability*, or simply her *posterior*, given by

$$\mathbb{E}[g|\rho_1(\cdot), \rho_2(\cdot), \theta; a, b_1, b_2, c] := a\mathbb{E}_0[g|\theta] + b_1\mathbb{E}_1[g|\theta] + b_2\mathbb{E}_2[g|\theta] + c\mathbb{E}_{12}[g|\theta], \quad (1)$$

which is a weighted average of expected culpability criterion based on alternative evidence scenarios, with nonnegative constants a , b_1 , b_2 and c used as weights. The first term, $E_0[g|\theta] := \int_0^1 g(s, \theta)f(s|\theta)ds$, is party 1’s expected culpability given the presumption that no party has observed the evidence s ; $\mathbb{E}_i[g|\theta] := \int_0^1 g(s, \theta)(1 - \rho_i(s, \theta))f(s|\theta)ds$ is the (normalized) expectation of g given the presumption that only party $i = 1, 2$ has observed s but has not disclosed; and the last

of (0.6, 0.7) corresponds to the standard of “clear and convincing evidence.” According to Posner (1999) judges associate probability level between 0.75 and 0.9 with the standard of “proof beyond a reasonable doubt.”

¹⁰The bias can be of a more general form. Letting $\Delta(s, \theta)$ denote the degree of bias in favor of party 2, the judge may follow the criterion $g(s, \theta) + \Delta(s, \theta)$ where $g(s, \theta)$ denotes an unbiased criterion. The subsequent analysis goes through as long as the new criterion $g(s, \theta) + \Delta(s, \theta)$ preserves the monotonicity property.

expectation term, $\mathbb{E}_{12}[g|\theta] := \int_0^1 g(s, \theta)(1 - \rho_1(s, \theta))(1 - \rho_2(s, \theta))f(s|\theta)ds$, is based on the presumption that both have observed s but neither has disclosed it.¹¹ Absent disclosure of s , the judge applies this posterior, ruling in favor of 2 if and only if $\mathbb{E}[g|\rho_1(\cdot), \rho_2(\cdot), \theta] > 0$. (The dependence of the posterior on (a, b_1, b_2, c) is suppressed when this does not generate any ambiguity).

The coefficients, (a, b_1, b_2, c) , henceforth referred to as the judge's *inference rule*, reflect how the judge weighs alternative evidence scenarios in her inference formation/burden of proof assignment. Throughout, we will only assume that the judge applies the same criterion, i.e. the coefficients (a, b_1, b_2, c) remain constant, regardless of whether a party is represented or not.

Since only the sign of the posterior matters for the judge's decision, we normalize by setting $a = 1$, and focus on the values of (b_1, b_2, c) .¹² Depending on the values of these variables, our adjudication criterion in (1) accommodates a variety of different decision procedures and burden-of-proof allocation rules. For example, if $b_1 = b_2 = c = 0$, then the judge bases her decision only on the prior expectation of g . In this case, the judge is *completely non-Bayesian* in the sense that she does not account for the possibility that one of the parties may be withholding evidence. If $b_1 > 0$ and $b_2 = c = 0$, then the judge never attributes nondisclosure of evidence to party 2's withholding it. In other words, the burden of proof is put on party 1. Likewise, if $b_2 > 0$ and $b_1 = c = 0$, then the burden of proof is assigned to party 2. If both b_1 and b_2 are strictly positive, then the judge assigns some weight to either party withholding the evidence, so the burden of proof is split between the two parties. One important case arises when the judge is *fully Bayesian*, i.e. $(b_1, b_2, c) = (\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}})$. In this case, the judge's posterior assessment assigns accurate probability weights to alternative scenarios of evidence withholding.

In the legal literature, the burden of proof is defined as an obligation to provide evidence which proves or disproves allegations. A party, that bears the burden of proof, loses the cases if they are not able to meet it by submitting such evidence. Our modeling of the burden of proof is consistent with this notion. Indeed, as we will show below, if a single party bears all burden of proof in our model (e.g. party 1 bears it when b_1 is sufficiently large and $b_2 = c = 0$), then this party can only win the case by providing favorable evidence. Moreover, by varying the coefficients b_1, b_2, c we are able to quantify the effect of burden-of-proof allocation, and show how the extent of disclosure by a party depends on its share of the burden-of-proof.

There is an active debate in the legal literature regarding the appropriate allocation of the

¹¹The value of (1) would correspond to a weighted expectation of the adjudication criterion with arbitrarily fixed weights a, b_1, b_2, c if we normalize it dividing by $a + b_1 \int_0^1 (1 - \rho_1(s, \theta))f(s|\theta)ds + b_2 \int_0^1 (1 - \rho_2(s, \theta))f(s|\theta)ds + c \int_0^1 (1 - \rho_1(s, \theta))(1 - \rho_2(s, \theta))f(s|\theta)ds$. Since the judge's ruling depends only on the sign of (1), all our results are invariant to this normalization. So, for brevity we work with (1) without normalizing it.

¹²The only loss is when $a = 0$. This case is arbitrarily closely approximated by $a \approx 0, a > 0$. Further, c will be seen to play a limited role.

burden of proof, as well as the applicability of Bayesian approach. It is widely acknowledged that adjudicators are prone to biases and errors in computing the true statistical odds of events (see Tribe (1971)) and are often reluctant to convict on the basis of simple statistical likelihood.¹³ Therefore, it is important to allow for non-Bayesian — as well as Bayesian — burden-of-proof allocations.

Furthermore, legal rules and procedures often restrict the admissibility of certain types of evidence and limit the inferences which a judge or a jury are allowed to make from certain evidence or lack thereof, because of the concerns about their prejudicial effect. Our model allows for any biases and errors in the allocation of the burden of proof, as well as for any restrictions that may be imposed by the law of evidence on the adjudicators' inference formation. In this regard, the coefficient b_i can be seen as the extent to which the rule allows the judge to be “rationally” prejudiced against party i in interpreting his nondisclosure. Given this interpretation, we will say that an inference rule (b'_1, b'_2) is *less prejudicial than* an inference rule (b_1, b_2) if $(b'_1, b'_2) < (b_1, b_2)$.

For a later purpose, it is useful to consider a *posterior assessment* arising when the parties follow *cutoff* strategies. Suppose party 1 employs a strategy of disclosing her/his evidence if and only if $s < \hat{s}_1$ and party 2 discloses if and only if $s > \hat{s}_2$. We denote the judge's posterior under such cutoff strategies (with a slight abuse of notation) by

$$\begin{aligned} \mathbb{E}[g|\hat{s}_1, \hat{s}_2, \theta; b_1, b_2, c] := & \int_0^1 g(s, \theta) f(s|\theta) ds + b_1 \int_{\hat{s}_1}^1 g(s, \theta) f(s|\theta) ds + b_2 \int_0^{\hat{s}_2} g(s, \theta) f(s|\theta) ds \\ & + c \int_{\{\hat{s}_1 \leq s \leq \hat{s}_2\}} g(s, \theta) f(s|\theta) ds. \end{aligned} \quad (2)$$

• Equilibrium concept and outcome:

In each regime, we focus on Perfect Bayesian equilibria in the parties' disclosure strategies and the judge's ruling strategy. Since the adjudication decision is trivial in the case of disclosure, the strategy profile is summarized by a triple, (ρ_1, ρ_2, δ) . The object of ultimate interest though is

¹³One of the most well-known examples extensively discussed in the literature to highlight the problems with this kind of cases and the use of statistical evidence is the so-called Blue Bus/Grey Bus case. In this case, a plaintiff has been negligently hit by a bus in the location where Blue Bus Company operates a greater number of buses than Grey Bus Company. A direct application of ‘more likely than not’ criterion should lead the court to convict Blue Bus company on the basis of the ‘bare bones’ statistical evidence that blue buses are more numerous and, therefore, are more likely to have hit the plaintiff. Yet, experimental results (see Wells (1992)) show that judges and members of the jury are very unlikely to make such conviction when only such evidence is presented. Several legal scholars (e.g. Posner (1999) and Thompson (1989)) explain the reluctance to convict by the fact that it is quite implausible that the statistic is the only evidence available to the plaintiff. That is, absence of other evidence should lead the adjudicator to infer that the plaintiff is concealing some evidence indicating that the bus actually belonged to the other bus company. The latter point of view is consistent with the judges and juries following an adjudication criterion such as (2) with $b_i > 0$.

the equilibrium outcome of adjudication, i.e., the decision made as a function of the information available to the parties. Formally, an *adjudication outcome* is a function, $\phi : X_1 \times X_2 \times S \times \Theta \mapsto [0, 1]$, that maps the state of the world (x_1, x_2, s, θ) into the probability that the judge rules for party 2, where $x_i \in \{0, 1\}, i = 1, 2$, with $x_i = 1$ if party i observes s and $x_i = 0$ if not. In particular, an equilibrium (ρ_1, ρ_2, δ) induces an outcome function via

$$\phi(x_1, x_2, s, \theta) = \delta(\theta)(1-x_1\rho_1(s, \theta))(1-x_2\rho_2(s, \theta)) + 1_{\{g(s, \theta) \geq 0\}} [1 - (1 - x_1\rho_1(s, \theta))(1 - x_2\rho_2(s, \theta))].$$

We are interested in comparing the adjudication outcomes induced by equilibria under different legal regimes.

3 Irrelevance of Legal Advice

In this section, we characterize equilibrium outcomes across legal regimes that differ in the availability of (costless) legal advice. We then compare them.

3.1 No Representation

In this regime, neither party 1 nor party 2 has a lawyer. Thus, they must decide whether to disclose the evidence s without being certain about the value of θ , and thus without knowing whether this disclosure will lead to a favorable or an unfavorable ruling by the judge.

We shall establish that there exists a unique perfect Bayesian equilibrium. In this equilibrium, both parties and the judge adopt cutoff strategies. In particular, parties 1 and 2 use a common threshold \hat{s} : Party 1 discloses s if and only if $s < \hat{s}$, and party 2 discloses s if and only if $s > \hat{s}$. The judge's equilibrium default ruling strategy is also characterized by a threshold, denoted by $\hat{\theta}$. That is, when s is not disclosed, the judge rules for party 1 if $\theta < \hat{\theta}$ and for party 2 if $\theta > \hat{\theta}$. The optimality of the judge's cutoff strategy follows from the monotonicity of her posterior $\mathbb{E}[g|\hat{s}, \hat{s}, \theta, b_1, b_2, c]$ with respect to θ , in the case when the parties follow the cutoff strategies with a common threshold $\hat{s} \in [0, 1]$.

Note that given the judge's cutoff strategy with threshold $\hat{\theta}$, it is optimal for each party to employ a cutoff strategy with threshold $\hat{s} = h(\hat{\theta})$. To see this, suppose party 1 has observed $s < h(\hat{\theta})$. In this case, it is optimal for party 1 to disclose s , regardless of party 2's strategy. Since party 1's disclosure decision matters only if party 2 does not disclose s , assume that party 2 does not disclose. Then there are two possibilities. Suppose first $\theta < \hat{\theta}$. Then, both withholding and disclosing s will result in a favorable ruling for party 1 (In particular, disclosure results in a ruling favorable for party 1 because $g(s, \theta) < g(h(\theta), \theta) = 0$). So party 1 will do no worse by disclosing s . Suppose next $\theta > \hat{\theta}$. In this case, withholding s will surely result in an unfavorable ruling

for party 1, whereas disclosure can reverse that ruling whenever $s < h(\theta)$, which happens with a positive probability. Hence, disclosing evidence is optimal if $s < h(\hat{\theta})$. A similar argument shows that it is strictly optimal for party 1 to withhold any $s > h(\hat{\theta})$.

This argument shows why party 1, and by symmetry party 2, will adopt a cutoff strategy with threshold $\hat{s} = h(\hat{\theta})$. Substituting this into (2), the judge's equilibrium posterior becomes $\mathbb{E}[g|h(\hat{\theta}), h(\hat{\theta}), \hat{\theta}, b_1, b_2, c]$. Hence, her cutoff threshold is given by:

$$\hat{\theta}^*(b_1, b_2) := \inf\{\hat{\theta} \in \Theta \mid \mathbb{E}[g|h(\hat{\theta}), h(\hat{\theta}), \hat{\theta}, b_1, b_2, c] > 0\}, \quad (3)$$

where $\hat{\theta}^*(b_1, b_2) := 1$ if the set in the RHS is empty. Note that the threshold does not depend on c since the last expectation term, $\mathbb{E}_{12}[\cdot]$, in (1) vanishes.

The equilibrium is thus characterized by two thresholds, $\hat{\theta}^*(b_1, b_2)$ and $\hat{s} = h(\hat{\theta}^*(b_1, b_2))$, as depicted in Figure 2. The fact that these thresholds satisfy $g(\hat{s}, \hat{\theta}^*(b_1, b_2)) = 0$ will be important for our results. As the burden of proof shifts from party 2 to party 1 i.e., as b_1 increases and b_2 decreases, the judge's threshold decreases. This, in turn, causes an increase in the parties' common disclosure threshold, $h(\hat{\theta}^*(b_1, b_2))$. Hence, the party with an increased burden of proof is caused to disclose a wider range of evidence and the party with a decreased burden discloses less evidence. Formally, we establish the following.

PROPOSITION 1 *If no party is represented by a lawyer, there exists a unique Perfect Bayesian equilibrium in which party 1 discloses s if and only if $s < h(\hat{\theta}^*(b_1, b_2))$, party 2 discloses s if and only if $s > h(\hat{\theta}^*(b_1, b_2))$, and the judge rules for party 1 if $\theta < \hat{\theta}^*(b_1, b_2)$ and for party 2 if $\theta > \hat{\theta}^*(b_1, b_2)$ following nondisclosure. As the burden of proof shifts from party 2 to party 1 i.e., as b_1 increases and b_2 decreases, the latter discloses more and the former discloses less, i.e. $\hat{\theta}^*(b_1, b_2)$ decreases, and hence $h(\hat{\theta}^*(b_1, b_2))$ increases, in $(b_1, -b_2)$.*

3.2 Full Representation

In this regime, both parties are represented by lawyers and learn θ through legal advice. Hence, unlike the no representation case, the parties make their disclosure decisions based on both s and θ . Recall that the judge's ruling in case of disclosure is completely determined by the criterion $g(s, \theta)$. Hence, party 1 has a unique weakly dominant strategy of disclosing s if and only if $s < h(\theta)$, or $g(s, \theta) < 0$. For instance, disclosing $s < h(\theta)$ leads to a sure win for party 1, whereas withholding may entail an unfavorable ruling. Likewise, withholding $s > h(\theta)$ is a dominant strategy for party 1 because the judge may rule for party 1 without disclosure, but will rule against him for sure if s is disclosed. By the same logic, party 2's unique weakly dominant strategy is to disclose s if and only if $s > h(\theta)$, or $g(s, \theta) > 0$.

Dominant strategies have an intuitive appeal in our model, particularly with representation. In the US legal system, a lawyer has a positive duty to explore all avenues of defense, and withholding exculpatory evidence may contravene this obligation. Getting a client’s consent for such strategy may also be problematic. Furthermore, the judge could simply refuse to believe that a lawyer is not following a dominant strategy. Finally, if there is even small uncertainty about the judge’s default ruling, then disclosing all favorable evidence and withholding all unfavorable evidence is the unique optimal strategy for either party. Any of these possibilities rule out any other equilibria under representation. For this reason, we focus on the dominant disclosure strategies here. Later, we shall consider what happens when these arguments do not apply and examine equilibria supported by “dominated” disclosure strategies.

The disclosure behavior of a party’s represented by a lawyer using a dominant strategy is clearly different from that of a non-represented party. Remarkably, this change in disclosure behavior does *not* affect the judge’s default ruling. Indeed, given the dominant disclosure strategies by the parties, the judge’s posterior is given by $\mathbb{E}[g|h(\theta), h(\theta), \theta]$. This posterior is different in magnitude from that held by the judge in the case of no representation, but the two posteriors always have the same sign, since

$$\mathbb{E}[g|h(\theta), h(\theta), \theta] \gtrless 0 \text{ if } \theta \gtrless \hat{\theta}^*(b_1, b_2).$$

Hence, we arrive at the following result.

PROPOSITION 2 *If both parties are represented, there exists a unique dominant strategy equilibrium in which the judge uses the cutoff strategy with threshold $\hat{\theta}^*(b_1, b_2)$ (defined by equation (3)) in her default ruling: in the absence of disclosure she rules for party 1 (resp. party 2) if $\theta < \hat{\theta}^*(b_1, b_2)$ (resp. $\theta > \hat{\theta}^*(b_1, b_2)$). Party 1 reveals (resp. withholds) s with probability 1 if $g(s, \theta) < 0$ (resp. $g(s, \theta) > 0$). Party 2 reveals (resp. withholds) s with probability 1 if $g(s, \theta) > 0$ (resp. $g(s, \theta) < 0$).*

The fact that the threshold $\hat{\theta}^*(b_1, b_2)$ is the same in the no representation and full representation cases is surprising, and it is worth exploring the logic behind it. In the no representation case, the parties employ a (common) threshold $\hat{s} = h(\hat{\theta}^*(b_1, b_2))$ that does not vary with θ , whereas in the full representation case, their threshold $h(\theta)$ varies with θ and thus in general differs from $h(\hat{\theta}^*(b_1, b_2))$. Nonetheless, these two thresholds coincide with each other when $\theta = \hat{\theta}^*(b_1, b_2)$. Since the sign of the judge’s posterior changes from negative to positive as θ rises past $\hat{\theta}^*(b_1, b_2)$, the posterior has the same sign under both regimes, even though their exact magnitudes will typically be different. Hence, the judge’s default ruling is the same under both regimes.¹⁴

¹⁴More precisely, if the judge’s equilibrium threshold is interior, her cutoff threshold must satisfy the same

3.3 Partial Representation

The results of the previous subsections generalize to the regime in which only one side hires a lawyer. Suppose without loss of generality that party 1 hires a lawyer and party 2 does not. Let $\hat{\theta}$ denote the threshold which the judge uses in her default ruling strategy when s is not disclosed. Focusing as before on undominated strategies, party 1 will disclose s if and only if $s < h(\theta)$, just as in Subsection 3.2. As established in Subsection 3.1, party 2's unique optimal strategy is to disclose s if and only if $s > h(\hat{\theta})$. So, when the judge observes θ but not s , her posterior becomes

$$\mathbb{E}[g|h(\theta), h(\hat{\theta}), \theta].$$

Since this posterior is monotonic in θ and changes the sign from negative to positive at $\hat{\theta}^*(b_1, b_2)$, the following result is immediate.¹⁵

PROPOSITION 3 *If only one party hires a lawyer, there exists a unique equilibrium in undominated strategies. In this equilibrium the judge uses a cutoff strategy with threshold $\hat{\theta}^*(b_1, b_2)$ (defined in (3)) in her default ruling. If party 1 [resp. party 2] obtains legal advice, he discloses s iff $g(s, \theta) < 0$ [resp. $g(s, \theta) > 0$]. If party 1 [resp. 2] does not obtain legal advice, he uses cutoff strategy with threshold $h(\hat{\theta}^*(b_1, b_2))$: party 1 [resp. party 2] reveals s if $s < h(\hat{\theta}^*(b_1, b_2))$ [resp. $s > h(\hat{\theta}^*(b_1, b_2))$]. A shift in the burden of proof affects only the party without a lawyer, in a way described in Proposition 1.*

3.4 Irrelevance of Representation

A striking feature of all three regimes is that the judge's equilibrium default ruling strategy is the same across all three regimes. The judge adopts a cutoff strategy with the same threshold $\hat{\theta}^*(b_1, b_2)$, regardless of whether the parties obtain legal advice. This does not mean that the parties disclose the same evidence. Propositions 1, 2 and 3 clearly show that the set of s 's revealed to the judge differs across the regimes. Nevertheless, we will show that the difference in the parties' disclosure strategies does not amount to any real difference in the outcome of the trial.

This irrelevance is in fact a result of a more general property of equilibrium behavior in our disclosure/adjudication game. This property is described in the following lemma.

condition $\mathbb{E}[g|h(\hat{\theta}^*(b_1, b_2)), h(\hat{\theta}^*(b_1, b_2)), \hat{\theta}^*(b_1, b_2)] = 0$ in both cases. The condition for the corner solution — i.e. judge's equilibrium threshold being either 0 or 1 — is also the same in the two regimes.

¹⁵The result holds more generally in the following sense. Suppose each party randomizes on hiring a lawyer, and the judge has some arbitrary beliefs about the parties' decisions to hire lawyers. The behavior described in Proposition 3 continues to be an equilibrium in this environment.

LEMMA 1 (**Decision Equivalence**) Suppose that the judge adopts a cutoff strategy with threshold $\hat{\theta} \in \Theta$ in her default ruling. Regardless of the legal regime, i.e. of whether either party obtains legal advice or not, any combination of the best response disclosure strategies by the two parties lead to the same outcome characterized by the following outcome function:

$$\phi^{\hat{\theta}}(x_1, x_2, s, \theta) = \begin{cases} 1_{\{g(s, \theta) \geq 0\}} & \text{if } x_1 = x_2 = 1, \\ 1_{\{g(s, \theta) \geq 0 \text{ and } \theta \geq \hat{\theta}\}} & \text{if } x_1 = 1, x_2 = 0, \\ 1_{\{g(s, \theta) \geq 0 \text{ or } \theta \geq \hat{\theta}\}} & \text{if } x_1 = 0, x_2 = 1, \\ 1_{\{\theta \geq \hat{\theta}\}} & \text{if } x_1 = x_2 = 0, \end{cases} \quad (4)$$

where $x_i = 1$ ($x_i = 0$) if party i observes (does not observe) the evidence and $\phi^{\hat{\theta}}(x_1, x_2, s, \theta)$ is the probability of ruling for party 2 in the state of the world (x_1, x_2, s, θ) given the adjudicator's default ruling strategy.

The Decision Equivalence Lemma shows that the judge's cutoff strategy uniquely determines the equilibrium adjudication outcome, regardless of the parties' use of legal advice.¹⁶ Some insight into this result can be gained from comparing the cases of no representation and full representation. Consider Figure 2 and suppose that the judge's threshold is given by $\hat{\theta}$.

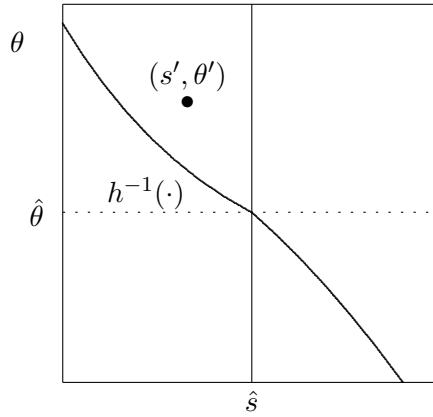


Figure 2

Then, by Propositions 1 and 2, the common threshold adopted by the parties under self-representation is given by $\hat{s} = h(\hat{\theta})$, while in the dominant strategy equilibrium with representation party 1 (party 2) discloses when $s < h(\theta)$ ($s > h(\theta)$). Suppose that (s', θ') occurs and party 1 observes s' . With legal advice, party 1 would not disclose s' , but the judge will still rule for party

¹⁶This Lemma plays a role akin to that played by the Revenue Equivalence theorem in the auction literature (see Riley and Samuelson (1980) and Myerson (1981)).

2. Under no representation, party 1 will disclose s' being unaware of θ' , and the judge will rule for party 2. Hence, despite different disclosure behavior, there is no difference in the adjudication outcome: the judge's ruling is unfavorable to party 1 in either case. Obviously, this outcome does not depend on whether party 2 makes disclosure or not. Combining Propositions 1-3 with Lemma 1, we obtain our key result:

PROPOSITION 4 (Irrelevance of legal advice) *Suppose that the judge applies the same inference rule, (b_1, b_2, c) , regardless of the representation regime (i.e. of whether both or any party are represented or not), and the parties employ undominated strategies in disclosure. Then there is a unique equilibrium outcome which does not depend on the representation regime and is characterized by the outcome function $\phi^{\hat{\theta}^*(b_1, b_2)}(\cdot)$.*

Remarkably, the irrelevance result does not depend on the judge's inference rule: it holds if the judge is fully Bayesian (i.e., $(b_1, b_2) = (\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}})$), or if she follows any other inference rule (b_1, b_2, c) , as long as the same inference rule is applied regardless of the parties' use of legal advice. A change in (b_1, b_2) would typically cause the threshold $\hat{\theta}^*(b_1, b_2)$ to shift, but would not alter the fact that the representation regime has no effect on the adjudication outcome.

The robustness of the irrelevance result is surprising and may appear contradictory to the lawyers' prominent roles in high-profile trials. One should not take the irrelevance result as suggesting that legal representation is never useful, for lawyers perform a number of valuable tasks that are not captured by our model. Our analysis focuses on one particular aspect of legal representation — the role of lawyers as gate-keepers of information reaching the court. To the extent that this role is crucial from the information elicitation perspective, however, our irrelevance result clarifies and qualifies the sense in which lawyers can make a difference. In fact, extensions of our model will explore the situations in which lawyers *do* affect the adjudication outcomes. We turn to these extensions next.

4 Relevance: Withholding Favorable Evidence

Thus far, we have focused on equilibria in undominated strategies. Lawyers adopting such strategies never advise their clients to suppress ex post favorable evidence. Although such a strategy is compelling for reasons discussed above, deviating from this strategy — i.e., suppressing favorable evidence — may influence the judge's posterior and thus the ultimate ruling in favor of the lawyer's client. To get some intuition behind this, consider the disclosure strategy of party 2 to be fixed. Then the judge will interpret nondisclosure more favorably for party 1 if party 1 follows the strategy of never disclosing any evidence. For, under this strategy, party 1 sometimes withholds

evidence which favors her, which causes the judge's posterior in (2) and her default ruling to shift in a way that benefits party 1.

Below, we investigate whether such behavior can occur in an equilibrium and what effect it has on the adjudication outcome. We continue to focus on equilibria in which the judge follows a cutoff strategy, which is reasonable and intuitive.¹⁷

To evaluate precisely how the adoption of (weakly) dominated strategies influences the judge's inference, suppose that both parties have retained lawyers, and that party 2 (or his lawyer) follows the dominant strategy of disclosing all favorable evidence, but the lawyer for party 1 advises him to withhold s regardless of its value. Given these strategies, the judge's posterior becomes $\mathbb{E}[g|0, h(\theta), \theta]$ which is less than $\mathbb{E}[g|h(\theta), h(\theta), \theta]$, and is therefore more favorable to party 1 than if both adopt their dominant strategies. Likewise, if party 1 adopts the dominant strategy but party 2 adopts the strategy of never disclosing his private evidence, then the judge forms a posterior $\mathbb{E}[g|h(\theta), 1, \theta] > \mathbb{E}[g|h(\theta), h(\theta), \theta]$, which is more favorable for party 2 than if both adopt their dominant strategies. Define

$$\begin{aligned}\hat{\theta}_+(b_1, b_2, c) &:= \inf\{\theta \mid \mathbb{E}[g|0, h(\theta), \theta; b_1, b_2, c] > 0\}; \\ \hat{\theta}_-(b_1, b_2, c) &:= \inf\{\theta \mid \mathbb{E}[g|h(\theta), 1, \theta; b_1, b_2, c] > 0\}.\end{aligned}$$

Using the same argument as in Lemma A2 in the Appendix, we can show that $\mathbb{E}[g|0, h(\theta), \theta] > 0$ if and only if $\theta > \hat{\theta}_+(b_1, b_2, c)$, and $\mathbb{E}[g|h(\theta), 1, \theta] > 0$ if and only if $\theta > \hat{\theta}_-(b_1, b_2, c)$, and also that $\hat{\theta}_-(b_1, b_2, c) \leq \hat{\theta}^*(b_1, b_2) \leq \hat{\theta}_+(b_1, b_2, c)$. If $(b_1, b_2, c) > (0, 0, 0)$, then at least one inequality is strict, so the region $[\hat{\theta}_-(b_1, b_2, c), \hat{\theta}_+(b_1, b_2, c)]$ is non-degenerate.¹⁸

If $\theta < \hat{\theta}_-(b_1, b_2, c)$, the judge will surely rule for party 1 because the judge's posterior is negative even if she holds the most favorable beliefs about party 2 — namely that party 2 does not disclose any evidence and party 1 discloses all favorable evidence. Similarly, if $\theta > \hat{\theta}_+(b_1, b_2, c)$, then the judge will rule for party 2 in the absence of disclosure because her posterior is positive even if she holds the most favorable belief for party 1. But if $\theta \in [\hat{\theta}_-(b_1, b_2, c), \hat{\theta}_+(b_1, b_2, c)]$, then the judge's default ruling is affected by the parties' disclosure strategies, because for such θ ,

$$\mathbb{E}[g|0, h(\theta), \theta] < 0 < \mathbb{E}[g|h(\theta), 1, \theta],$$

So in this case, the judge's inference and hence her ruling can go either way depending on the equilibrium disclosure strategies. It turns out that any $\hat{\theta} \in [\hat{\theta}_-(b_1, b_2, c), \hat{\theta}_+(b_1, b_2, c)]$ can be

¹⁷An earlier version of this paper presents other equilibria. Since they do not add any new insight, we omit them here.

¹⁸Using equation (2), it is easy to see that $\hat{\theta}_-(b_1, b_2, c) \leq \hat{\theta}^*(b_1, b_2) \leq \hat{\theta}_+(b_1, b_2, c)$ because $\mathbb{E}[g|0, h(\theta), \theta] < \mathbb{E}[g|h(\theta), h(\theta), \theta] < \mathbb{E}[g|h(\theta), 1, \theta]$. Further, $\hat{\theta}^+(b_1, b_2, c) > \hat{\theta}^-(b_1, b_2, c)$ if $\hat{\theta}^+(b_1, b_2, c) > 0$ and $\hat{\theta}^-(b_1, b_2, c) < 1$. Given $(b_1, b_2, c) > (0, 0, 0)$, the former holds if $\mathbb{E}[g(s, 0)] < 0$ and the latter holds if $\mathbb{E}[g(s, 1)] > 0$, both of which hold by assumption.

supported as a an equilibrium threshold for the judge’s default ruling under full representation, as we show below.

PROPOSITION 5 (Relevance of legal advice with dominated strategies) *(i) Suppose that both parties retain lawyers. Then, for any $\hat{\theta} \in [\hat{\theta}_-(b_1, b_2, c), \hat{\theta}_+(b_1, b_2, c)]$, there exists a perfect Bayesian equilibrium such that in the absence of disclosure the judge rules for party 1 [resp. party 2] if $\theta < \hat{\theta}$ [resp. $\theta > \hat{\theta}$]. Conversely, any equilibrium cutoff default ruling strategy has a threshold in $[\hat{\theta}_-(b_1, b_2, c), \hat{\theta}_+(b_1, b_2, c)]$.*

(ii) Suppose only party 1 [resp. party 2] retains a lawyer. Then, for any $\hat{\theta} \in [\hat{\theta}^(b_1, b_2), \hat{\theta}_+(b_1, b_2, c)]$ [resp. $\hat{\theta} \in [\hat{\theta}_-(b_1, b_2, c), \hat{\theta}^*(b_1, b_2)]$], there exists a perfect Bayesian equilibrium such that in the absence of disclosure the judge rules for party 1 [resp. party 2] if $\theta < \hat{\theta}$ [resp. $\theta > \hat{\theta}$]. Conversely, any cutoff default ruling strategy by the judge has a threshold in $[\hat{\theta}^*(b_1, b_2), \hat{\theta}_+(b_1, b_2, c)]$ [resp. $[\hat{\theta}_-(b_1, b_2, c), \hat{\theta}^*(b_1, b_2)]$].*

Proposition 5 shows that a range of different posteriors by the judge — and thus a range of different default rulings — is sustainable when the parties adopt legal strategies of withholding favorable evidence. The reason is simple. Suppose party 1 (or his lawyer) adopts a strategy of suppressing favorable evidence $s < h(\theta)$, while party 2 follows the weakly dominant strategy. This will lead the judge to make a more favorable inference, and thus a favorable ruling, for party 1 in case of nondisclosure, which in turn justifies party 1’s withholding of the favorable information. The resulting outcome with a threshold $\hat{\theta} > \hat{\theta}^*(b_1, b_2)$ is clearly more beneficial for party 1. Since such a strategy requires conditioning disclosure of evidence on the realized level of θ , it cannot be played without the legal expertise of a lawyer. In this sense, we have identified a source of private value of legal advice — namely, the ability to advise a party to withhold favorable evidence.

This benefit is most evident when only one party has access to legal advice, the case illustrated in (ii) of Proposition 5. Suppose initially neither party retains a lawyer. Then, by Proposition 1, the judge employs a threshold of $\hat{\theta}^*(b_1, b_2)$ in her default ruling. Suppose now only party 1 hires a lawyer. Provided that the lawyer can credibly advise party 1 to adopt a dominated strategy, the judge can be induced to employ a more favorable threshold in $[\hat{\theta}^*(b_1, b_2), \hat{\theta}_+(b_1, b_2, c)]$. More importantly, any equilibrium threshold in this situation is (weakly) more favorable for party 1 than $\hat{\theta}^*(b_1, b_2)$, the threshold used when neither party hires a lawyer. In this sense, legal advice becomes relevant once (weakly) dominated strategies are available. Nevertheless, if both parties hire lawyers, the parties cannot be both better off than if neither party hired a lawyer. The last fact implies that the game of hiring lawyers has the structure of a prisoner’s dilemma, which may explain why both parties would hire lawyers in equilibrium.

Clearly, the relevance of legal advice rests on the credibility of weakly dominated strategy

of withholding favorable evidence. One way in which a lawyer can achieve such credibility is by building a reputation through repeated trials. Casual observation suggests that lawyers are concerned about their reputations and undertake specific steps to develop/enhance them. For example, some criminal defense lawyers are known to call very few witnesses. Sometimes, a lawyer would rest the case without calling any witnesses at all if (s)he considers that the case has not been proven by the prosecutors. Our results indicate that such behavior helps to build a lawyer’s reputation, which could skew the court’s ruling in favor of that lawyer and his clients. From this perspective, the above result can be interpreted in terms of the relative reputation of the lawyers representing the two sides. A lawyer with a good reputation can make one better off, while a lawyer with a bad reputation can make one worse off, relative to the no representation case. Interestingly, good reputation in our context means being known for presenting limited evidence, while bad reputation is being known for presenting too much evidence, sometimes unnecessarily.

The interval, $[\hat{\theta}_-(b_1, b_2, c), \hat{\theta}_+(b_1, b_2, c)]$, can be interpreted as a range of manipulation of the outcomes by the lawyers. It is worth noting that this range depends on the inference rule (b_1, b_2, c) . In particular, this range vanishes as $(b_1, b_2, c) \rightarrow (0, 0, 0)$; i.e., as the judge’s inference rule becomes completely non-Bayesian/non-prejudicial. This feature points to a possible rationale for regulating the judge’s inference rule — a topic addressed more fully in the next section.

5 Welfare implications of legal advice and restrictions on judges’ inferences

In this section, we consider the welfare implications of our results. Recall that the judge’s inference rule, (b_1, b_2, c) , influences the parties’ disclosure behavior, and ultimately determines the equilibrium outcome. It is thus important to understand how the inference rule affects the welfare and how it should be optimally chosen.

Of particular interest is whether Bayesian inference rule $(b_1, b_2, c) = (\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}})$ is optimal. This issue has special policy relevance for the law of evidence which imposes various restrictions on inferences that adjudicators are allowed to make from evidence or from lack thereof. For instance, the burden of proof is sometimes assigned to one of the parties (e.g., the plaintiff); in criminal cases a negative inference cannot be made when the defendant refuses to testify; a certain inference is to be made even with insufficient evidence (i.e. prima facie rules); and self-interest alone does not constitute a reason for discounting evidence (Daughety and Reinganum, 2000a, 2000b; Posner, 1999). If Bayesian inference rule is optimal, then such restrictions would not be warranted for rational adjudicators who strive to adjudicate in a Bayesian fashion. If not, some restrictions may be warranted and it is important to examine what they are.

Our model allows us to address this issue in a simple fashion. It is natural to take the judge's objective as our welfare criterion. When maximizing this criterion, we can treat the judge's threshold as the only choice variable since, by Decision Equivalence of Lemma 1, the judge's threshold completely pins down the outcome. So, we can formulate our welfare inquiry as the following mechanism design problem:

$$[WP] \quad \max_{\hat{\theta} \in \Theta} \sum_{i,j=0,1} p_{ij} \mathbb{E} \left[\phi^{\hat{\theta}}(i, j, s, \theta) g(s, \theta) \right],$$

where $\phi^{\hat{\theta}}$ is the outcome induced by the cutoff rule with threshold $\hat{\theta}$ (see Lemma 1). This objective function puts a positive value on the ruling for party 2 if and only if party 1 is truly culpable, i.e. $g(s, \theta) > 0$ (see the discussion in Section 2). The analysis of [WP] yields the following result.

PROPOSITION 6 *A cutoff ruling strategy with a Bayesian threshold, $\hat{\theta}^*(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}})$, is socially optimal, i.e. solves [WP].*

According to Proposition 6, the equilibrium outcome is socially optimal if the parties are self-represented or are represented by lawyers disclosing all favorable evidence, and the judge uses the Bayesian inference rule. In this sense, Proposition 6 argues against regulating adjudicators' inferences.

This conclusion does not hold, however, if lawyers can credibly use the strategies of not disclosing all favorable evidence. Proposition 5 shows that, in this case, any threshold $\hat{\theta} \in [\hat{\theta}_-(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}}), \hat{\theta}_+(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}})]$ can arise in equilibrium even under Bayesian inference rule. Thus, if a lawyer, due to his reputation, credibly uses a disclosure strategy which shifts the threshold away from $\hat{\theta}^*(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}})$, then legal representation is privately valuable but moves the outcome away from social optimum. So legal advice is socially harmful in this case.

In light of this result, the following proposition provides a possible justification for regulating adjudicators' inferences.

PROPOSITION 7 (i) *If $(p_{10}, p_{01}) \gg (0, 0)$, then there exists $(b_1, b_2) \ll (\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}})$ with either $b_1 = 0$ or $b_2 = 0$ such that $\hat{\theta}^*(b_1, b_2) = \hat{\theta}^*(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}})$. (ii) *There exists (b_1, b_2) with either $b_1 = 0$ or $b_2 = 0$, such that**

$$\hat{\theta}^*(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}) \in [\hat{\theta}_-(b_1, b_2, 0), \hat{\theta}_+(b_1, b_2, 0)] \subset [\theta_-(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}}), \theta_+(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}})]. \quad (5)$$

The first part of Proposition 7 shows that the outcome attained under the Bayesian inference rule can be replicated by an inference rule that assigns no burden of proof to one of the parties, provided that the parties follows undominated strategies. The evidence law often assigns the entire burden of proof to one of the parties, e.g. the plaintiff. Interestingly, a one-sided allocation

does not necessarily mean that the adjudication outcome would be different from the one attained under the Bayesian rule. Part (ii) of the Proposition offers a sense in which such a burden of proof allocation has the advantage of being less susceptible to manipulation by the lawyers: The range of equilibrium outcomes around the optimal outcome is narrower than that under the Bayesian one. These two findings imply that committing adjudicators to an inference rule different from the Bayesian could be socially desirable.¹⁹

6 Relevance: A Signaling Role of Costly Legal Advice

So far, we have assumed that legal advice is available for free. This approach helps to isolate the effect of lawyers' expertise and provides a foundation for normative analysis. Furthermore, in a variety of situations legal advice does indeed, come for free. In the US, Canada and a number of other countries, the defendants, who cannot afford to hire a lawyer in criminal trials, are provided taxpayer-funded legal representation. Contingency fee arrangements, widespread in civil trials in the US, imply that the liability stage is essentially costless for the litigants. Needless to say that the prosecuting attorneys are financed by the public which may be considered as a different entity from the prosecutor's office or the government.

There are of course, many other situations where legal advice is costly, perhaps more so if a lawyer has a good reputation or a high profile. It is thus natural to extend our model by considering costly legal representation. An immediate goal of this extension is to understand how the costliness of legal advice affects the nature of the disclosure game. The most important finding of this section is that lawyer advice, when provided at a cost, affects the parties' disclosure behavior in a way that affects both private and social welfare. This happens because legal advice turns out to be more valuable for parties with "worse" evidence than for the parties with "better" evidence who prefer to disclose their information rather than to pay for representation. This results in a greater amount of disclosure (coming from the parties with 'better' evidence) and higher accuracy of adjudication. A higher value of legal advice for parties with "worse" evidence comes from two aspects: first, it allows them to disclose only favorable evidence, second, it allows them to pool with parties without evidence who also hire lawyers to avoid prejudicial inference by the judge.

This extension also enables us to study how different types of individuals choose to hire lawyers of different quality and whether this can affect the adjudication outcomes. Some recent cases have raised the concerns that those who can afford expensive lawyers can skew the justice in their favor.

¹⁹These arguments for regulating judges' inferences differ from the existing ones based on the cost of evidence production (see Hay and Spier (1997) for example) or on the ex ante deterrence (see Bernardo et al. (2000)).

Our analysis will provide some insight into such issues.

To extend our model in this direction, we need to add more structure to it. In particular, the cost of legal representation must be measured in the same units as the value of winning or losing. To this end, we assume that the cost of legal advice is $w > 0$, and that a party derives the value of $v > 0$ when (s)he wins the dispute and zero when (s)he loses, all measured in monetary units.

Further, we simplify our model in several ways. First, we assume that $b_1 = b_2 = b$. Likewise, s and θ are assumed to be independently distributed according to cdf $F(s, \theta) = K(s)L(\theta)$ with $K(\cdot)$ and $L(\cdot)$ having densities k and l , respectively. Next, we assume that the nature of the dispute is symmetric between the two parties:

ASSUMPTION 2 (symmetry) For all $(s, \theta) \in [0, 1]^2$, $k(s) = k(1 - s)$, $l(\theta) = l(1 - \theta)$, and $g(s, \theta) = -g(1 - s, 1 - \theta)$.

Among other things, this assumption means that the strength of the case for party 1 at state (s, θ) is the same as the strength of the case for party 2 at state $(1 - s, 1 - \theta)$. The assumption implies that $g(\frac{1}{2}, \frac{1}{2}) = 0$, or $h^{-1}(\frac{1}{2}) = \frac{1}{2}$.

With costly legal advice, there are two types of equilibria: an “uninformative” equilibrium in which legal advice has no signalling role, and an “informative” one in which legal representation becomes a signal. We begin with the uninformative equilibrium.

PROPOSITION 8 (Uninformative equilibrium) *There exists an equilibrium in which no party retains a lawyer, and the parties follow the same strategies as in the equilibrium described in Proposition 1.*

The proof of this proposition is straightforward. Suppose that the judge follows a default ruling strategy with threshold $\hat{\theta}^*$ characterized by (3), regardless of whether any party has retained a lawyer. Then, it is a best response for parties not to hire any lawyers and to follow the disclosure strategies with threshold $h(\hat{\theta}^*)$. These strategies in turn rationalize the judge’s beliefs and her default ruling behavior. If a party, say party 1, deviates and hires a lawyer, disclosing θ if and only if $g(s, \theta) < 0$ is clearly his dominant strategy, so the judge’s ruling is sequentially rational. Hence, the uninformative equilibrium can be sustained.

There exists another, more interesting, equilibrium in which legal representation plays a non-trivial signaling role. In this equilibrium, a lawyer can be hired for two reasons. First, a party without evidence hires a lawyer to add “credibility” to his lack of evidence. Second, a party with sufficiently weak (likely to be unfavorable) evidence does so to imitate those who do not have any evidence. Specifically, for any cost $w > 0$ let $\hat{s}(w) \in [\frac{1}{2}, 1]$ denote an associated threshold. The value of $\hat{s}(w)$ will be precisely defined below. Then, consider the following *lawyer signaling strategies*:

- Party 1 [resp. party 2] retains a lawyer either if he observes no evidence or if he observes $s > \hat{s}(w)$ [resp. $s < 1 - \hat{s}(w)$]. In the latter case, he discloses s if and only if $g(s, \theta) < 0$ [resp. $g(s, \theta) > 0$].
- If party 1 [resp. party 2] observes $s \in [0, \hat{s}(w)]$ [resp. $s \in [1 - \hat{s}(w), 1]$], he does not hire a lawyer and discloses s .
- If s is disclosed, then the judge rules for party 1 if and only if $g(s, \theta) < 0$. If s is not disclosed, and either both sides have retained lawyers or no side has retained a lawyer, then the judge rules for 1 if and only if $\theta < \frac{1}{2}$. If s is not disclosed and only party 1 [resp. party 2] has retained a lawyer, then the judge rules for party 1 if and only if $g(0, \theta) < 0$ [resp. $g(1, \theta) < 0$].

Notice that the judge's beliefs off the equilibrium path are prejudiced against a party without a lawyer. Particularly, if there is no disclosure and only party 1 (party 2), has retained a lawyer, the judge believes that $s = 0$ ($s = 1$), i.e. the evidence is the worst for party 2 (party 1).

To complete the description, we need to characterize the threshold $\hat{s}(w)$. It must satisfy

$$v(1-p)[L(\frac{1}{2}) - L(h^{-1}(\hat{s}(w)))] = w, \quad (6)$$

To understand (6), note that party 1 with signal $s = \hat{s}(w)$ must be indifferent between hiring a lawyer *and* withholding s and not hiring a lawyer *and* disclosing s . The first strategy has cost w but raises party 1's chance of winning if party 2 has not observed $\hat{s}(w)$. (If party 2 observes $\hat{s}(w)$, then he will disclose it because $\hat{s}(w) \in [1 - \hat{s}(w), 1]$, so party 1's decision would not make any difference.) So, suppose that party 2 does not observe $\hat{s}(w)$. Then, if party 1 does not hire a lawyer and discloses $\hat{s}(w)$, he wins if $g(\hat{s}(w), \theta) < 0 \Leftrightarrow \theta < h^{-1}(\hat{s}(w))$, whereas the strategy of hiring a lawyer allows him to win if $\theta < \frac{1}{2}$. Hence, hiring a lawyer increases party 1's probability of winning by $(1-p)[L(\frac{1}{2}) - L(h^{-1}(\hat{s}(w)))]$. Therefore, for party 1 with evidence $\hat{s}(w)$ to be indifferent, the expected gain from winning more often (the LHS of (6)) must equal the cost of hiring a lawyer, w (the RHS of (6)).

Since $\hat{s}(w) \leq 1$, the cost of legal representation must not exceed $\bar{w} := v(1-p)[L(\frac{1}{2}) - L(h^{-1}(1))]$ for a lawyer to be ever hired. For any $w \in [0, \bar{w}]$, there is a unique solution $\hat{s}(w)$ to (6): its LHS is nondecreasing in $\hat{s}(w)$ and is equal to zero at $s = \frac{1}{2}$ and equals \bar{w} at $s = 1$. Hence, $\hat{s}(w)$ lies in $[\frac{1}{2}, 1]$ for any $w \in [0, \bar{w}]$. Further, $\hat{s}(w)$ is increasing in w and equals 1 when $w = \bar{w}$.

We are now in a position to state the main result of this section.

PROPOSITION 9 (Lawyer signaling equilibrium) *If $w \in [0, \bar{w}]$, then the lawyer signaling strategies constitute a perfect Bayesian equilibrium.*

In this equilibrium, hiring a lawyer allows a party to “buy” “the right to remain silent without prejudice,” in the sense that a party who withholds evidence can avoid an extremely negative inference by hiring a lawyer. Those who choose to hire a lawyer and “buy this right” either have no evidence to reveal or have sufficiently unfavorable evidence (i.e., party 1 with $s > \hat{s}(w)$ or party 2 with $s < 1 - \hat{s}(w)$). Since these types strictly prefer to hire a lawyer, legal advice *does* have private value.

Recent cases have raised the concern that those who can afford prominent lawyers can buy justice. To see this in our model, consider party 1 with evidence $\hat{s}(w) - \epsilon$ and the same party with evidence $\hat{s}(w) + \epsilon$, for small ϵ . The latter type incurs the cost of hiring a lawyer (whereas the former does not) and consequently wins with a higher probability than the former, despite having a weaker case.²⁰ In this sense, expensive lawyers can buy justice. But the represented party himself does not benefit because he has to pay legal fees for an increased chance of winning.

The signaling equilibrium also affects social welfare. To the extent that the lawyers’ fees are neutral transfers from the parties to the lawyers, net social welfare can be measured by the adjudicator’s objective. By this criterion, the effect of costly lawyer signaling is quite intuitive. A higher cost of non-disclosure (in terms of negative inference) means that the parties are compelled to disclose more. More disclosure leads to more accurate adjudication. So lawyer signaling — hence costly legal advice — improves welfare. More precisely, in the lawyer signaling equilibrium, party 1 (resp. party 2) does not hire a lawyer and discloses s if $s \leq \hat{s}(w)$ (resp. $s \geq 1 - \hat{s}(w)$) where $\hat{s}(w) > \frac{1}{2}$. In the model without representation characterized in the previous sections and adapted to the current specification, the common disclosure threshold is $\hat{s} = 1/2$. Hence, lawyer signaling equilibrium entails extra disclosure, by the amount represented in Figure 3 with a rightward shift of party 1’s threshold and a leftward shift of party 2’s threshold.

²⁰A simple revealed preference argument shows this. By continuity, when ϵ is small, the probabilities that party 1 wins *after disclosing* $s(w) - \epsilon$ and $s(w) + \epsilon$, respectively, are close to each other. However, party 1 with signal $s(w) + \epsilon$ prefers to incur a positive cost of hiring a lawyer which therefore must be associated with less disclosure but a discrete increase in the probability of winning.

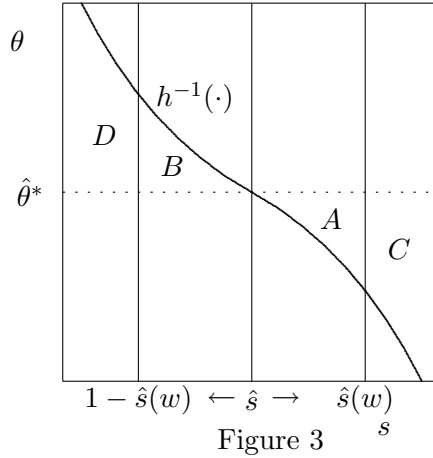


Figure 3

As a result, compared with the representation-neutral outcome of Proposition 4, the lawyer signaling equilibrium entails different outcomes in two cases: (i) party 1 alone observes evidence and the state is in area A ; (ii) party 2 alone observes evidence and the state is in area B . In both cases, wrong adjudication decisions are made in the representation-neutral outcome but these mistakes are corrected in the lawyer signaling equilibrium. For instance, suppose that only party 1 observes evidence and the state is in area A . Then, the judge would rule incorrectly for 1 in the representation-neutral outcome because s would not be disclosed, but she will rule correctly for 2 in the lawyer signaling equilibrium because party 1 will disclose s . Still, the lawyer signaling equilibrium involves incorrect decisions if party 1 (resp. 2) alone observes evidence and the state is in area C (resp. D). But as w increases toward \bar{w} , the regions of erroneous ruling shrink and the social welfare increases. When $w = \bar{w}$ in the limit, there is full disclosure, so adjudication decisions are always correct.

COROLLARY 1 *The lawyer signaling equilibrium yields higher social welfare than the representation-neutral outcome. The social welfare is increasing in the lawyer fee w on $(0, \bar{w}]$ and attains the first-best at $w = \bar{w}$, in which case all private evidence is disclosed.*

This result shows that legal advice can be socially valuable. The lawyer signaling equilibrium also has an implication for regulating adjudicators' inferences. Adjudicators are often prohibited from drawing negative inferences against parties refusing to disclose their information, lest such inference may distort the judgment. Little is known, however, about how such inferences would affect parties' disclosure incentives. Our analysis shows that negative inferences from nondisclosure can improve parties' disclosure incentives and lead to a better outcome. In our lawyer signaling equilibrium, an unrepresented party faces a very high burden of proof when withholding

his evidence and is therefore compelled to disclose more evidence. At the minimum, our result suggests that a careful examination of the rules governing adjudicators' inferences is warranted.

Thus far, we have characterized two equilibria. A natural question is whether there are any other equilibria. We show that, given plausible restrictions, no other equilibrium exists.

PROPOSITION 10 Suppose that parties do not randomize in the representation decision,²¹ the represented parties always follow the dominant strategy of disclosing all favorable evidence and withholding all unfavorable evidence, and the judge follows a threshold strategy in her default ruling. Then there are no other equilibria besides the lawyer signaling equilibrium of Proposition 9 and the uninformative equilibrium of Proposition 8.

7 Conclusions

In this paper, we have studied the effect of legal representation on the adjudication outcomes. Our analysis was concerned with the role of lawyers as gate-keepers of information reaching the court. We have compared outcomes under legal representation and self-representation, and have shown that legal representation does not affect the adjudication outcome if legal advice is costless and the lawyers cannot credibly suppress favorable information. At the same time, we have shown that lawyers can affect the adjudication outcome if they can leverage their legal expertise to engage in more sophisticated strategic behavior. First, they can do so by credibly withholding some favorable information and thereby affecting the judge's inference in their clients favor when evidence is not disclosed. Second, legal representation can play a signaling role. In our signalling equilibrium, hiring a lawyer allows a litigating party to avoid a negative inference from non-disclosure, so legal representation "buys a right to be silent without being prejudiced" which ultimately affects the litigation outcome.

Besides the lawyers' role in disclosure, this paper yields useful insights regarding several related issues. First, our findings help to understand the implications of quality differences in legal advice. Recent legal cases have generated a concern that high-profile lawyers may influence the outcome to the point of jeopardizing fair adjudication. Our model can be used to understand the effect of quality differences in lawyering, once we interpret self-representation as representation by an inexperienced lawyer. Second, our study also helps to understand various rules regulating the

²¹If we allow such randomization, then there is only one other possible equilibrium scenario: an uninformed party randomizes between hiring and not hiring a lawyer. Although we have not been able to completely rule out this type of equilibria, it is easy to show that the qualitative nature of the outcome in such an equilibrium would be the same as in the lawyer signalling equilibrium of Proposition 9: an informed party with a 'good' signal (small s for party 1 and high s for party 2) does not hire a lawyer and discloses, while an informed party with a 'bad' signal will hire a lawyer and typically would not disclose.

adjudicators interpretation of evidence and restrictions on inferences they can or cannot draw from nondisclosure of evidence.

More broadly, our results could shed light on the role of advising in settings outside legal disputes. Agents and divisions often compete for resources within organizations, and resource allocating decisions — which could take such forms as merit assignment, promotion for workers, budget allocation between divisions — often depend on the information provided by those closely affected by the decisions. Advising agents regarding disclosure of information can affect both the quality of information transmission and the resource allocation decision itself. Our results offer some basic insight on the role of advising in such circumstances.

8 Appendix: Proofs

We first establish several lemmas that will be used in the proofs.

LEMMA A1 *For any $\theta' > \theta$*

$$\int_0^{\hat{s}} g(s, \theta) f(s|\theta') ds \geq \min \left\{ 0, \int_0^{\hat{s}} g(s, \theta) f(s|\theta) ds \right\}$$

PROOF: Both $\frac{F(s|\theta)}{F(\hat{s}|\theta)}$ and $\frac{F(s|\theta')}{F(\hat{s}|\theta')}$ are cdf's on $[0, \hat{s}]$. By MLRP, $\frac{F(s|\theta')}{F(\hat{s}|\theta')}$ first-order stochastically dominates $\frac{F(s|\theta)}{F(\hat{s}|\theta)}$. Therefore, since $g(s, \theta)$ is increasing in s , we have: $\int_0^{\hat{s}} g(s, \theta) \frac{f(s|\theta')}{F(\hat{s}|\theta')} ds \geq \int_0^{\hat{s}} g(s, \theta) \frac{f(s|\theta)}{F(\hat{s}|\theta)} ds$, which can be rewritten as: $\int_0^{\hat{s}} g(s, \theta) f(s|\theta') ds \geq \frac{F(\hat{s}|\theta')}{F(\hat{s}|\theta)} \int_0^{\hat{s}} g(s, \theta) f(s|\theta) ds$. The latter inequality implies that, if $\int_0^{\hat{s}} g(s, \theta) f(s|\theta) ds \geq 0$, then $\int_0^{\hat{s}} g(s, \theta) f(s|\theta') ds \geq 0$. Also, note that $\frac{F(\hat{s}|\theta')}{F(\hat{s}|\theta)} \leq 1$. Hence, if $\int_0^{\hat{s}} g(s, \theta) f(s|\theta) ds \leq 0$, then $\int_0^{\hat{s}} g(s, \theta) f(s|\theta') ds \geq \int_0^{\hat{s}} g(s, \theta) f(s|\theta) ds$. ■

LEMMA A2 *Fix any $\hat{s} \in [0, 1]$. If $\mathbb{E}[g|\hat{s}, \hat{s}, \theta] \geq 0$, then $\mathbb{E}[g|\hat{s}, \hat{s}, \theta'] > 0$ for any $\theta' > \theta$.*

PROOF: Recall that

$$\mathbb{E}[g|\hat{s}, \hat{s}, \theta] := \int_0^1 g(s, \theta) f(s|\theta) ds + b_1 \int_{\hat{s}}^1 g(s, \theta) f(s|\theta) ds + b_2 \int_0^{\hat{s}} g(s, \theta) f(s|\theta) ds. \quad (7)$$

The result follows from several observations. By MLRP and monotonicity of $g(\cdot, \cdot)$, for $\theta' > \theta$,

$$\int_0^1 g(s, \theta') f(s|\theta') ds > \int_0^1 g(s, \theta) f(s|\theta) ds \quad (8)$$

and

$$\int_{\hat{s}}^1 g(s, \theta') f(s|\theta') ds > \int_{\hat{s}}^1 g(s, \theta) f(s|\theta) ds. \quad (9)$$

To get the second inequality, rewrite the set restriction as $1_{\{s > \hat{s}\}}$, an increasing function of s . Therefore, the first term $\int_0^1 g(s, \theta) f(s|\theta) ds$ is strictly increasing in θ , and the second term $b_1 \int_{\hat{s}}^1 g(s, \theta) f(s|\theta) ds$ is nondecreasing in θ .

Now consider the third term. Suppose first that $\int_0^{\hat{s}} g(s, \theta) f(s|\theta) ds \geq 0$. Then by Lemma A1, $\int_0^{\hat{s}} g(s, \theta') f(s|\theta') ds \geq 0$. This, together with (8) and (9), implies that $\mathbb{E}[g|\hat{s}, \hat{s}, \theta'] > 0$.

Suppose next $\int_0^{\hat{s}} g(s, \theta) f(s|\theta) ds < 0$. Then, by Lemma A1 $\int_0^{\hat{s}} g(s, \theta') f(s|\theta') ds \geq \int_0^{\hat{s}} g(s, \theta) f(s|\theta) ds$. Combining this fact with (8) and (9), we again conclude that $\mathbb{E}[g|\hat{s}, \hat{s}, \theta'] > 0$. ■

LEMMA A3 *If $\mathbb{E}[g|h(\theta), h(\theta), \theta] \geq 0$, then $\mathbb{E}[g|h(\theta'), h(\theta'), \theta'] > 0$ for any $\theta' > \theta$.*

PROOF: Recall that

$$\mathbb{E}[g|h(\theta), h(\theta), \theta] = \int_0^1 g(s, \theta) f(s|\theta) ds + b_1 \int_{h(\theta)}^1 g(s, \theta) f(s|\theta) ds + b_2 \int_0^{h(\theta)} g(s, \theta) f(s|\theta) ds. \quad (10)$$

The first term of (10) is increasing in θ by (8). Now consider the second term. We have:

$$\int_{h(\theta')}^1 g(s, \theta') f(s|\theta') ds = \int_{h(\theta)}^1 g(s, \theta') f(s|\theta') ds + \int_{h(\theta')}^{h(\theta)} g(s, \theta') f(s|\theta') ds > \int_{h(\theta)}^1 g(s, \theta) f(s|\theta) ds, \quad (11)$$

where the inequality follows from (9) and the fact that $h(\theta') < h(\theta)$ and $g(s, \theta') \geq 0$ if $s > h(\theta')$.

Now consider the third term. Since $\int_0^{h(\theta)} g(s, \theta) f(s|\theta) ds < 0$, and $g(s, \theta)$ is strictly increasing in θ , Lemma A1 implies that

$$\int_0^{h(\theta)} g(s, \theta') f(s|\theta') ds > \int_0^{h(\theta)} g(s, \theta) f(s|\theta) ds. \quad (12)$$

Differentiating $\int_0^{h(\theta)} g(s, \theta) f(s|\theta) ds$ with respect to θ , we have

$$h'(\theta)g(h(\theta), \theta)f(h(\theta)|\theta) + \frac{d}{d\tilde{\theta}} \left[\int_0^{h(\theta)} g(s, \tilde{\theta}) f(s|\tilde{\theta}) ds \right]_{\tilde{\theta}=\theta} \geq 0,$$

since the first term vanishes and the second term is nonnegative by (12).

Combining the observations, we conclude that (10) is strictly increasing in θ . ■

PROOF OF PROPOSITION 1: The proof consists of several steps.

STEP 1: *In any equilibrium, parties 1 and 2 use cutoff strategies with the same threshold, i.e. there exists \hat{s} such that party 1 discloses evidence s if (only if) $s < (\leq) \hat{s}$, and party 2 discloses evidence s if (only if) $s > (\geq) \hat{s}$.*

PROOF: Fix any equilibrium and suppose that party 1 has observed evidence s . Party 1's disclosure decision affects the outcome of the trial only if party 2 does not disclose the evidence. Let $P_0(s)$ denote the probability that the judge rules for party 1 in that equilibrium if s is not disclosed. This probability depends on s , because the judge's decision depends only on the value of θ , and s and θ are (weakly) affiliated. On the other hand, if party 1 discloses s , then the judge will rule for party 1 if $g(s, \theta) < 0$, or $\theta < h^{-1}(s)$. Thus, party 1 discloses s in that equilibrium if (only if)

$$P_0(s) < (\leq) \Pr\{\theta < h^{-1}(s) \mid s\}. \quad (13)$$

Similarly, party 2 discloses s if (only if)

$$P_0(s) > (\geq) \Pr\{\theta < h^{-1}(s) \mid s\}. \quad (14)$$

Thus, the disclosure incentives of the two parties are precisely the opposite.

To establish that parties 1 and 2 use cutoff strategies in any equilibrium, we show that, for any $s' > s$, $P_0(s') > \Pr\{\theta < h^{-1}(s') \mid s'\}$ if $P_0(s) = \Pr\{\theta < h^{-1}(s) \mid s\}$. Suppose the judge follows a default ruling strategy, $\delta(\theta)$, i.e. she rules for party 2 with probability $\delta(\theta)$ given θ and nondisclosure. Then, we have:

$$\begin{aligned}
P_0(s') &\equiv \int_0^1 (1 - \delta(\theta))f(\theta|s')d\theta \\
&= \int_0^{h^{-1}(s)} (1 - \delta(\theta))f(\theta|s')d\theta + \int_{h^{-1}(s)}^1 (1 - \delta(\theta))\frac{f(\theta|s')}{f(\theta|s)}f(\theta|s)d\theta \\
&\geq \int_0^{h^{-1}(s)} (1 - \delta(\theta))f(\theta|s')d\theta + \int_{h^{-1}(s)}^1 (1 - \delta(\theta))\frac{f(h^{-1}(s)|s')}{f(h^{-1}(s)|s)}f(\theta|s)d\theta \\
&= \int_0^{h^{-1}(s)} (1 - \delta(\theta))f(\theta|s')d\theta + \int_0^{h^{-1}(s)} \delta(\theta)\frac{f(h^{-1}(s)|s')}{f(h^{-1}(s)|s)}f(\theta|s)d\theta \\
&\geq \int_0^{h^{-1}(s)} (1 - \delta(\theta))f(\theta|s')d\theta + \int_0^{h^{-1}(s)} \delta(\theta)\frac{f(\theta|s')}{f(\theta|s)}f(\theta|s)d\theta \\
&= \int_0^{h^{-1}(s)} f(\theta|s')d\theta = \Pr\{\theta < h^{-1}(s) \mid s'\} > \Pr\{\theta < h^{-1}(s') \mid s'\}
\end{aligned}$$

The first and the last two equalities in this sequence hold by definition. The two non-strict inequalities hold by MLRP. The equality between them holds because

$$\begin{aligned}
P_0(s) = \Pr\{\theta < h^{-1}(s) \mid s\} &\Leftrightarrow \int_0^1 (1 - \delta(\theta))f(\theta|s)d\theta = \int_0^{h^{-1}(s)} f(\theta|s)d\theta \\
&\Leftrightarrow \int_{h^{-1}(s)}^1 (1 - \delta(\theta))f(\theta|s)d\theta = \int_0^{h^{-1}(s)} \delta(\theta)f(\theta|s)d\theta.
\end{aligned}$$

The lone strict inequality holds because $h^{-1}(\cdot)$ is strictly decreasing, and s and θ are affiliated.

A symmetric argument establishes that, for all $s'' < s$, $P_0(s'') < \Pr\{\theta < h^{-1}(s'') \mid s''\}$ if $P_0(s) = \Pr\{\theta < h^{-1}(s) \mid s\}$.

In combination, these results imply the existence of a common threshold $\hat{s} \in [0, 1]$ s.t. party 1 discloses (withholds) s if $s < \hat{s}$ ($s > \hat{s}$) and party 2 discloses (withholds) s if $s > \hat{s}$ ($s < \hat{s}$).²² \blacksquare

STEP 2: *In any equilibrium, the judge follows a cutoff strategy in her default ruling; i.e., there exists $\hat{\theta}$ such that $\delta(\theta) = 0$ if $\theta < \hat{\theta}$ and $\delta(\theta) = 1$ if $\theta > \hat{\theta}$.*

PROOF: By Step 1, the parties follow cutoff disclosure strategies with some common threshold \hat{s} . Hence, the judge's posterior on party 1's culpability when she observes θ is given by $\mathbb{E}[g|\hat{s}, \hat{s}, \theta]$. Then, by Lemma A2, there exists $\hat{\theta} \in \Theta$ such that $\delta(\theta) = 0$ if $\theta < \hat{\theta}$ and $\delta(\theta) = 1$ if $\theta > \hat{\theta}$. \blacksquare

²²If some party, say party 1, has a strict incentive for disclosing all s , then the statement remains valid with $\hat{s} = 1$.

STEP 3: *If \hat{s} is the parties' common threshold and $\hat{\theta}$ is the judge's threshold, then $\hat{s} = h(\hat{\theta})$.*

PROOF: Since the parties' strategies must constitute best responses to the judge's default ruling strategy with threshold $\hat{\theta}$, we must have

$$P_0(s) = \Pr\{\theta < \hat{\theta} \mid s\}.$$

Hence, the optimality of the cutoff strategies with threshold \hat{s} , together with (13) and (14), implies that $\Pr\{\theta < \hat{\theta} \mid s\} < (\leq) \Pr\{\theta < h^{-1}(s) \mid s\}$ if (only if) $s < (\leq) \hat{s}$. Similarly, $\Pr\{\theta < \hat{\theta} \mid s\} > (\geq) \Pr\{\theta < h^{-1}(s) \mid s\}$ if (only if) $s > (\geq) \hat{s}$. Therefore, $\hat{s} = h(\hat{\theta})$. ■

STEP 4: *It is an equilibrium for the judge to follow a cutoff strategy with threshold $\hat{\theta}^*$ and for the parties to follow cutoff strategies with a common threshold $h(\hat{\theta}^*)$.*²³

PROOF: Recall from (3) that

$$\hat{\theta}^* := \inf\{\theta \in \Theta \mid \mathbb{E}[g|h(\theta), h(\theta), \theta] > 0\}.$$

It then follows from Lemma A2 that

$$\mathbb{E}[g|h(\hat{\theta}^*), h(\hat{\theta}^*), \theta] \gtrless 0 \quad \text{if} \quad \theta \gtrless \hat{\theta}^*.$$

So, the judge's cutoff strategy with threshold $\hat{\theta}^*$ is optimal when the parties adopt cutoff strategies with common threshold $h(\hat{\theta}^*)$. Likewise, Steps 1 and 3 show that the parties' cutoff strategies with common threshold $h(\hat{\theta}^*)$ are best responses to the judge's cutoff strategy with threshold $\hat{\theta}^*$. Hence, this strategy profile constitutes a perfect Bayesian equilibrium. ■

STEP 5: *The equilibrium described in Step 4 is unique.*

PROOF: The uniqueness follows from the uniqueness of the judge's threshold, which in turn follows from Lemma A3. ■

PROOF OF PROPOSITION 2: The weak dominance of the parties' disclosure strategies is already established in the text. Given the disclosure strategies, when the judge observes θ her posterior of party 1's culpability is given by $\mathbb{E}[g|h(\theta), h(\theta), \theta]$. Recall that

$$\hat{\theta}^* := \inf\{\theta \in \Theta \mid \mathbb{E}[g|h(\theta), h(\theta), \theta] > 0\}.$$

Lemma A3 then implies that

$$\mathbb{E}[g|h(\theta), h(\theta), \theta] \gtrless 0 \quad \text{if} \quad \theta \gtrless \hat{\theta}^*,$$

²³For brevity, we omit the dependence of $\hat{\theta}^*$ on b_1 , b_2 and c .

proving that the judge's cutoff default ruling strategy with threshold $\hat{\theta}^*$ is optimal. The uniqueness of equilibrium follows from the uniqueness of the equilibrium threshold, which in turn follows from Lemma A3 and the definition of $\hat{\theta}^*$. ■

PROOF OF PROPOSITION 3: Suppose without loss of generality that party 1 has hired a lawyer but party 2 has not. (The opposite case is completely symmetric.) Then, party 1 has a dominant strategy of disclosing (withholding) s if $s > h(\theta)$ ($s < h(\theta)$). Just as in Proposition 1, party 2 will adopt a cutoff strategy with some threshold $\hat{s} \in S$.

Consider next the judge's default ruling strategy. Given θ and nondisclosure of s , the judge's posterior becomes $\mathbb{E}[g|h(\theta), \hat{s}, \theta]$. Lemmas A1 and A2 imply that this posterior is ordinally monotonic: i.e., $\mathbb{E}[g|h(\theta), \hat{s}, \theta] \geq 0$ implies $\mathbb{E}[g|h(\theta'), \hat{s}, \theta'] > 0$ for $\theta' > \theta$. Hence, the judge adopts a cutoff strategy with some threshold $\hat{\theta}$. Then, the same argument as in Proposition 1 can be used to establish that $\hat{s} = h(\hat{\theta})$. It then follows that $\hat{\theta} = \hat{\theta}^*$. Further, the equilibrium threshold $\hat{\theta}^*$ is unique by Lemma A2. ■

PROOF OF LEMMA 1: Suppose that the judge follows a default ruling strategy of a cutoff form with a threshold $\hat{\theta} \in \Theta$. Let us show that any combination of the parties' best response disclosure strategies lead to the same outcome, regardless of whether either party has obtained legal advice or not. To begin, given the threshold $\hat{\theta}$, let $\mathcal{S}_1^{\hat{\theta}}$ be a set of party 1's disclosure strategies such that $\rho_1(s, \theta) \in \mathcal{S}_1^{\hat{\theta}}$ if it has the following properties:

$$\begin{aligned} \theta > \hat{\theta} \text{ and } g(s, \theta) < 0 &\implies \rho_1(s, \theta) = 1 \\ \theta < \hat{\theta} \text{ and } g(s, \theta) > 0 &\implies \rho_1(s, \theta) = 0. \end{aligned}$$

Similarly, let $\mathcal{S}_2^{\hat{\theta}}$ be the set of disclosure strategies of party 2 such that $\rho_2(s, \theta) \in \mathcal{S}_2^{\hat{\theta}}$ if

$$\begin{aligned} \theta > \hat{\theta} \text{ and } g(s, \theta) < 0 &\implies \rho_2(s, \theta) = 0 \\ \theta < \hat{\theta} \text{ and } g(s, \theta) > 0 &\implies \rho_2(s, \theta) = 1. \end{aligned}$$

In words, a party $i = 1, 2$ following a strategy in $\mathcal{S}_i^{\hat{\theta}}$ will always present evidence that would overturn an unfavorable default ruling, and would never present evidence that will overturn a favorable ruling. Such a strategy is optimal for each party, regardless of the opponent's disclosure strategy. If the latter discloses then a party's strategy has no effect, whereas if the opponent does not disclose, then no other strategy can make the party strictly better off.

Note that, if the judge follows a default ruling strategy with a cutoff threshold $\hat{\theta}$, then any pair of parties' disclosure strategies $(\rho_1, \rho_2) \in \mathcal{S}_1^{\hat{\theta}} \times \mathcal{S}_2^{\hat{\theta}}$, induces the outcome in (4).

If a party $i = 1, 2$ has obtained a legal advice, clearly all strategies in $\mathcal{S}_i^{\hat{\theta}}$ are feasible. Importantly, an unrepresented party i also has access to a strategy in $\mathcal{S}_i^{\hat{\theta}}$. To see this, consider

unrepresented party 1's strategy $\rho_1(s, \phi)$ s.t. $\rho_1(s, \phi) = 1$ if $s < \hat{s}$ and $\rho_1(s, \phi) = 0$ if $s > \hat{s}$, where $\hat{s} := \inf\{s | g(s, \hat{\theta}) > 0\}$. It is easy to see that this strategy is feasible for unrepresented party 1 and belongs to $\mathcal{S}_1^{\hat{\theta}}$. A symmetric cutoff strategy works for party 2.

Finally, to complete the proof, suppose that $\rho_i(s, \theta)$ ($\rho_i(s, \phi)$) is represented (unrepresented) party i 's best response to some strategy of player j and the judge's threshold strategy $\hat{\theta}$, then $\rho_i(s, \theta) \in \mathcal{S}_i^{\hat{\theta}}$ ($\rho_i(s, \phi) \in \mathcal{S}_i^{\hat{\theta}}$). The proof is by contradiction. So suppose that $\rho_i(s, \theta) \notin \mathcal{S}_i^{\hat{\theta}}$ ($\rho_i(s, \phi) \notin \mathcal{S}_i^{\hat{\theta}}$)

Case 1. There is (s', θ') s.t. $g(s', \theta') < 0$, $\theta' > \hat{\theta}$, and $\rho^1(s', \theta') < 1$ ($\rho^1(s', \phi) < 1$).

Consider an alternative strategy $\hat{\rho}^1(s, \theta)$ ($\hat{\rho}^1(s, \phi)$) s.t. $\hat{\rho}^1(s, \theta) = \rho^1(s, \theta)$ for all $(s, \theta) \neq (s', \theta')$ ($\hat{\rho}^1(s, \phi) = \rho^1(s, \phi)$ for all $s \neq s'$), and $\hat{\rho}^1(s', \theta') = 1$ ($\hat{\rho}^1(s', \phi) = 1$).

Obviously, $\hat{\rho}^1(s, \theta)$ allows represented party 1 to attain a strictly better payoff than $\rho^1(s, \theta)$.

Let us now show that for unrepresented party 1, $\hat{\rho}^1(s, \phi)$ is strictly better than $\rho^1(s, \phi)$. Since these two strategies differ only when $s = s'$, suppose that s' occurs. First, by disclosing s' party 1 wins the case under all $\theta < h^{-1}(s')$. In particular, she wins for sure when $\theta = \theta'_1$ as $\theta' < h^{-1}(s')$, while under $\rho^1(s, \phi)$ he wins with probability less than 1 when $\theta = \theta'$. At the same time, by disclosing s' party 1 loses the case under all $\theta > h^{-1}(s')$. But since $h^{-1}(s') > \theta' > \hat{\theta}$, party 1 loses when $\theta > h^{-1}(s')$, no matter what strategies are used.

Case 2. There is (s', θ') s.t. $g(s', \theta') > 0$, $\theta' < \hat{\theta}$, and $\rho^1(s', \theta') > 0$ ($\rho^1(s', \phi) < 0$). The proof in this case is similar to the one in case 1 and is therefore omitted. █

PROOF OF PROPOSITION 5: Before proceeding, it is useful to establish some preliminary results. The arguments employed in Lemmas A2 and A3 can be combined to show that $\forall \theta' > \theta$:

$$\begin{aligned}\mathbb{E}[g|0, h(\theta), \theta] \geq 0 &\implies \mathbb{E}[g|0, h(\theta'), \theta'] > 0 \\ \mathbb{E}[g|h(\theta), 1, \theta] \geq 0 &\implies \mathbb{E}[g|h(\theta'), 1, \theta'] > 0.\end{aligned}$$

From these, it follows that $\mathbb{E}[g|0, h(\theta), \theta] > 0$ if and only if $\theta > \hat{\theta}_+(b_1, b_2, c)$, and $\mathbb{E}[g|h(\theta), 1, \theta] > 0$ if and only if $\theta > \hat{\theta}_-(b_1, b_2, c)$.

We first prove (i). Fix any $\hat{\theta} \in [\hat{\theta}_-(b_1, b_2, c), \hat{\theta}_+(b_1, b_2, c)]$. We shall prove that there exists an equilibrium in which the judge adopts a cutoff strategy with threshold $\hat{\theta}$. In this equilibrium, party 1 discloses s if and only if $s < h(\theta)$ and $\theta > \hat{\theta}$, whereas party 2 discloses s if and only if $s > h(\theta)$ and $\theta < \hat{\theta}$. Given these disclosure strategies, the judge's posterior becomes $\mathbb{E}[g|0, h(\theta), \theta] < 0$ if $\theta < \hat{\theta}$ and $\mathbb{E}[g|h(\theta), 1, \theta] > 0$ if $\theta > \hat{\theta}$. Hence, it is optimal for the judge to rule for party 1 if and only if $\theta < \hat{\theta}$. Given the default ruling by the judge, party i 's ($i = 1, 2$) disclosure strategy is in $\mathcal{S}_i^{\hat{\theta}}$ and hence constitutes a best response. The first statement is thus proven.

Next, consider the converse. To prove that any equilibrium threshold $\hat{\theta}$ must be in $[\hat{\theta}_-(b_1, b_2, c), \hat{\theta}_+(b_1, b_2, c)]$, suppose otherwise i.e. there exists an equilibrium strategy combination $(\hat{\theta}, \rho_1, \rho_2)$ s.t. $\hat{\theta} \notin [\hat{\theta}_-(b_1, b_2, c), \hat{\theta}_+(b_1, b_2, c)]$. At first, consider $\hat{\theta} > \hat{\theta}_+(b_1, b_2, c)$. Then $\mathbb{E}[g|\rho_1, \rho_2, \tilde{\theta}] \leq 0$ for an arbitrary $\tilde{\theta} \in (\hat{\theta}_+(b_1, b_2, c), \hat{\theta})$, where

$$\mathbb{E}[g|\rho_1, \rho_2, \tilde{\theta}] = \int_0^1 g(s, \tilde{\theta})f(s|\tilde{\theta})ds + b_1 \int_0^1 (1 - \rho_1(s|\tilde{\theta}))g(s, \tilde{\theta})f(s|\tilde{\theta})ds + b_2 \int_0^1 (1 - \rho_2(s|\tilde{\theta}))g(s, \tilde{\theta})f(s|\tilde{\theta})ds.$$

Note that both parties never disclose the same s in equilibrium, because (ρ_1, ρ_2) are best response strategies and therefore $\rho_i \in S_i^{\hat{\theta}}$ for $i \in \{1, 2\}$ (see the proof of Lemma 1). So the term associated with c disappears.

Let us compare $\mathbb{E}[g|\rho_1, \rho_2, \tilde{\theta}]$ and $E[g|0, h(\tilde{\theta}), \tilde{\theta}]$ term by term. First, $\int_0^1 (1 - \rho_2(s|\tilde{\theta}))g(s, \tilde{\theta})f(s|\tilde{\theta})ds \geq \int_0^{h(\tilde{\theta})} g(s, \tilde{\theta})f(s|\tilde{\theta})ds$. Also, by Lemma 1, $\rho_1(s, \theta) = 0$ if $g(s, \theta) > 0$. Hence,

$$\int_0^1 (1 - \rho_1(s|\tilde{\theta}))g(s, \tilde{\theta})f(s|\tilde{\theta})ds \geq \int_0^1 g(s, \tilde{\theta})f(s|\tilde{\theta})ds.$$

Therefore, $\mathbb{E}[g|\rho_1, \rho_2, \tilde{\theta}] > 0$ if $E[g|0, h(\tilde{\theta}), \tilde{\theta}] > 0$. Since $\tilde{\theta} > \hat{\theta}_+(b_1, b_2, c)$, $E[g|0, h(\tilde{\theta}), \tilde{\theta}] > 0$, so $\mathbb{E}[g|\rho_1, \rho_2, \tilde{\theta}] > 0$ - a contradiction. Hence, $\hat{\theta} \leq \hat{\theta}_+(b_1, b_2, c)$. A symmetric argument proves that $\hat{\theta} \geq \hat{\theta}_-(b_1, b_2, c)$.

Turning now to part (ii), let us without loss of generality focus on the case in which only party 1 obtains legal advice. Choose any $\hat{\theta} \in [\hat{\theta}^*(b_1, b_2), \hat{\theta}_+(b_1, b_2, c)]$. Consider the disclosure strategies whereby party 1 discloses s if and only if $s < h(\theta)$ and $\theta > \hat{\theta}$ and party 2 (who does not have legal advice) discloses s if and only if $s > h(\hat{\theta})$. This pair of strategies constitute best responses given the judge's threshold $\hat{\theta}$. Under these disclosure strategies, the judge's posterior is $\mathbb{E}[g|0, h(\hat{\theta}), \theta]$ if $\theta < \hat{\theta}$ and $\mathbb{E}[g|h(\theta), h(\hat{\theta}), \theta]$ if $\theta > \hat{\theta}$. But $\mathbb{E}[g|0, h(\hat{\theta}), \theta] < 0$ and $\mathbb{E}[g|h(\theta), h(\hat{\theta}), \theta] > 0$ because $\hat{\theta} \in [\hat{\theta}^*(b_1, b_2), \hat{\theta}_+(b_1, b_2, c)]$. Hence, the judge's cutoff strategy is optimal. The proof of the converse is analogous to that for part (i) and is therefore omitted. \blacksquare

PROOF OF PROPOSITION 6: The objective function of $[WP]$ can be rewritten as follows:

$$p_{11} \int_{s>h(\theta)} g(s, \theta)f(s|\theta)l(\theta)dsd\theta + p_{10} \int_{\theta>\hat{\theta}} \int_{s>h(\theta)} g(s, \theta)f(s|\theta)l(\theta)dsd\theta + p_{01} \left\{ \int_{\theta>\hat{\theta}} \int_0^1 g(s, \theta)f(s|\theta)l(\theta)dsd\theta + \int_{\theta\leq\hat{\theta}} \int_{s>h(\theta)} g(s, \theta)f(s|\theta)l(\theta)dsd\theta \right\} + p_{00} \int_{\theta>\hat{\theta}} \int_0^1 g(s, \theta)f(s|\theta)l(\theta)dsd\theta,$$

where $l(\cdot)$ is the marginal density of θ .

Differentiating this with respect to $\hat{\theta}$ yields

$$\begin{aligned} & -p_{00} \int_0^1 g(s, \hat{\theta})f(s|\hat{\theta})dsl(\hat{\theta}) - p_{10} \int_{h(\hat{\theta})}^1 g(s, \hat{\theta})f(s|\hat{\theta})dsl(\hat{\theta}) - p_{01} \int_0^{h(\hat{\theta})} g(s, \hat{\theta})f(s|\hat{\theta})dsl(\hat{\theta}) \\ & \geq 0 \quad \text{if} \quad \hat{\theta} \geq \hat{\theta}^* \left(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}} \right). \end{aligned}$$

So the objective function of $[WP]$ attains its maximum at $\hat{\theta}^*(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}})$. ▮

PROOF OF PROPOSITION 7: To prove (i), let $\bar{\theta}^* := \hat{\theta}^*(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}})$. Also, let

$$B := \left(\frac{p_{10}}{p_{00}}\right) \int_{h(\bar{\theta}^*)}^1 g(s, \bar{\theta}^*) f(s|\bar{\theta}^*) ds + \left(\frac{p_{01}}{p_{00}}\right) \int_0^{h(\bar{\theta}^*)} g(s, \bar{\theta}^*) f(s|\bar{\theta}^*) ds.$$

If $B > 0$, set $b_1 = \hat{b}_1 \equiv \frac{B}{\int_{h(\bar{\theta}^*)}^1 g(s, \bar{\theta}^*) f(s|\bar{\theta}^*) ds}$. Since $p_{01} > 0$, we have $0 < \hat{b}_1 < \frac{p_{10}}{p_{00}}$. Furthermore,

$$\begin{aligned} \mathbb{E}[g|h(\bar{\theta}^*), h(\bar{\theta}^*), \bar{\theta}^*; \hat{b}_1, 0, 0] &= \int_0^1 g(s, \bar{\theta}^*) f(s|\bar{\theta}^*) ds + \hat{b}_1 \int_{h(\bar{\theta}^*)}^1 g(s, \bar{\theta}^*) f(s|\bar{\theta}^*) ds \\ &= \int_0^1 g(s, \bar{\theta}^*) f(s|\bar{\theta}^*) ds + B = \mathbb{E}[g|h(\bar{\theta}^*), h(\bar{\theta}^*), \bar{\theta}^*; \frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}}]. \end{aligned}$$

This, together with Lemma A3, proves that

$$\hat{\theta}^*(\hat{b}_1, 0) = \bar{\theta}^* = \hat{\theta}^*(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}),$$

as was to be shown. The case with $B < 0$ is treated symmetrically with $b_1 = 0$.

We now prove (ii). Without loss of generality, assume $B > 0$. Consider any inference rule $(b_1, 0, 0)$ with $b_1 > 0$. Clearly, $\mathbb{E}[g|0, h(\theta), \theta; b_1, 0, 0] > 0$ whenever $\mathbb{E}[g|0, h(\theta), \theta; \frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}}] \geq 0$. Hence, $\hat{\theta}_+(b_1, 0, 0) < \hat{\theta}_+(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}})$.

Recall that $\hat{\theta}^*(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}) = \hat{\theta}^*(\hat{b}_1, 0) \geq \hat{\theta}_-(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}}, \frac{p_{11}}{p_{00}})$ and that $\hat{\theta}_+(b_1, 0, 0) - \hat{\theta}_-(b_1, 0, 0)$ monotonically converges to zero as b_1 gets small. Hence, there exists b_1 such that $(b_1, 0, 0)$ satisfies (5) in the statement of the Proposition. The case with $B < 0$ can be treated symmetrically. Finally, if $B = 0$, then $\hat{\theta}_-(0, 0, 0) = \hat{\theta}_+(0, 0, 0) = \hat{\theta}^*(0, 0) = \hat{\theta}^*(\frac{p_{10}}{p_{00}}, \frac{p_{01}}{p_{00}})$, so (5) is satisfied with the inference rule $(0, 0, 0)$. ▮

PROOF OF PROPOSITION 9: Given the strategies adopted by parties 1 and 2, the judge's ruling strategy is rational under her Bayes-consistent beliefs. In particular, the symmetry between the two parties implies that the judge's threshold of $\frac{1}{2}$ is optimal when both parties are represented. We next show that the disputing parties' strategies are sequentially rational. Given the symmetry, it suffices to check only for party 1's incentives for deviation. The proof consists of several steps.

STEP 1: *If party 1 observes $s \in [0, 1]$ and does not retain a lawyer, and the judge and party 2 follow the candidate equilibrium strategies, then it is optimal for party 1 to disclose s .*

PROOF: If party 1 discloses s , he wins if and only if $\theta < h^{-1}(s)$. So, his expected payoff is equal to

$$vL(h^{-1}(s)). \tag{15}$$

If party 1 does not disclose, the expected outcome depends on the value of s . Suppose, first, that $s < 1 - \hat{s}(w)$. With probability $1 - p$, party 2 does not observe s . He then hires a lawyer and makes no disclosure. With probability p party 2 observes s . He then hires a lawyer and discloses s if $\theta > h^{-1}(s)$. As a result, the judge rules for party 1 if and only if $\theta < h^{-1}(1)$. So, party 1's payoff from nondisclosure is

$$vL(h^{-1}(1)). \quad (16)$$

Next, suppose that $s > 1 - \hat{s}(w)$. Then, if party 2 observes s , he does not retain a lawyer and discloses s . If party 2 does not observe s , then he retains a lawyer and makes no disclosure. Hence, given the judge's strategy, party 1's payoff from nondisclosure is

$$vpL(h^{-1}(s)) + v(1 - p)L(h^{-1}(1)). \quad (17)$$

Since $L(h^{-1}(s))$ is nonincreasing in s , each of (16) and (17) is less than (15). Therefore, if party 1 observes $s \in [0, 1]$ and does not retain a lawyer, it is optimal for him to disclose. ■

STEP 2: *If party 1 observes $s \in [0, 1]$ and the judge and party 2 follow the candidate equilibrium strategies, then it is optimal for party 1 to retain a lawyer if and only if $s \geq \hat{s}(w)$.*

PROOF: If party 1 retains a lawyer, then it is optimal for him to disclose s if and only if $\theta \leq h^{-1}(s)$. Let us compute party 1's expected payoff associated with this strategy. If party 2 also observes s (which happens with probability p), then he discloses it either if $s > 1 - \hat{s}(w)$ (without hiring a lawyer) or if $s \leq 1 - \hat{s}(w)$ and $\theta > h^{-1}(s)$ (after hiring a lawyer). Either way, party 1 wins if and only if $\theta \leq h^{-1}(s)$.

If party 2 does not observe s (which happens with probability $1 - p$), he retains a lawyer and does not disclose. Given the judge's default ruling strategy when both sides are represented, party 1 wins if and only if $\theta < \max\{h^{-1}(s), \frac{1}{2}\}$. Thus, party 1's expected payoff when he hires a lawyer after observing s is

$$vpL(h^{-1}(s)) + v(1 - p)L(\max\{h^{-1}(s), \frac{1}{2}\}) - w. \quad (18)$$

Suppose next that party 1 does not retain a lawyer after observing s . By Step 1, he will then always disclose s and receive the payoff given by (15). By (6), (18) is greater than (15) if and only if $s \geq \hat{s}(w)$. So the strategy of hiring a lawyer if and only if $s \geq \hat{s}(w)$ is, indeed, optimal. ■

STEP 3: *If party 1 does not observe s and the judge and party 2 follow the candidate equilibrium strategies, then it is optimal for party 1 to retain a lawyer.*

PROOF: Suppose, indeed, that party 1 retains a lawyer. Given the other players' strategies, party 1 wins if $\theta \leq \frac{1}{2}$ and party 2 does not disclose, and if $\theta \leq h^{-1}(s)$ and party 2 discloses s .

Hence, party 1's expected payoff is equal to

$$vp \left[K(1 - \hat{s}(w))L(\frac{1}{2}) + \int_{1-\hat{s}(w)}^1 L(h^{-1}(s))k(s)ds \right] + v(1-p)L(\frac{1}{2}) - w. \quad (19)$$

Meanwhile, if party 1 does not retain a lawyer, then his payoff becomes

$$vp \left[K(1 - \hat{s}(w))L(h^{-1}(1)) + \int_{1-\hat{s}(w)}^1 L(h^{-1}(s))k(s)ds \right] + v(1-p)L(h^{-1}(1)). \quad (20)$$

Subtracting (20) from (19) gives

$$\begin{aligned} & v[pK(1 - \hat{s}(w)) + 1 - p](L(\frac{1}{2}) - L(h^{-1}(1))) - w > v(1-p)(L(\frac{1}{2}) - L(h^{-1}(1))) - w \\ & \geq v(1-p)(L(\frac{1}{2}) - L(h^{-1}(\hat{s}(w)))) - w = 0. \end{aligned}$$

Hence, it is optimal for party 1 to retain a lawyer in this case. \blacksquare

Steps 1-3 establish that party 1's candidate equilibrium strategy constitutes his best response to party 2's and the judge's strategies. By symmetry, the same is true for party 2. The optimality of the judge's strategy was established earlier. \blacksquare

PROOF OF PROPOSITION 10: We first show that there is no equilibrium in which each party hires a lawyer with probability 1. The proof is by contradiction. Suppose to the contrary that such an equilibrium exists. Let $\hat{\theta}$ be the judge's threshold characterizing his default strategy in case of non-disclosure. If $h^{-1}(0) > \hat{\theta}$, then party 1 strictly prefers to remain unrepresented and disclose s when s is sufficiently close to zero. On the other hand, if $h^{-1}(0) \leq \hat{\theta}$ then $h^{-1}(1) \leq \hat{\theta}$ because $h^{-1}(\cdot)$ is decreasing. In this case, party 2 strictly prefers to remain unrepresented and disclose s when s is sufficiently close to 1.

We next rule out the existence of equilibria in which some party, say party 1, remains unrepresented with probability 1 when he does not learn s , while some informed types of this party hire a lawyer with a positive probability. The proof is also by contradiction. So, suppose such an equilibrium exists. Since party 1's actions do not affect the outcome when party 2 discloses, let us focus on the case in which party 2 does not disclose s . On the equilibrium path, party 2 does not disclose with a positive probability, because he does not learn s with a positive probability.

Nondisclosure by both parties when party 1 is represented and party 2 has not deviated from our candidate equilibrium would lead the judge to conclude that party 1 possesses evidence s s.t. $g(s, \theta) > 0$. This is because party 1 hires a lawyer only when he is informed and, by assumption, represented parties disclose all favorable evidence. So, the judge will always rule against represented party 1, if there is no disclosure and party 2's nondisclosure occurs on the

equilibrium path. Therefore, in the candidate equilibrium, represented party 1 wins the dispute if and only if $g(s, \theta) < 0$. Yet, he could have done strictly better by not hiring a lawyer (saving the cost w) and disclosing with probability 1, generating a contradiction.

Thus, the only remaining candidate equilibrium strategy are: (i) the parties remain unrepresented with probability 1. This is the outcome of the uninformative equilibrium; (ii) uninformed party is represented with probability 1, and some types of informed party are represented with probability 1. This is the outcome of informative equilibrium given our assumption that represented parties follow the dominant strategy of disclosing all favorable evidence. **■**

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