Optimal Fee-Shifting Rules*

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January 12, 2016

Abstract

We introduce a model of civil litigation where both parties hold private information about evidence, but one party might be better informed than the other. Thus, our framework includes one-sided asymmetric information as a limit case. We study rules that shift the court fees to the loser. Contrary to the existing literature, in our model optimal fee-shifting rules do not affect the settlement rate even when the parties use different probabilities to calculate the expected trial costs. In turn, fee-shifting rules are optimal if they are "flat", that is, if they change discontinuously in the parties' evidence. Next to the traditional English rule, which no country adopts in its pure form, we examine a family of more realistic endogenous fee-shifting rules, where the court is given discretion to shift the court fees if it is confident enough in the trial outcome. The analysis has two parts. First, in a game-theoretic model we provide a tractable analysis of the settlement rate, the filing rate, case selection, the accuracy of judicial decisions, and the litigants' expenditures. Second, we show that our main result—that optimal fee-shifting rules are "flat" and do not affect the settlement rate—holds in a direct-revelation mechanism where fee-shifting rules are optimally designed to minimize the probability of litigation.

Keywords: settlement, fee-shifting, two-sided asymmetric information, margin of victory.

*The authors would like to thank Albert Choi, Andrew Daughety, Fernando Gomez, William Hubbard, Scott Duke Kominers, Shmuel Leshem, David Levine, Jennifer Reinganum, Neil Rickman, Chris Sanchirico, Kathy Spier, Alex Stremitzer, Avi Tabbach, Eric Talley, Joel Watson, and the participants in the International Meeting in Law and Economics at Université Paris X, Nanterre, on March 20-21, 2014, the conference on "Norms, Actions, Games" at Kings College, London, on April 1-2, 2014, the Law and Economic Theory Workshop at U.C. Berkeley on November 14-15, 2014, the annual conferences of the Italian Society for Law and Economics at the University of Rome, "La Sapienza", on December 18-20, 2014, the American Law and Economics Association at Columbia Law School, on May 15-16, 2015, and the European Association of Law and Economics at the University of Vienna, on September 17-19, 2015, for insightful comments.

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1 Introduction

An increasingly popular method to discourage negative-value litigation consists of shifting part of its costs to the losing party. The White House Task Force on High-tech Patent Issues recommended that legislation provide "district courts with more discretion to award attorney's fees [...] as a sanction for abusive court filings".[1] Along the same lines, in sponsoring the Innovation Act,[2] congressman Bob Goodlatte stressed that fee-shifting would help "eliminate the abuses of [the] patent system by discouraging frivolous patent litigation."[3]

These policies are only partially supported by theory. On the one hand, fee-shifting discourages filings with low probability of success.[4] Moreover, fee-shifting encourages spending at trial, which makes litigation more expensive and hence less appealing,[5] reinforcing the effect on filings. On the other hand, however, the literature also finds that, holding filing and expenditures constant, fee-shifting may discourage settlement, dissipating the positive effects illustrated above. The negative effect of fee-shifting on the settlement rate emerges in the context of two very different sets of models—based either on divergent priors (Shavell, 1982) or on one-sided asymmetric information (Bebchuk, 1984; Reinganum and Wilde, 1986). Yet, in both cases the effect is caused by the fact that litigants may use different probabilities to calculate the expected court fees.[6] An example of this situation, but not the only one, is provided by uncertainty about the probability of winning at trial.[7]

These findings raise the question whether fee-shifting rules can be designed in such a way as to remove their negative effect on settlement. We address this questions in the context of a more general analysis on the effects of fee-shifting. To do so, we introduce a tractable model of litigation with two-sided asymmetric information, where one party might be better informed than the other. Thus, our framework includes one-sided asymmetric information as a limit case. Contrary to the literature, in our model fee-shifting does not have a negative effect on settlement in spite of the fact that the parties use different probabilities to calculate the expected trial costs. Before delving into the details of our framework of analysis it is instructive to emphasize the key differences with extant approaches.

In divergent-prior models (Shavell, 1982), litigation arises between two sufficiently optimistic parties. Both parties might believe to have good chances of winning at trial and, with fee-shifting, not to have to pay the court fees. Thus, to optimistic parties, fee-shifting makes litigation more desirable at the margin because it increases the wedge between winning and losing at trial. In our model, parties might be "rationally optimistic" due to the different information at their disposal. Yet, each party takes into account that the other party also has relevant private information. Consequently, the parties anticipate the effect of fee-shifting by adjusting their settlement demands and offers (and hence the equilibrium settlement amount), and continue to settle with the same probability.

[1] *Fact Sheet: White House Task Force on High-Tech Patent Issues* of June 04, 2014 available at <http://www.whitehouse.gov/the-press-office/2013/06/04/fact-sheet-white-house-task-force-high-tech-patent-issues> last accessed on October 24, 2014.

[2] H.R.3309 Innovation Act.

[3] Ad available at <https://www.youtube.com/watch?v=uSEH7nYTRh4> last accessed on October 24, 2014.

[4] Shavell (1982); Rosenberg and Shavell (1985); Farmer and Pecorino (1998); see also Katz (1990). See most recently Liang and Berliner (2013).

[5] Braeutigam et al. (1984); Katz (1987); Plott (1987); Cooter and Rubinfeld (1989); Hause (1989); Hyde and Williams (2002); Choi and Sanchirico (2004).

[6] Reinganum and Wilde (1986, 562).

[7] Note that what is important is that fee-shifting be determined by variables surrounded by uncertainty, not that uncertainty be about the probability of winning. Thus, as will be the case in our model, also uncertainty about the amount of the award can generate different parties' expectations about the allocation of the court fees if the fee-shifting rule is a function of the award (see, for instance, Spier, 1994). A result repeatedly found in the literature is that fee-shifting has no effect on the settlement rate if there is uncertainty about the amount of the award. However, this result is entirely due to the assumption that the allocation of the court fees does not depend on the amount of the award.

In models of one-sided asymmetric information, either the uninformed or the informed party makes a take-it-or-leave-it offer to the other party (respectively, screening: Bebchuk, 1984; signaling: Reinganum and Wilde, 1986). Litigation arises because the informed party can exploit his or her informational advantage to obtain a favorable settlement at the expense of going to trial some of the time. With fee-shifting, the informed party might have private information not only on the probability of winning but also on the probability of paying the court fees; in this case, his or her posture at the settlement stage will be more aggressive and, in equilibrium, there will be more litigation. In contrast, in our model both parties make offers. Each party's strategy is contained by the strategy of the other party. Hence, neither party can exploit his or her private information at the expense of the other party, dissipating again the negative effects of fee-shifting.

These differences show why the traditional explanation does not apply to our model: our parties do attach different probabilities to the event of having to pay the court fees and yet fee-shifting rules do not affect the settlement rate. However, as we will show, only optimal fee-shifting rules have this property. To zero in on what characterizes them and to verify the generality of our main result, in the final part of the paper we recast the settlement game into a mechanism-design approach to fee-shifting, closely following Spier (1994). We show that the optimal mechanism, in which the probability of litigation in minimized, requires that fee-shifting rules be "flat" almost everywhere; that is, the allocation of the court fees should not respond continuously to the parties' evidence, but should jump at certain predetermined thresholds. Such optimal fee-shifting rules do not alter the settlement rate. The fee-shifting rules that we use in the game-theoretic analysis have precisely this optimal feature. Since one-sided asymmetric information models and divergent-prior models can be recast as special cases of our general framework, we can directly compare our results with previous theoretical studies on fee-shifting.

Our analysis is not limited to comparing the American rule of no fee-shifting with the traditional English rule, which no country adopts in its pure form. Rather, we examine more realistic endogenous fee-shifting rules, where the court is given discretion to shift the court fees if it is confident enough in the trial outcome. The tractability of our model allows us to study issues that are rarely tackled within the same framework of analysis: the settlement rate, the filing rate, case selection, the accuracy of judicial decisions and settlements, and the litigants' endogenous expenditures at trial. All of these issues have important practical implications and are central to current proposals on how to reform overburdened judicial systems. The remainder of this introduction summarizes our approach, illustrates the main results and relates our findings to the existing literature.

In the model, two litigants have common information about the merits of the case—which can initially be in favor of either party—but hold private information about the evidence that each of them has. Bargaining during the settlement phase is modeled as a one-shot simultaneous-bid process (think of parties communicating their bids to a mediator; Chatterjee and Samuelson, 1983). If the plaintiff's demand is lower than the defendant's offer, the parties settle for an amount halfway between demand and offer; otherwise they litigate. If there is a trial, the court adjudicates the case based on the evidence that the parties submit. Based on the same evidence, the court decides how to allocate the litigation costs. The one-shot simultaneous-bid process captures the fundamental problem of bargaining to avoid trial: each party will trade off a more favorable settlement amount with a greater probability of going to trial; as a result, trails may occur in cases in which both parties would have gained from settling (Schweizer, 1989; Spier, 1994).

Friedman and Wittman (2006) were the first to apply this bargaining protocol to the study of settlement; their model is derived as a special case of our model and their results are replicated. Our paper answers their call for additional research in the area of common-value models of litigation[8] and generalizes their setup in

[8] Friedman and Wittman (2006, 115)

three ways. First, we allow the merits of the case to be in favor of either party, while in their model the parties have equal merits. This allows us to measure how close the court decision (based on the evidence submitted by the parties) is to the merits of the case (which the court cannot observe) and how the settlement amount compares to them. Second, we vary the degree of asymmetric information, allowing one party to be better informed than the other, while in their model the parties are privately informed to the same extent. Third, we compare various fee-shifting regimes while they only focus on the American rule.

The English rule, where fee-shifting only depends on who wins the case, does not do justice to the role of the courts, which are almost everywhere reluctant to shift court fees unconditionally to the loser. Already in ancient Athens, the losing party was subjected to a penalty only if he failed to secure a minimum number of votes in his favor by the jury, which indicated that the case was patently meritless. Modern courts in most countries determine fee-shifting case by case based on how clear the parties' merits appear to be.[9] In the United States, two recent unanimous decisions by the Supreme Court have given courts more discretion in determining fee-shifting.[10] Also private parties seem to attach value to judicial discretion: 4.3% of the contracts in a sample of large corporations' public securities filings explicitly provide for discretion in the application of fee-shifting rules.[11] While a large and important literature has studied the litigation process under different fee-shifting rules, the role of the court has rarely been examined.[12]

We endogenize the determination of fee-shifting by allowing the court to allocate the litigation costs based not only on the outcome of adjudication (who wins) but also on the precision of the evidence independently submitted by the parties (how confident the court is about who should win). Therefore, two cases might end with the same judgment on the merits but different fee-shifting arrangements. Different fee-shifting rules can be characterized by the sensitivity of the fee-shifting decision to the precision of the evidence on a continuum ranging from the American rule (infinite sensitivity—there is never fee-shifting) to the English rule (no sensitivity—there is always fee-shifting). Our results hold for this broad family of rules and are also verified in a model of fee-shifting based on the margin of victory, which has already been studied in the literature.[13]

We use the model described above to address a number of policy-relevant issues and derive testable implications. Firstly, fee-shifting does not affect case selection for trial, which instead only depends on the merits of the case and the court fees. Secondly, fee-shifting, however, dramatically affects the final outcome of the case and hence has profound distributional implications. Yet, our results do not support the view that a more permissive fee-shifting policy enhances the accuracy of judicial decisions—and of the corresponding settlements. Rather, whether more or less fee-shifting is desirable for accuracy reasons depends on other factors and, principally, the court fees. With low court fees, the English rule performs better than the American rule and vice versa. This might explain why the United States, where the costs of litigation are said to be high relative to other countries, has traditionally been cautious in allowing fee-shifting. Moreover,

[9] Thuer (2012); Reimann (2012).

[10] *Highmark v. Allcare Health Management System* 134 S. Ct. 1744 (2014); *Octane Fitness v. ICON Health & Fitness* 134 S. Ct. 1749 (2014).

[11] Eisenberg and Miller (2012). Eisenberg et al. (2013) show that courts in Israel use their discretion also to implement one-way fee-shifting.

[12] The main focus has been on exogenous fee-shifting rules that determine ex ante who pays the litigation costs: for instance, Shavell (1982); Reinganum and Wilde (1986); Kaplow (1993); Gravelle (1993); Bebchuk and Chang (1996). Another strand of the literature studies the effects of conditioning the allocation of the litigation costs to the parties' pretrial announcements, which we do not study here; see Miller (1986); Spier (1994); Chung (1996). For a recent survey of the literature on fee-shifting see Katz and Sanchirico (2012).

[13] In Spier (1994), fees are shifted to the plaintiff if the award is below a threshold and to the defendant if the award is above that threshold; in turn, the threshold is endogenously determined by the parties' settlement bids. In our model, where the settlement bids are not verifiable, the optimal threshold would be equal to the expected award (that is, $\frac{1}{2}$), making this rule undistinguishable from the English rule. Instead, in Bebchuk and Chang (1996) there are two different thresholds so that in the intermediate region the court fees are shared. In Section 8 we show that our result continues to hold in this model.

the optimal fee-shifting rule could lie in between the English and the American rule, prescribing fee-shifting only if the evidence is strong enough. Finally, incentives for primary behavior improve if the expected outcome of a case is close to its "true" value—for instance, to the true level of damages. Therefore, our results about the accuracy of judicial decisions can also be used to study the effects of fee-shifting on primary behavior.

Virtually no legal system implements rules that shift all litigation costs. While only court fees can be commonly shifted, some countries also allow shifting a reasonable, predetermined or capped portion of the lawyers' fees. Shiftable costs are typically difficult to inflate.[14] To capture this fact, we distinguish between "court fees" (including the lawyer's side of the regular costs of court proceedings), which can be shifted and are predetermined, and "lawyers' fees" (above what is included in the former), which cannot be shifted and are essentially determined by the parties through their choice of lawyers. In an augmented model we study the parties' choice of lawyers and allow for the endogenous determination of litigation costs. We find that parties tend to hire a more expensive lawyer if the case is more uncertain, if the court fee is higher and if there is a higher degree of fee-shifting. The latter confirms the results obtained by numerous studies pointing out that the English rule yields larger litigation expenditures than the American rule.[15]

In the final part of the paper we present a mechanism-design analysis of our model and test the generality of our main result. We follow closely Spier (1994) and show that the optimal direct-revelation mechanism requires that the allocation of the court fees do not change continuously in a party's evidence but might jump discontinuously at certain thresholds. If this is not the case, then fee-shifting discourages settlement. If the court could observe the parties pretrial bids (as in Spier, 1994) or if it could shift costs to the winner rather than to the loser (as in Talley, 1995), then fee-shifting could be used to encourage settlement. Besides the two contributions just mentioned, we are not aware of any other model of two-sided asymmetric information that illuminates the effects of different fee-shifting rules on the settlement rate.[16]

This paper is organized as follows. Section 2 presents the model setup. The basic model focuses on litigation about dividing an asset of known value—that is, there is uncertainty about the amount of the award[17]—under the American and the English rule. In Section 3, we show that, in equilibrium, the settlement rate is the same under the two rules and compare our model with the common divergent-prior model. In Section 4, we introduce endogenous fee-shifting. In Section 5, we formulate our central result—that fee-shifting does not affect the settlement rate—in its most general form. In Section 6, we study the characteristics of litigated cases: case selection, accuracy and decisions to file and defend against lawsuits. In Section 7, we augment the model and study endogenous legal expenditures. In Section 8, we show that our main results remain valid in a model of litigation about the determination of liability, where parties are uncertain about the probability of victory, and in a model with endogenous fee-shifting based on the margin of victory. Section

[14] Reimann (2012).

[15] This is so even if our model lets the parties select a lawyer (and hence determine legal expenditures) before the settlement phase, while in general in the literature legal expenditures are set after the settlement phase. See footnote 5 for references.

[16] The very few other models of settlement with two-sided asymmetric information can be divided in two camps. One camp assumes that parties are parties are asymmetrically informed about the same aspect of the dispute, as we do. Schweizer (1989) considers a model with discrete information (good versus bad cases) and only analyzes the English rule without comparing it to the American rule. In contrast, we consider information on a continuum (probability of victory or amount of the award) and examine several fee-shifting rules. Gong and Mcafee (1994), in a model with discrete information, find no effect of fee-shifting rules but remark that their model is not adequate to answer questions about the likelihood of settlement given its coarse signal structure. Note that Spier (1994) and Friedman and Wittman (2006) also belong to this camp. Another camp assumes that parties are asymmetrically informed on two different aspects of the dispute. In Chopard et al. (2010) each party knows his or her own litigation costs. They examine fee-shifting rules but the results are ambiguous. In Sobel (1989) and Daughety and Reinganum (1994), the defendant knows the probability of liability and the plaintiff knows the amount of damages. These papers, however, do not study fee-shifting. Note that Talley (1995), differently from us, also assumes that the defendant knows the probability of liability and the plaintiff knows the amount of damages.

[17] Note, however, that we allow the court to condition fee-shifting on the decision on the merits as in Spier (1994). This is not generally allowed in models of uncertainty about the amount of the award, which find no effect of fee-shifting in this case (Reinganum and Wilde, 1986). By doing so, we stack the deck against our main claim.

9 contains the mechanism-design approach to our model. Section 10 concludes. The Appendix contains all proofs.

2 Model

We analyze the behavior of two risk-neutral parties: the plaintiff Π files a lawsuit against the defendant Δ to seek a judgment—such as a damages award or a share of an undivided asset—whose true value is $q \in (0, 1)$.[18] The quality q of the plaintiff's case is known to the parties but is not verifiable in court. Therefore, to make his or her case in court, each party must collect a piece of hard evidence. Prior to trial, the parties try to settle the case. The game unfolds as follows:

Time 1: Evidence collection. Both parties jointly observe the quality of the plaintiff's case q and the distribution of the evidence (Figure 1). The plaintiff draws a signal $\theta_\Pi \sim U[0, q]$, that is, a piece of positive evidence proving that $q \geq \theta_\Pi$; simultaneously, the defendant draws a signal $\theta_\Delta \sim U[q, 1]$, that is, a piece of negative evidence proving that $q \leq \theta_\Delta$. A party's signal cannot be credibly conveyed to the other party prior to trial[19] (there is two-sided asymmetric information) but is verifiable in court.

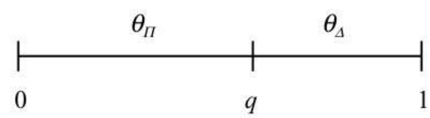


Fig. 1: Evidence signals

Time 2: Settlement negotiations. At the settlement stage, the parties make simultaneous bids. If the plaintiff's demand is weakly lower than the defendant's offer ($p \leq d$), they settle for $\frac{p+d}{2}$ and the game ends. Otherwise ($p > d$), they litigate.

Time 3: Adjudication and fee-shifting. At trial, the court verifies the evidence submitted by the parties—for instance, it hears the experts—and adjudicates the case by awarding $J = \frac{\theta_\Pi + \theta_\Delta}{2}$ to the plaintiff. The court also allocates the court fee according to α, which represents the share of the total court fee $c \geq 0$ paid by the defendant. Under the American rule the court fee is always shared and α is equal to $\frac{1}{2}$, while under the English rule the loser pays the court fee so that α is equal to 0 if the defendant wins and 1 if the plaintiff wins.

In the following subsections, we expand on the micro-foundations of the evidence collection process, the settlement-negotiation protocol and the adjudication and fee-shifting rules. In Section 3 we will solve the model and find the parties' equilibrium settlement bids—that is, the plaintiff's demand and the defendant's offer—as functions of their private signals. These equilibrium bid functions will depend on the two parameters of the game (the quality of the case, q, and the fee-shifting rule) and will determine the equilibrium rate of litigation and other characteristics of tried and settled cases.

[18] In the basic model presented here, the parties attempt to settle only after having seen their private signals. Obviously, if settlement negotiations occurred prior to the revelation of private signals, there would be no asymmetric information and we could expect all cases to settle for an amount equal to q. However, settlement occurs in the shadow of trial and, at trial, q is not observable. This justifies our focus on settlement with asymmetric information on the evidence that each party will produce at trial. In Section 7, we augment the model by considering a preliminary phase during which each party, independently of the other, chooses a more or less expensive (that is, capable) lawyer. We allow for zero expenditures, which can be interpreted as going to the settlement stage without a lawyer. The non-cooperative nature of this phase of the game induces both parties to expend some resources on lawyers, acquire private information and hence fail to settle some of the cases.

[19] This assumption is standard in the literature. Sobel (1989) shows that the parties might fail to reveal private information due to discovery costs.

2.1 Evidence collection

In order to motivate the evidence collection process described above, think of a population of experts, q of whom are pro-plaintiff—that is, they support the plaintiff's claim and show that damages are higher than a certain threshold—while the remaining $1-q$ are pro-defendant—that is, they can demonstrate that damages are below a certain threshold. Next to measuring the true value of the plaintiff's case, q also naturally captures its evidentiary quality; with a higher q there is more abundant evidence supporting the plaintiff, vice versa, with a low q the plaintiff's case is difficult to prove.[20]

Each expert has a piece of hard evidence (Bull and Watson, 2004, 2007; Gennaioli and Perotti, 2009), which varies in strength. A strong piece of evidence is very close to q: for the plaintiff, strong evidence is a large θ_Π, showing that damages are high, while for the defendant strong evidence is a low θ_Δ, showing that damages are low. It is easy for the parties to identify experts in their favor; that is, parties know whether an expert belongs to $[0, q]$ (pro-plaintiff) or to $[q, 1]$ (pro-defendant). However, the strength of the evidence is revealed only after each party has been paired with an expert; that is, the parties do not observe the value of θ while choosing an expert.[21] This justifies the information structure in Figure 1.[22] Assuming a uniform distribution is a standard simplification made to guarantee the tractability of the model (Gong and Mcafee, 1994; Friedman and Wittman, 2006; Gennaioli and Perotti, 2009).

Note that this formulation allows us to vary the amount of asymmetric information that the parties have. If q is large, the plaintiff has a good case and is also better informed than the defendant, because the variance of the plaintiff's signal is larger than the variance of the defendant's signal; and vice versa if q is small.[23] This feature of the model will allow us to extend our results to one-sided asymmetric information as a limit case: with $q \to 0$ only the defendant has private information, while with $q \to 1$ only the plaintiff is privately informed. The fact that we compress the evidence space of the two parties to two different and contiguous intervals might seem problematic. However, note that, as we will show below, a simple linear transformation allows us to describe both parties' evidence signals as lying on $[0, 1]$ while keeping intact the other features of the model. This also shows that assuming that the plaintiff's signal is drawn from below q while the defendant signal is drawn from above q, rather than vice versa, is an innocuous choice.

[20] Since q determines both the true value of the plaintiff's case and the share of pro-plaintiff's experts, our model has the very natural feature that it is easier to prove that damages are high if they are in fact high; this assumption could be relaxed without affecting the main message of the model but at the price of more cumbersome notation and formulas.

[21] An alternative way to describe the evidence collection process is to assume that experts have two characteristics $\{\phi, \theta\}$ with $\theta \sim U[0, 1]$ and

$$\phi = \begin{cases} 0 & \text{if} \quad \theta \geq q \\ 1 & \text{if} \quad \theta \leq q \end{cases}$$

(Note that the slight ambiguity that arises when $\theta = q$ does not cause problems as it has mass zero but is necessary to keep the model symmetric.) We assume that ϕ is directly observable to a party, while θ is revealed only after choosing an expert. A party may need some time and effort to understand if the expert has strong or weak evidence. Note that for the plaintiff, the worst positive signal, $\{1, 0\}$, is preferable to any negative signal, $\{0, \theta\}$ for any θ. This is because the former indicates that q can take any value (thus, it carries no information), while the latter gives an upper bound for q. Thus, it is a dominant strategy for the plaintiff to choose a pro-plaintiff expert rather than a pro-defendant expert; likewise, the defendant prefers a pro-defendant expert. Consequently, we can define $\theta_\Pi \in \{\theta \mid \phi = 0\}$ and $\theta_\Delta \in \{\theta \mid \phi = 1\}$ as the plaintiff's and the defendant's signal. Given that θ is uniformly distributed, we have $\theta_\Pi \sim U[0, q]$ and $\theta_\Delta \sim U[q, 1]$.

[22] Allowing the parties to collect multiple pieces of evidence would significantly complicate the analysis without affecting the main results as long as parties have symmetric access to evidence. In Section 7 we will allow parties to invest in lawyers of different abilities.

[23] In reality, merits and asymmetric information might vary in different ways, while our framework uses q to vary both of them at the same time. However, our results are not qualitatively affected by this feature of the model. To see why this is the case, note that a model in which the parties' signals are independent and uniformly distributed on $\left[\tilde{q} - \frac{1}{2}, \tilde{q} + \frac{1}{2}\right]$ (where the variance of the signals does not change with $\tilde{q}$) is essentially equivalent to a special case of our model with equal merits ($q = \frac{1}{2}$) and hence our results continue to hold.

2.2 Settlement negotiations

The settlement-negotiation phase is modeled as in Chatterjee and Samuelson (1983) and Friedman and Wittman (2006): the parties submit simultaneous bids (to a mediator) and settle if the bids cross; they litigate otherwise. This framework does not require us to make assumptions on who makes a take-it-or-leave-it offer and preserves the symmetry of the game. In addition, the resulting settlement-negotiation game is tractable and can be extended in several ways.

2.3 Adjudication and fee-shifting

At trial, the court cannot observe the quality q of the plaintiff's case and hence cannot generally set $J = q$. Due to numerous legal restrictions, courts are usually modeled as non-Bayesian actors (Daughety and Reinganum, 2000b; Gennaioli and Shleifer, 2007).[24] Daughety and Reinganum (2000a) identify a unique family of judgments that, among other desirable properties, are strictly monotonically increasing in each of the signals, bounded by the minimum and maximum of the signals, and symmetric with respect to the signals. The only member of this family of judgments that is based on a neutral interpretation of the law and on preponderance of evidence is $J = \frac{\theta_\Pi + \theta_\Delta}{2}$.[25] As expected, J lies between θ_Π and θ_Δ, increases in both evidence signals, treats the parties symmetrically and is typically different from q.[26] Intuitively, this simply means that the court receives a piece of evidence showing that $q \geq \theta_\Pi$ and another piece of evidence showing that $q \leq \theta_\Delta$ and chooses the middle point.

Next to adjudicating the case, the court also decides who pays the total court fee $c > 0$. Under the American rule, $\alpha_A(\theta_\Delta, \theta_\Pi) = \frac{1}{2}$ so that the court fee is invariably shared. Under the English rule, α is such that the loser—that is, the party submitting the weaker evidence—pays the court fee:

$$\alpha_E(\theta_\Delta, \theta_\Pi) = \begin{cases} 0 & \text{if} \quad \theta_\Pi < 1 - \theta_\Delta \\ \frac{1}{2} & \text{if} \quad \theta_\Pi = 1 - \theta_\Delta \\ 1 & \text{if} \quad \theta_\Pi > 1 - \theta_\Delta \end{cases} \tag{1}$$

Note also that evidence is weak if it is close to its worst realization: that is, θ_Π is weak if it is close to 0 and θ_Δ is weak if it is close to 1. Since the court cannot observe q, it measures the strength of the evidence in terms of its distance from the relevant endpoint. The three cases in (1) correspond to $J < \frac{1}{2}$ (defendant wins), $J = \frac{1}{2}$ and $J > \frac{1}{2}$ (plaintiff wins), respectively.

[24] Most importantly, this formulation implies that the court does not infer anything from the fact that a party presents no evidence and treats it as simply an uninformative signal. Thus, no evidence submitted by the plaintiff is equivalent to $\theta_\Pi = 0$, while no evidence submitted by the defendant is equivalent to $\theta_\Delta = 1$. This in turn implies that we could dispense of our assumption that the parties can observe the type of evidence (positive or negative) before choosing an expert. We could simply allow a plaintiff who has accidentally chosen a pro-defendant expert to submit no evidence and likewise for the defendant. Doing so would change the distribution of evidence (it would put positive mass on $\theta_\Pi = 0$ and on $\theta_\Delta = 1$) therefore complicating the analysis, but would not affect the basic structure of the model.

[25] More precisely, the family of judgments identified by Daughety and Reinganum (2000a) is (in our own notation) $\tilde{J}(\theta_\Delta, \theta_\Pi) = \left(\left(\frac{\theta_\Delta^\xi + \theta_\Pi^\xi}{2}\right)^{\frac{1}{\xi}}, \gamma\right)$, where $\xi \neq 0$ is a metric of the court's interpretation of the law, and γ is the evidence threshold. A large ξ magnifies the effect of the winner's signal, while a low ξ magnifies the impact of the loser's signal. Our formulation of the judgment is obtained by setting $\xi = 1$, which can be thought of as a neutral interpretation of the law, where the winner's and the loser's signal have the same weight. The evidence threshold in our framework is set at $\gamma = \frac{1}{2}$, which is the preponderance of evidence threshold: if $J > \frac{1}{2}$, the plaintiff wins, otherwise the defendant wins.

[26] The expected value of J for a given q is $\mathrm{E}_{\theta_\Pi, \theta_\Delta}[J] = \frac{2q+1}{4} \in \left(\frac{1}{4}, \frac{3}{4}\right)$, which is biased towards $\frac{1}{2}$, that is, is greater than q for $q < \frac{1}{2}$ and less than q for $q > \frac{1}{2}$. The party with the greater merits wins more often in court but this advantage exhibits decreasing marginal returns. Assuming that q is symmetrically distributed around $\frac{1}{2}$ (which implies $\mathrm{E}[q] = \frac{1}{2}$ and includes the uniform distribution) and taking the expectation over q yields an unbiased expected judgment equal to $\mathrm{E}_q\left[\mathrm{E}_{\theta_\Pi, \theta_\Delta}[J]\right] = \frac{1}{2}$. The assumption of symmetry is consistent with our more general choice to consider litigation between (ex ante) symmetric parties.

3 Settlement behavior in equilibrium

We are now ready to characterize the equilibrium of the settlement game that the parties play at time 2. After observing θ_Π, the plaintiff chooses a settlement demand p so as to maximize the expected gain Π given the defendant's settlement offer d. The plaintiff's gain has two components: the expected outcome of settlement—the first term, which occurs when $p \leq d$—and the expected outcome of litigation—the second term, when $p > d$ and the parties fail to settle. For each of these two components, the plaintiff's gain is calculated on all possible defendant's signals.[27] Similarly, the defendant minimizes the expected cost Δ.

$$\begin{aligned}
\Pi(p) &= \int_{\{p\leq d\}} \tfrac{p+d}{2}\tfrac{d\theta_\Delta}{1-q} + \int_{\{p>d\}} [J-(1-\alpha)c]\tfrac{d\theta_\Delta}{1-q} \\
\Delta(d) &= \int_{\{p\leq d\}} \tfrac{p+d}{2}\tfrac{d\theta_\Pi}{q} + \int_{\{p>d\}} [J+\alpha c]\tfrac{d\theta_\Pi}{q}
\end{aligned}$$

Since the parties submit their bids simultaneously, the Nash equilibrium is a pair $\{p, d\}$ of the plaintiff's demand and the defendant's offer, conditional on the fact that each party observes his or her own signal but not the signal of the other party. Therefore, in equilibrium, the plaintiff's demand p must be a function of θ_Π, and the defendant's offer d must be a function of θ_Δ. Moreover, in equilibrium, the parties' bids will not be equal to their signals due to the fact that overstating one's position reduces the probability of settlement for both parties (a common cost) while improving the settlement amount (a private benefit). The following linear transformations of the parties' signals will allow us to more easily visualize and analyze the results:[28]

Plaintiff's normalized evidence signal: $z_\Pi = \frac{\theta_\Pi}{q} \sim U[0,1]$;

Defendant's normalized evidence signal: $z_\Delta = \frac{\theta_\Delta - q}{1-q} \sim U[0,1]$.

The same transformations also apply to the judgment, so that $J(z_\Pi, z_\Delta) = \frac{qz_\Pi + (1-q)z_\Delta + q}{2}$, and to the fee-shifting rules. (With a slight abuse of notation we keep using J and α for the new functions, the arguments are enough to avoid confusion.)

American rule	$\alpha_A(z_\Delta, z_\Pi) = \frac{1}{2}$
English rule	$\alpha_E(z_\Delta, z_\Pi) = \begin{cases} 0 & \text{if } z_\Pi < \frac{1-q}{q}(1-z_\Delta) \\ \frac{1}{2} & \text{if } z_\Pi = \frac{1-q}{q}(1-z_\Delta) \\ 1 & \text{if } z_\Pi > \frac{1-q}{q}(1-z_\Delta) \end{cases}$

Tab. 1: American and English rules with normalized signals

Let $p = P(z_\Pi)$ be the plaintiff's settlement demand as a function of his or her normalized signal and $d = D(z_\Delta)$ be the defendant's offer. We assume that the parties' bid functions are linear and increasing in their signals. Given monotonicity, we can define inverse functions of the bids. The assumption of linearity is standard in the literature and is necessary for tractability (Chatterjee and Samuelson, 1983; Friedman and Wittman, 2006). Accordingly, $P^{-1}(d)$ is the value of the plaintiff's signal such that the plaintiff's demand p is equal to the defendant's offer d. For a given defendant's demand d, if the plaintiff's signal is $z_\Pi \leq P^{-1}(d)$, then $P(z_\Pi) \leq d$ and the parties settle; otherwise, the parties litigate. Similarly, $D^{-1}(p)$ is the value of the defendant's signal such that the defendant's demand d is equal to the plaintiff's offer p. For a given plaintiff's offer p, if the defendant's signal is $z_\Delta \geq D^{-1}(p)$, then $D(z_\Delta) \geq p$ and the parties settle; otherwise, the

[27] The set $\{p \leq d\}$ is simply the set of defendant's signals that, given the plaintiff's demand, result in a bid $d \geq p$ and hence in settlement, similarly for the complementary set $\{p > d\}$. In the defendant's payoff function these sets are defined analogously.
[28] Since the parties know q, these transformations are well defined.

parties litigate. Using these observations, we can write the parties' optimization problem:

$$\begin{array}{rcl} \max_p \Pi(p) & = & \max_p \left[\int\limits_{D^{-1}(p)}^{1} \frac{p+D(z_\Delta)}{2} dz_\Delta + \int\limits_{0}^{D^{-1}(p)} \left[\frac{qz_\Pi + z_\Delta(1-q)+q}{2} - (1-\alpha)c \right] dz_\Delta \right] \\ \min_d \Delta(d) & = & \min_d \left[\int\limits_{0}^{P^{-1}(d)} \frac{P(z_\Pi)+d}{2} dz_\Pi + \int\limits_{P^{-1}(d)}^{1} \left[\frac{qz_\Pi + z_\Delta(1-q)+q}{2} + \alpha c \right] dz_\Pi \right] \end{array} \tag{2}$$

To find the parties' equilibrium bid functions for each fee-shifting rule, we adapt the method used in Friedman and Wittman (2006) to our framework. We use the assumption of linearity, that is, we impose that the bids have the form $p = e + fz_\Pi$ and $d = a + bz_\Delta$. From there, we can write the inverse bid functions explicitly and substitute them into (2). Depending on the fee-shifting rule under consideration, we substitute the appropriate formulation of α from Table 1 into (2). We then calculate the first-order conditions of the expected payoffs for the plaintiff and the defendant. Under the English rule, α is discontinuous so that we calculate the first-order conditions piecewise. (The second order conditions are satisfied). Finally, from the first-order conditions we derive the unique pure-strategy piecewise linear bid functions—that is, we find the values of the coefficients a, b, e and f—and identify the points, if any, at which the bid functions are discontinuous. Constructive proofs are in the Appendix; here we provide intuitions and results. From now on we assume:

Assumption (balanced asymmetric information): $\frac{1}{3} \leq q \leq \frac{2}{3}$.

That is, we restrict the analysis to situations with balanced two-sided asymmetric information, where the difference in information between the parties is not too wide and there exist pure-strategy Nash equilibria. As q takes extreme values, we continuously approach the one-sided asymmetric information framework—with $q \to 0$ only the defendant is informed and with $q \to 1$ only the plaintiff is informed—and our pure-strategy equilibria can no longer be sustained. The widening information wedge between the parties exacerbates the asymmetric information problem to the point that, as is common in a market for lemons, the market collapses. This assumption will be relaxed in the mechanism-design approach presented in Section (9), where we will restore the more general setup with $q \in (0, 1)$.

3.1 American rule

Under the American rule, both parties face the same court fee $\frac{c}{2}$ and there is no fee-shifting.

Proposition 1. *Under the American rule, the equilibrium bid functions at the settlement stage are:*

$$\begin{array}{rcl} P_A(z_\Pi) & = & \frac{1}{2} - 3\left(\frac{5}{6} - q\right)c + \frac{1}{3}z_\Pi \\ & & \textit{truncated above at } D_A(1) \textit{ or below at } D_A(0) \\ D_A(z_\Delta) & = & \frac{1}{6} + 3\left(q - \frac{1}{6}\right)c + \frac{1}{3}z_\Delta \\ & & \textit{truncated above at } P_A(1) \textit{ or below at } P_A(0) \end{array}$$

As expected, the parties' bids are linearly increasing in their signals and are truncated because the plaintiff never demands less than the minimum he or she expects the defendant to offer and vice versa. The parties litigate if $P_A(z_\Pi) > D_A(z_\Delta)$, that is, if

$$z_\Pi > z_\Delta + 6c - 1 \tag{3}$$

Relatively "pessimistic" parties (low z_Π and high z_Δ) settle, while relatively "optimistic" parties (high z_Π and low z_Δ) go to trial, so that the litigation condition in (3) can be regarded as a rational version of the mutual optimism condition found in divergent-prior models. Figure 2 illustrates the parties' settlement decision as a result of their equilibrium bids for low and high levels of the court fee.

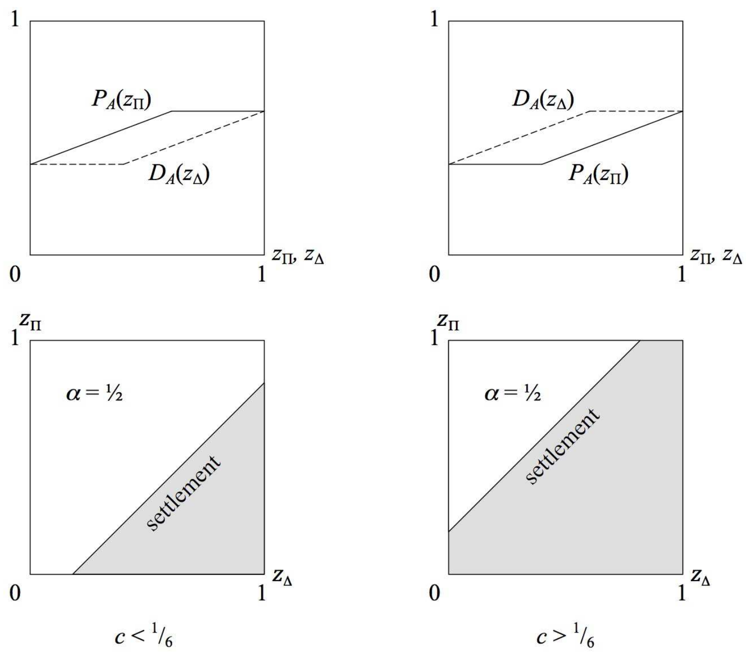


Fig. 2: Settlement bids (top) and settlement rate (bottom) under the American rule

When the court fee is low ($c < \frac{1}{6}$), the parties have relatively little to lose by going to trial. Hence, the plaintiff demand is high and the defendant offer low relative to their signals: if the plaintiff and the defendant see the same (normalized) signal, the plaintiff's demand is higher than the defendant's offer, $P_A(z) > D_A(z)$, and they go to trial. Settlement occurs if the plaintiff draws a low signal and the defendant a high signal such that the signals fall in the area below the settlement line defined by (3), $z_\Pi = z_\Delta + 6c - 1$, in the bottom-left graph in Figure 2.

As the court fee increases, the parties' moderate their positions: the plaintiff's demand function shifts downwards while the defendant's offer function shifts upwards, bringing the parties' bids closer and hence facilitating settlement. For $c > \frac{1}{6}$, the defendant's offer function is above the plaintiff's demand function; the settlement line is above the diagonal, hence taking a larger portion of the signal space than in the previous case. (At $c = \frac{1}{6}$, not drawn in Figure 2, the parties' bids are perfectly overlapping and the settlement runs through the diagonal of the signal space.)

Interestingly, the quality of the case, q, affects the parties' bids but does not influence the probability of litigation. This is because, in response to an improvement in the plaintiff's case, both bid functions shift upward with the plaintiff demanding more and the defendant offering correspondingly higher amounts so that the probability that they litigate remains the same. Finally, note that, as expected, by setting $q = \frac{1}{2}$ under the American rule we can replicate the results in Friedman and Wittman (2006).[29]

3.2 English rule

Under the English rule, the parties anticipate that the court will also allocate the court fee.

[29] To reproduce the results in Friedman and Wittman (2006) multiply c, z_Π and z_Δ by 2. This is necessary because we use c to denote the total court fee, while they use c to denote the individual court fee, so that the total is $2c$ in their framework. Moreover, with $q = \frac{1}{2}$, the pre-normalization signal space is of length $\frac{1}{2}$ in our model, while it is of length 1 in their model so that signals need to be scaled.

Proposition 2. *Under the English rule, the equilibrium bid functions at the settlement stage are:*

$$P_E(z_\Pi) = \begin{cases} \frac{1}{2} - 3(1-q)c + \frac{1}{3}z_\Pi & \text{if } z_\Pi \leq 6c(1-q) \\ \frac{1}{2} - 3\left(\frac{2}{3}-q\right)c + \frac{1}{3}z_\Pi & \text{if } z_\Pi > 6c(1-q) \end{cases}$$
truncated above at $D_E(1)$ or below at $D_E(0)$

$$D_E(z_\Delta) = \begin{cases} \frac{1}{6} + 3\left(q-\frac{1}{3}\right)c + \frac{1}{3}z_\Delta & \text{if } z_\Delta \leq 1-6cq \\ \frac{1}{6} + 3qc + \frac{1}{3}z_\Delta & \text{if } z_\Delta > 1-6cq \end{cases}$$
truncated above at $P_E(1)$ or below at $P_E(0)$

Fee-shifting does not only depend on a party's own signal, but also on the signal of the other party and hence cannot be predicted with certainty. Yet, low plaintiff's demands imply that the plaintiff litigates only with defendants that have offered a low amount (those who offer more will settle). Therefore, the plaintiff expects the defendant with whom he or she litigates to have a low signal and hence fee-shifting to be pro-defendant ($\alpha = 0$). Conversely, a plaintiff demanding high amounts litigates at the margin with defendants with a high signals and fee-shifting is pro-plaintiff ($\alpha = 1$). This asymmetry justifies the shift from the low to the high segment in the plaintiff's bid, as shown in the top graphs in Figure 3. The difference between the two segments (the height of the shift) is equal to c, that is, to the difference between paying and not paying the entire court fee. The defendant faces a similar scenario and also the defendant's bid exhibits two segments.

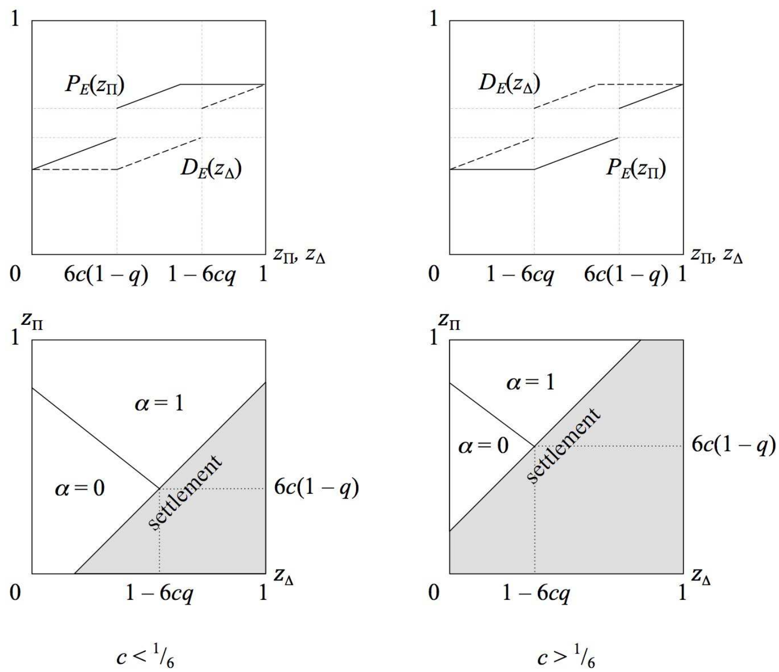


Fig. 3: Settlement bids (top) and settlement rate (bottom) under the English rule, with $q > \frac{1}{2}$

The point at which the parties' bids shift is determined endogenously at the equilibrium. As the bottom graphs in Figure 3 show, the point at which a party's bid shifts from low to high is exactly the point at which there is a change in fee-shifting in the cases that are litigated at the margin. This is the point where the fee-shifting diagonal[30] crosses the settlement line. Moreover, in equilibrium, the shift in the plaintiff's demand

[30] Figure 3 is drawn for $q > \frac{1}{2}$; with $q < \frac{1}{2}$ the negative-slope line dividing $\alpha = 0$ from $\alpha = 1$ would start from above the north-west vertex.

must correspond to the shift in the defendant's offer (as shown in the top graphs in Figure 3) so that, at the margin, a low-demanding plaintiff litigates with a low-offering defendant and, likewise, a high-demanding plaintiff litigates with a high-offering defendant.

The points at which the parties' bids shift depend on c and q in an intuitive way: the plaintiff will shift earlier to higher demands if the case has high quality or if the court fee is low; that is, if litigation brings large benefits and little costs the plaintiff is willing to accept a greater risk of going to trial. Instead, the defendant will shift earlier to higher offers—thereby making litigation less likely—if the case quality is high and if the court fee is high. Finally, it is important to notice that each of the segments of the parties' bids behave as under the American rule in response to changes in c and in q. The parties litigate if $P_E(z_\Pi) > D_E(z_\Delta)$. This inequality yields the same litigation condition as (3) under the American rule, which shows that fee-shifting does not affect the probability of litigation.

Proposition 3. *The litigation rate under the English rule is the same as under the American rule.*

The next subsection elaborates on this point.

3.3 Litigation versus settlement in our model and in the divergent-prior model

To illustrate our results, it is instructive to restrict our attention to $q = \frac{1}{2}$, when the parties' have equal merits and the asymmetry of information between them is perfectly balanced. The equilibrium bid functions are as follows. (We omit the truncations.)

$$\begin{array}{lcl} \multicolumn{3}{l}{\text{American rule with equal merits } (q = \tfrac{1}{2}):} \\ P_A(z_\Pi) & = & \frac{1}{2} - c + \frac{1}{3} z_\Pi \\ D_A(z_\Delta) & = & \frac{1}{6} + c + \frac{1}{3} z_\Delta \end{array}$$

$$\begin{array}{lcl} \multicolumn{3}{l}{\text{English rule with equal merits } (q = \tfrac{1}{2}):} \\ P_E(z_\Pi) & = & \begin{cases} \frac{1}{2} - \frac{3}{2}c + \frac{1}{3} z_\Pi & \text{if} \quad z_\Pi \leq 3c \\ \frac{1}{2} - \frac{1}{2}c + \frac{1}{3} z_\Pi & \text{if} \quad z_\Pi > 3c \end{cases} \\ D_E(z_\Delta) & = & \begin{cases} \frac{1}{6} + \frac{1}{2}c + \frac{1}{3} z_\Delta & \text{if} \quad z_\Delta \leq 1 - 3c \\ \frac{1}{6} + \frac{3}{2}c + \frac{1}{3} z_\Delta & \text{if} \quad z_\Delta > 1 - 3c \end{cases} \end{array}$$

The left graph in Figure 4 shows what happens to the parties' bid functions when we move from the American rule to the English rule.[31] Under the American rule both parties' (black) bids are continuous in their evidence signals. Instead, under the English rule, both parties' (grey) bids are discontinuous at the point where each party expects the court fee to be shifted from the plaintiff to the defendant. The left-hand portion of the parties' bids is lower than under the American rule: this is the region in which both parties expect the plaintiff to bear the entire court fee if the case goes to trial. As a result both parties bid less than under the American rule. Similarly, the right-hand portion of the parties' bids is above the American-rule bids, since now the defendant is expected to bear the court fee. In both cases, the wedge equal to $\frac{c}{2}$ corresponds to the difference between litigating under the American rule and litigating under the English rule.

What is important is that these shifts do not change the horizontal distance between the parties' bids, which remains equal to $6c - 1$. This distance is the crucial determinant of litigation. Parties litigate if the plaintiff's demand is above the defendant's offer, $P(z_\Pi) > D(z_\Delta)$, which occurs if the plaintiff's signal z_Π is at least at a distance $6c - 1$ to the right of the defendant's signal z_Δ. Since the parties adjust their

[31] The graph is drawn for $c > \frac{1}{6}$. For $c < \frac{1}{6}$ the figure changes similarly to Figures 2 and 3.

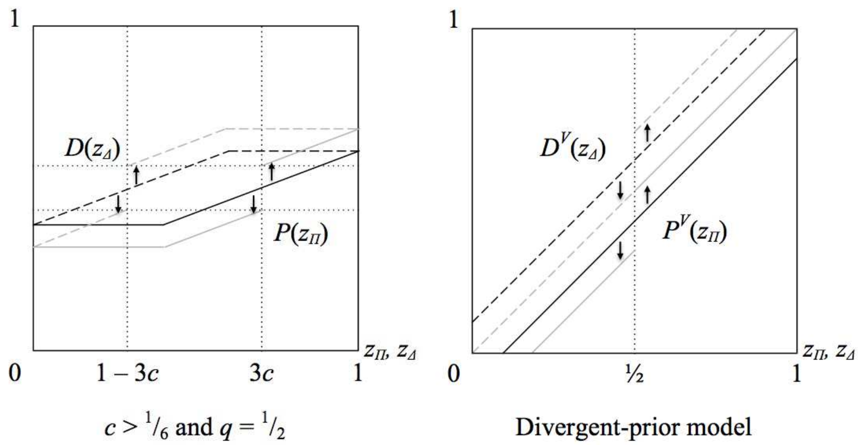


Fig. 4: American rule (black) and English rule (grey): our model (left) compared to the divergent-prior model (right)

bidding strategies to the fee-shifting rule, the American rule and the English rule yield the same probability of litigation.

To appreciate the implications of this result, compare it with the outcome that can be obtained with the naive bid functions used in the divergent-prior model (Shavell, 1982). In this model, a party fails to consider that the other party might have received a different signal, and believes that his or her signal perfectly identifies the trial outcome J^V; that is, the plaintiff believes that $J^V = z_\Pi$ while the defendant believes that $J^V = z_\Delta$.[32] A party's settlement bid is equal to his or her expected trial outcome net of the court fee.

American rule in the devergent-prior model:

$$\begin{aligned} P_A^V(z_\Pi) &= z_\Pi - \tfrac{c}{2} \\ D_A^V(z_\Delta) &= z_\Delta + \tfrac{c}{2} \end{aligned}$$

The plaintiff's demand is above the defendant's offer if the plaintiff's signal z_Π is at least at a distance c to the right of the defendant's signal, according to the familiar mutual optimism condition for litigation with divergent priors $z_\Pi - z_\Delta > c$.[33] Although the magnitude is different, this result is not qualitatively different from ours: if the court fee increases, the parties litigate less often. In contrast, the English rule yields radically different results. Now the plaintiff expects to pay nothing in case of victory at trial—that is,

[32] Note that these believes might also derive from the conviction that the other party must be bringing the same evidence—that is, that $z_\Pi = z_\Pi$—but that he or she makes mistakes in interpreting it (each party is convinced to have a correct and objective representation of the case).

[33] Note that c can be interpreted as the ratio of the court fee to the amount at stake, which we have normalized to 1.

if $z_\Pi > \frac{1}{2}$—and expects to pay the entire court fee in case the defendant wins. Similarly for the defendant.[34]

$$\text{English rule in the devergent-prior model :}$$
$$P_E^V(z_\Pi) = \begin{cases} z_\Pi - c & \text{if} \quad z_\Pi < \frac{1}{2} \\ z_\Pi - \frac{c}{2} & \text{if} \quad z_\Pi = \frac{1}{2} \\ z_\Pi & \text{if} \quad z_\Pi > \frac{1}{2} \end{cases}$$
$$D_E^V(z_\Delta) = \begin{cases} z_\Delta & \text{if} \quad z_\Delta < \frac{1}{2} \\ z_\Delta + \frac{c}{2} & \text{if} \quad z_\Delta = \frac{1}{2} \\ z_\Delta + c & \text{if} \quad z_\Delta > \frac{1}{2} \end{cases}$$

Ignoring the cases in which the parties' signals are exactly equal to $\frac{1}{2}$, which have mass zero, we have three cases: if the parties signals are on the same side of the threshold $\frac{1}{2}$, then litigation occurs if $z_\Pi - z_\Delta > c$, as under the American rule; if $z_\Pi < \frac{1}{2} < z_\Delta$, then the parties never litigate irrespective of c, as under the American rule; finally, if $z_\Delta < \frac{1}{2} < z_\Pi$, then the parties always litigate irrespective of c under the English rule, while they settle some of the time under the American rule.[35]

In the divergent-prior model, the litigation rate under the English rule is higher than under the American rule as the former exacerbates the effects of mutual optimism. The difference with our model comes from the fact that in the divergent-prior model a party fails to consider that, under the English rule, the other party faces similarly improved prospects in case of victory and hence will adapt his or her bidding strategy. This is important because the cost of a more aggressive settlement posture is an increased probability of trial. This probability, however, also depends on the other party's posture. In our model, the parties take into account each other's strategies and hence fully appreciate the costs of more daring settlement bids. In contrast, in the divergent-prior model, a party does not act strategically but responds rather blindly to his or her signal.

4 Endogenous fee-shifting

We can now generalize the basic model to unpack the endogenous determination of fee-shifting at trial. The American and the English rule studied above will emerge as corner cases of this more general model. The timing of the game is as in the basic setting. Let us first return to the original setup with signals θ_Π and θ_Δ, redefine the fee-shifting rules and then apply again our normalization strategy to obtain the normalized signals z_Π and z_Δ. Here we consider a more general fee-shifting rule for the court to use at time 3:

$$\alpha_t(\theta_\Delta, \theta_\Pi) = \begin{cases} 0 & \text{if} \quad \theta_\Pi < 1 - \theta_\Delta \quad \text{and} \quad \theta_\Delta < t \\ \frac{1}{2} & \text{if} \quad \theta_\Pi = 1 - \theta_\Delta \quad \text{or} \quad (\theta_\Delta \geq t \text{ and } \theta_\Pi \leq 1 - t) \\ 1 & \text{if} \quad \theta_\Pi > 1 - \theta_\Delta \quad \text{and} \quad \theta_\Pi > 1 - t \end{cases} \tag{4}$$

where t is a parameter identifying the fee-shifting rule. It is worth noting that $t = 0$ describes the American rule (the court fee is always shared) and $t = 1$ corresponds to the English rule in (1) (the loser pays the

[34] This representation of the English rule differs from the existing literature because we allow the award to determine fee-shifting; we do so in order to keep the framework of analysis aligned to our model. Consequently, while the literature finds no difference between the English and the American rule in the divergent-prior model with uncertainty about the award (Shavell, 1982), we do. By so doing, we stack the deck against our main claim. Importantly, note that our results do not depend on this reinterpretation of the English rule and that they are preserved in a model with uncertainty about the probability of victory, where the literature does find a difference between the English and the American rule (see Section 8). Visualization of the results is easier in the model with uncertainty about the award while the intuitions are the same; hence we chose to discuss our results in this model.

[35] In this case, the mutual optimism condition for litigation under the English rule is $z_\Pi - z_\Delta > 0$, which in always satisfied when $z_\Pi > z_\Delta$. The condition is $z_\Pi - z_\Delta > c$ under the American rule, which is satisfied only if the difference between the signals is large enough.

court fee). For values of $t \in (0,1)$ the corresponding fee-shifting rule gives some weight to the quality of the evidence submitted by the parties and shifts the court fee only if the evidence is sufficiently precise, that is, if the signals θ_Π and θ_Δ are close to each other and hence identify a narrow range for q. This feature of the model captures the reality of fee-shifting in most countries around the world: the law allows courts to apply fee-shifting only if sufficiently "confident" in the outcome of adjudication.

To elaborate, the fee-shifting rule in (4) depends on two criteria. The first criterion is the relative strength of the parties' evidence signals, which determines which party loses the case and hence is eligible to pay the court fee, as it was in (1). However, whether the court fee is in fact shifted depends on a second criterion: the cumulative precision of the evidence submitted by the parties. Precision is naturally captured by the distance between the parties' signals, $\theta_\Delta - \theta_\Pi$; this distance measures the range of uncertainty for q, which the court cannot observe. Intuitively, if the plaintiff's and the defendant's signals are far apart, the range in which the true merits can fall is large and hence J might be far from q. The fee-shifting rule in (4) is the simplest, one-parameter characterization of a family of rules that formalizes this intuition. It turns out that to take into account the distance between the signals it is sufficient to define a threshold for the signal of the winning party, $t \in [0,1]$, which fully characterizes the rule in (4). A larger value of t implies that the rule is less sensitive to the precision of the evidence, that is, that fee-shifting occurs even if the signals are not too precise.[36]

Figure 5 depicts different types of fee-shifting rules characterized by different values of t. If $t = 0$, fee-shifting is infinitely sensitive to the precision of the evidence so that fee-shifting never occurs and the court fee is invariably shared; this is the American rule, where $\alpha = \frac{1}{2}$ irrespective of the signals. If instead $t = 1$, fee-shifting is insensitive to the precision of the evidence and the loser always pays the court fee; this is the English rule, where $\alpha = 0$ if the defendant wins ($\theta_\Pi < 1 - \theta_\Delta$) and $\alpha = 1$ if the plaintiff wins ($\theta_\Pi > 1 - \theta_\Delta$). For intermediate values of t, fee-shifting occurs only if the evidence of the winning party is sufficiently strong or—which is the same—if the distance between the parties' signals $\theta_\Delta - \theta_\Pi$ is sufficiently small and hence evidence is sufficiently precise. In all cases, if neither party wins ($\theta_\Pi = 1 - \theta_\Delta$) or if the winner's evidence does not meet the threshold, the fee is shared.

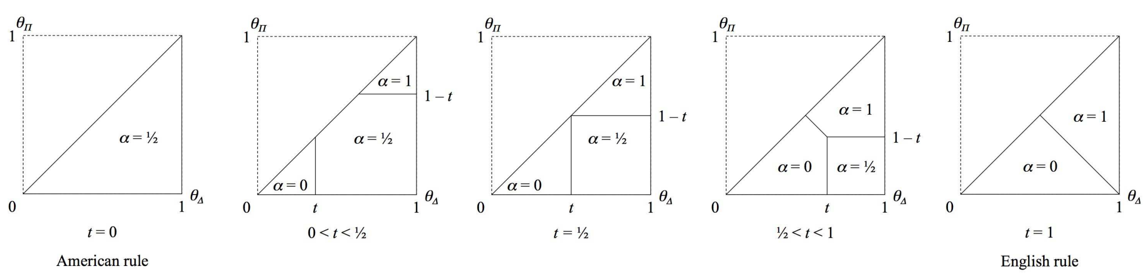


Fig. 5: Fee-shifting rules

This family of endogenous fee-shifting rules has the following three appealing properties:

- *Symmetry.* If the parties were to exchange their signals, the plaintiff would pay the defendant's share and vice versa, as is evident from Figure 5:

$$\alpha_t(\theta_\Pi, \theta_\Delta) = 1 - \alpha_t\left((1-\theta_\Delta), (1-\theta_\Pi)\right)$$

- *Responsiveness to the strength of the evidence.* Fee-shifting occurs in a broader range of cases if the

[36] Note that the condition "($\theta_\Pi < 1 - \theta_\Delta$ and $\theta_\Delta \geq t$) or ($\theta_\Pi > 1 - \theta_\Delta$ and $\theta_\Pi \leq 1 - t$)" is equivalent to the simpler condition "$\theta_\Delta \geq t$ and $\theta_\Pi \leq 1 - t$". We use the latter in (4).

evidence in favor of the winning party becomes stronger; that is, α weakly increases in $\theta_\Pi + \theta_\Delta$. The solid lines in Figure 6 are "iso-strength" lines, along which the sum $\theta_\Pi + \theta_\Delta$ and, hence, the judgment J are constant. As we move north-east, strength increases and α may therefore also increase, as can be verified in Figure 5.

- *Responsiveness to the precision of the evidence.* Fee-shifting occurs in a broader range of cases if the evidence becomes more precise, that is, α weakly moves away from $\frac{1}{2}$ if $\theta_\Delta - \theta_\Pi$ decreases. The dashed lines in Figure 6 are "iso-precision" lines, along which the difference $\theta_\Delta - \theta_\Pi$ is constant. As we move north-west, precision increases and hence α may move away from $\frac{1}{2}$, as can be verified in Figure 5.

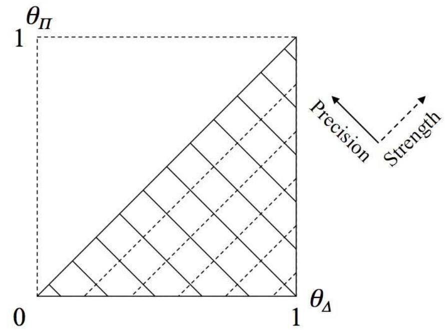


Fig. 6: Properties of the fee-shifting rules

The last two properties imply that two lawsuits could end with the same judgment, while yielding two different allocations of the court fee, as in Spier (1994).[37] Assume that $t = \frac{2}{3}$—thus, look at the second graph from the right in Figure 5—and consider two hypothetical lawsuits. In lawsuit A, the parties submit evidence $\theta_\Pi = \frac{1}{4}$ and $\theta_\Delta = 1$. Accordingly, the court decides $J = \frac{\frac{1}{4}+1}{2} = \frac{5}{8}$ on the merits. Although the plaintiff wins, since $\theta_\Pi = \frac{1}{4} > 0 = 1 - \theta_\Delta$, the court does not shift the fee since the evidence is not precise enough (the signals are far apart): $\alpha = \frac{1}{2}$ because, applying (4), $\theta_\Delta = 1 > \frac{2}{3} = t$ and $\theta_\Pi = \frac{1}{4} < \frac{1}{3} = 1 - t$. In contrast, in lawsuit B, the parties submit evidence $\theta_\Pi = \frac{1}{2}$ and $\theta_\Delta = \frac{3}{4}$. The court decides $J = \frac{\frac{1}{2}+\frac{3}{4}}{2} = \frac{5}{8}$ as in lawsuit A but now $\alpha = 1$ (due to $\theta_\Pi = \frac{1}{2} > \frac{1}{4} = 1 - \theta_\Delta$ and $\theta_\Pi = \frac{1}{2} > \frac{1}{3} = 1 - t$): the defendant pays the entire court fee since the evidence against him or her is more precise than in lawsuit A (the signals in lawsuit B are closer to each other). An increase in the fee-shifting parameter t allows the court to "punish" the loser more often: with $t > \frac{4}{5}$ even lawsuit A would result in fee-shifting to the defendant. In contrast, lower levels of t condition the fee-shifting decision to more precise evidence.

Figures 5 and 6 describe fee-shifting as applied by the court. Since the court cannot observe q, the fee-shifting rule is defined on the entire interval $[0, 1]$ for both signals. The parties, however, observe q and hence their expectations about fee-shifting will reflect the fact that the plaintiff's signal is less than q while the defendant's signal is greater than q. For any known q, only a portion of the space value for α is admissible. To see why this is relevant, consider the following example. Assume that $q = \frac{1}{2}$ and that $t = \frac{1}{3}$, which is an instance of Case 1 in Figure 7. In this case, the defendant's signal is necessarily above $\frac{1}{2}$ and hence $\theta_\Delta < t = \frac{1}{3}$ can never be satisfied. Similarly, the plaintiff's signal is surely below $\frac{1}{2}$ and hence cannot satisfy the fee-shifting condition $\theta_\Pi > 1 - t = \frac{2}{3}$. The same is true for all values of t and q such that $t \leq q \leq 1 - t$. Therefore, in Case 1 the court fee is always shared.

[37] This is not the case when fee-shifting depends on the margin of victory as in Bebchuk and Chang (1996), which we study in Section 8.

Consider now a different case. Assume $q = \frac{1}{3}$ and $t = \frac{1}{2}$, an instance of Case 2 in Figure 7. In this case, it is possible for the defendant's signal to be above q and below t (for instance, $\theta_\Delta = \frac{5}{12}$) so that if the defendant wins (which happens if, for instance, $\theta_\Pi = \frac{3}{12} < \frac{7}{12} = 1 - \theta_\Delta$), then the court fee is shifted to the plaintiff. A winning plaintiff, in turn, can never satisfy the fee-shifting requirement $\theta_\Pi > \frac{1}{2} = 1 - t$. Hence, in this case, only one-way fee-shifting to the plaintiff is possible.

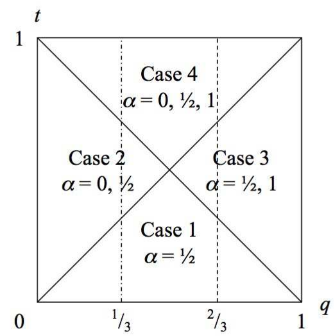


Fig. 7: Four cases: no fee-shifting (Case 1), one-way fee-shifting to the plaintiff (Case 2), one-way fee-shifting to the defendant (Case 3), and two-way fee-shifting (Case 4)

More generally, depending on how q compares to t and to $1 - t$, we can distinguish among four possible cases illustrated in Figure 7. For a given level of q, by considering increasing values of t we go from no fee-shifting (Case 1), to one-way fee-shifting (Case 2 or 3) and, finally, to two-way fee-shifting (Case 4).[38] Table 2 formalizes these observations.

Case 1	$t \leq q \leq 1 - t$	$\alpha_t = \frac{1}{2}$
Case 2	$q < t < 1 - q$	$\alpha_t(\theta_\Delta) = \begin{cases} 0 & \text{if} \quad \theta_\Delta < t \\ \frac{1}{2} & \text{if} \quad \theta_\Delta \geq t \end{cases}$
Case 3	$1 - q < t < q$	$\alpha_t(\theta_\Pi) = \begin{cases} \frac{1}{2} & \text{if} \quad \theta_\Pi \leq 1 - t \\ 1 & \text{if} \quad \theta_\Pi > 1 - t \end{cases}$
Case 4	$1 - t \leq q \leq t$	$\alpha_t(\theta_\Delta, \theta_\Pi) = \begin{cases} 0 & \text{if} \quad \theta_\Delta < 1 - \theta_\Pi \quad \text{and} \quad \theta_\Delta < t \\ \frac{1}{2} & \text{if} \quad \theta_\Delta = 1 - \theta_\Pi \quad \text{or} \quad (\theta_\Delta \geq t \text{ and } \theta_\Pi \leq \text{1-t}) \\ 1 & \text{if} \quad \theta_\Delta > 1 - \theta_\Pi \quad \text{and} \quad \theta_\Pi > 1 - t \end{cases}$

Tab. 2: Four cases of fee-shifting

Since the parties know q, these four cases are relevant for their expectations about the allocation of the court fee. In particular, Case 2 and Case 3 are radically different with respect to what parties know. In Case 2, only the defendant's evidence signal can go over the threshold, and hence fee-shifting only depends on the evidence submitted by the defendant. Therefore, the defendant knows for sure whether the court will shift the court fee to the plaintiff ($\alpha = 0$) or share it ($\alpha = \frac{1}{2}$). In contrast, the plaintiff cannot observe the defendant's signal before trial and hence cannot predict the allocation of the court fee. For the plaintiff fee-shifting is uncertain: $\alpha \in \left\{0, \frac{1}{2}\right\}$. This asymmetry in information about fee-shifting adds to the two-sided asymmetry of information about evidence and will be an important determinant of the parties' settlement behavior. Case 3 is the mirror image of Case 2 and displays an informational advantage for the plaintiff. Case 1 and 4 are instead symmetric with respect to information about fee-shifting because either there is no fee-shifting (Case 1) or fee-shifting depends on the evidence submitted by both parties (Case 4).

[38] Note that $q = \frac{1}{2}$ is a special case that does not allow for one-way fee-shifting.

We are now ready to characterize the equilibrium of the settlement game that the parties play at time 2 under endogenous fee-shifting. To do so, we rewrite the fee-shifting rules as functions of the normalized signals as we did in the basic model. Note also that Table 3 generalizes Table 1 since $\alpha_0 = \alpha_A$ and $\alpha_1 = \alpha_E$. For a graphical representation of Table 3 see Figure 8.

Case 1	$t \leq q \leq 1-t$	$\alpha_t = \frac{1}{2}$
Case 2	$q < t < 1-q$	$\alpha_t(z_\Delta) = \begin{cases} 0 & \text{if} \quad z_\Delta < \frac{t-q}{1-q} \\ \frac{1}{2} & \text{if} \quad z_\Delta \geq \frac{t-q}{1-q} \end{cases}$
Case 3	$1-q < t < q$	$\alpha_t(z_\Pi) = \begin{cases} \frac{1}{2} & \text{if} \quad z_\Pi \leq \frac{1-t}{q} \\ 1 & \text{if} \quad z_\Pi > \frac{1-t}{q} \end{cases}$
Case 4	$1-t \leq q \leq t$	$\alpha_t(z_\Delta, z_\Pi) = \begin{cases} 0 & \text{if} \quad z_\Delta < 1 - \frac{q}{1-q} z_\Pi \quad \text{and} \quad z_\Delta < \frac{t-q}{1-q} \\ \frac{1}{2} & \text{if} \quad z_\Delta = 1 - \frac{q}{1-q} z_\Pi \quad \text{or} \quad \left(z_\Delta \geq \frac{t-q}{1-q} \text{ and } z_\Pi \leq \frac{1-t}{q} \right) \\ 1 & \text{if} \quad z_\Delta > 1 - \frac{q}{1-q} z_\Pi \quad \text{and} \quad z_\Pi > \frac{1-t}{q} \end{cases}$

Tab. 3: Four cases of fee-shifting with normalized signals

Next, we proceed as in the basic model and find the parties' bid functions that solve (2). The only difference with respect to the basic model is that we now consider a continuum of fee-shifting rules. Readers interested in the details can refer to the Appendix for calculations and additional figures.

4.1 Case 1: no fee-shifting

In Case 1, both parties face the same court fee $\frac{c}{2}$ and there is no fee-shifting. This case includes the American rule ($t = 0$).

Proposition 4. *In Case 1 ($t \leq q \leq 1-t$), the equilibrium bid functions at the settlement stage are:*

$$\begin{aligned} P_1(z_\Pi) &= \tfrac{1}{2} - 3\left(\tfrac{5}{6} - q\right)c + \tfrac{1}{3} z_\Pi \\ &\quad \textit{truncated above at } D_1(1) \textit{ or below at } D_1(0) \\ D_1(z_\Delta) &= \tfrac{1}{6} + 3\left(q - \tfrac{1}{6}\right)c + \tfrac{1}{3} z_\Delta \\ &\quad \textit{truncated above at } P_1(1) \textit{ or below at } P_1(0) \end{aligned}$$

The American rule ($t = 0$) belongs to this case.

Case 1 defines a neighborhood of the American rule in which the court fee is always shared. Unsurprisingly, the parties' settlement bids are as in Proposition 1.

4.2 Case 2: one-way fee-shifting to the plaintiff

In Case 2, the values of t and q are such that there are two possible fee-shifting outcomes: either the plaintiff pays the court fee ($\alpha = 0$) or the court fee is shared ($\alpha = \frac{1}{2}$). Note that this is not because the court applies an asymmetric fee-shifting rule. Rather, it is the consequence of a particular realization of q: the merits of the case are in favor of the defendant.

Proposition 5. *In Case 2 ($q < t < 1-q$), the equilibrium bid functions at the settlement stage are:*

$$P_2(z_\Pi) = \begin{cases} \frac{1}{2} - 3(1-q)c + \frac{1}{3}z_\Pi & \equiv \underline{P}_2(z_\Pi) \quad \text{if} \quad z_\Pi < 6c - 1 + \frac{t-q}{1-q} \\ \frac{1}{2} - 3\left(\frac{5}{6} - q\right)c + \frac{1}{3}z_\Pi & \equiv \overline{P}_2(z_\Pi) \quad \text{if} \quad z_\Pi \geq 6c - 1 + \frac{t-q}{1-q} \end{cases}$$
$$\text{truncated above at } D_2(1) \text{ or below at } D_2(0)$$
$$D_2(z_\Delta) = \begin{cases} \frac{1}{6} + 3\left(q - \frac{1}{3}\right)c + \frac{1}{3}z_\Delta & \equiv \underline{D}_2(z_\Delta) \quad \text{if} \quad z_\Delta < \frac{t-q}{1-q} \\ \frac{1}{6} + 3\left(q - \frac{1}{6}\right)c + \frac{1}{3}z_\Delta & \equiv \overline{D}_2(z_\Delta) \quad \text{if} \quad z_\Delta \geq \frac{t-q}{1-q} \end{cases}$$
$$\text{truncated above at } P_2(1) \text{ or below at } P_2(0)$$

Since fee-shifting in Case 2 only depends on the defendant's signal, the defendant can determine exactly when fee-shifting will occur and his or her offer shifts upwards at $z_\Delta = \frac{t-q}{1-q}$, at the point where fee-shifting changes from $\alpha = 0$ to $\alpha = \frac{1}{2}$ and litigation becomes more expensive for the defendant, hence triggering a higher offer.

In turn, the plaintiff cannot perfectly anticipate the fee-shifting decision by the court because the defendant's signal is private information prior to trial. However, the plaintiff knows that litigating against a defendant with a signal below the threshold $\frac{t-q}{1-q}$ is more costly than litigating against a defendant with a signal above that threshold. Anticipating the defendant's bidding strategy, the plaintiff's best response is to demand more in the latter case than in the former case. The lower segment of the plaintiff's demand, $\underline{P}_2(z_\Pi)$, reflects the fact that trial ($p > d$) occurs only with defendants who have drawn a signal below the fee-shifting threshold $\frac{t-q}{1-q}$, which results in fee-shifting to the plaintiff. Therefore, the plaintiff's demand is relatively low. Instead, the upper segment of the plaintiff's demand, $\overline{P}_2(z_\Pi)$, reflects the fact that, at the margin, trial occurs with defendants who have drawn a signal above the threshold, which results in a shared court fee.

4.3 Case 3: one-way fee-shifting to the defendant

Case 3 is the mirror image of Case 2. In Case 3, the court fee is either shared ($\alpha = \frac{1}{2}$) or shifted to the defendant ($\alpha = 1$). Importantly, now the fee-shifting outcome only depends on the plaintiff's signal.

Proposition 6. *In Case 3 ($1-q < t < q$), the equilibrium bid functions at the settlement stage are:*

$$P_3(z_\Pi) = \begin{cases} \frac{1}{2} - 3\left(\frac{5}{6} - q\right)c + \frac{1}{3}z_\Pi & \equiv \underline{P}_3(z_\Pi) \quad \text{if} \quad z_\Pi \leq \frac{1-t}{q} \\ \frac{1}{2} - 3\left(\frac{2}{3} - q\right)c + \frac{1}{3}z_\Pi & \equiv \overline{P}_3(z_\Pi) \quad \text{if} \quad z_\Pi > \frac{1-t}{q} \end{cases}$$
$$\text{truncated above at } D_3(1) \text{ or below at } D_3(0)$$
$$D_3(z_\Delta) = \begin{cases} \frac{1}{6} + 3\left(q - \frac{1}{6}\right)c + \frac{1}{3}z_\Delta & \equiv \underline{D}_3(z_\Delta) \quad \text{if} \quad z_\Delta \leq 1 - 6c + \frac{1-t}{q} \\ \frac{1}{6} + 3qc + \frac{1}{3}z_\Delta & \equiv \overline{D}_3(z_\Delta) \quad \text{if} \quad z_\Delta > 1 - 6c + \frac{1-t}{q} \end{cases}$$
$$\text{truncated above at } P_3(1) \text{ or below at } P_3(0)$$

Mirroring Case 2, here the plaintiff's demand shifts upward at $z_\Pi = \frac{1-t}{q}$, at the point where fee-shifting changes in his or her favor; the defendant's offer shifts in response to the plaintiff's strategy.

4.4 Case 4: two-way fee-shifting

In Case 4, fee-shifting depends on both signals and hence the bids resemble a combination of the previous two cases. A party's bid shifts either in response to that party's own signal or in response to a shift in the other party's bid. Examining Case 4 yields two subcases, depending on the level of c.[39] In Case 4A the court fee is smaller than a threshold that depends on q and t ($c \leq \frac{1}{6}\frac{1-t}{q(1-q)}$). Since the court fee is relatively low, even moderately optimistic parties (a plaintiff who has drawn a low signal and a defendant who has drawn a high signal) might go to trial. This implies that some of the litigated cases will be characterized by signals that are very far apart, which in turn trigger a sharing of the court fee. As a result, the parties' bids contemplate all three possible outcomes and shift at the points were, in equilibrium, fee-shifting is expected to occur.

Proposition 7. *In Case 4A ($1-t \leq q \leq t$ and $c \leq \frac{1}{6}\frac{1-t}{q(1-q)}$), the equilibrium bid functions at the settlement stage are:*

$$
\begin{aligned}
P_{4A}(z_\Pi) &= \begin{cases} \frac{1}{2} - 3(1-q)c + \frac{1}{3}z_\Pi & \equiv \underline{P}_4(z_\Pi) \quad \text{if} \quad z_\Pi < 6c - 1 + \frac{t-q}{1-q} \\ \frac{1}{2} - 3\left(\frac{5}{6} - q\right)c + \frac{1}{3}z_\Pi & \equiv \dot{P}_4(z_\Pi) \quad \text{if} \quad 6c - 1 + \frac{t-q}{1-q} \leq z_\Pi \leq \frac{1-t}{q} \\ \frac{1}{2} - 3\left(\frac{2}{3} - q\right)c + \frac{1}{3}z_\Pi & \equiv \overline{P}_4(z_\Pi) \quad \text{if} \quad z_\Pi > \frac{1-t}{q} \end{cases} \\
&\quad \text{truncated above at } D_{4A}(1) \text{ or below at } D_{4A}(0) \\
D_{4A}(z_\Delta) &= \begin{cases} \frac{1}{6} + 3\left(q - \frac{1}{3}\right)c + \frac{1}{3}z_\Delta & \equiv \underline{D}_4(z_\Delta) \quad \text{if} \quad z_\Delta < \frac{t-q}{1-q} \\ \frac{1}{6} + 3\left(q - \frac{1}{6}\right)c + \frac{1}{3}z_\Delta & \equiv \dot{D}_4(z_\Delta) \quad \text{if} \quad \frac{t-q}{1-q} \leq z_\Delta \leq 1 - 6c + \frac{1-t}{q} \\ \frac{1}{6} + 3qc + \frac{1}{3}z_\Delta & \equiv \overline{D}_4(z_\Delta) \quad \text{if} \quad z_\Delta > 1 - 6c + \frac{1-t}{q} \end{cases} \\
&\quad \text{truncated above at } P_{4A}(1) \text{ or below at } P_{4A}(0)
\end{aligned}
$$

In Case 4B the court fee is above that threshold ($c > \frac{1}{6}\frac{1-t}{q(1-q)}$), and hence more cases settle. In particular, now only very optimistic parties go to trial. Those cases are characterized by a high z_Π and a low z_Δ, implying that, if a case is litigated, the signals must be relatively close and hence fee-shifting applies. In this case, the only two possible allocations of the court fee and $\alpha = 0$ and $\alpha = 1$, and bids have only two parts. (Note that with $t = 1$ the threshold condition becomes $c > \frac{1}{6}\frac{1-t}{q(1-q)} = 0$, so that the English rule falls in Case 4B for any level of c.)

Proposition 8. *In Case 4B ($1-t \leq q \leq t$ and $c > \frac{1}{6}\frac{1-t}{q(1-q)}$), the equilibrium bid functions at the settlement stage are:*

$$
\begin{aligned}
P_{4B}(z_\Pi) &= \begin{cases} \frac{1}{2} - 3(1-q)c + \frac{1}{3}z_\Pi & \equiv \underline{P}_4(z_\Pi) \quad \text{if} \quad z_\Pi < 6c(1-q) \\ \frac{1}{2} - 3\left(\frac{2}{3} - q\right)c + \frac{1}{3}z_\Pi & \equiv \overline{P}_4(z_\Pi) \quad \text{if} \quad z_\Pi \geq 6c(1-q) \end{cases} \\
&\quad \text{truncated above at } D_{4B}(1) \text{ or below at } D_{4B}(0) \\
D_{4B}(z_\Delta) &= \begin{cases} \frac{1}{6} + 3\left(q - \frac{1}{3}\right)c + \frac{1}{3}z_\Delta & \equiv \underline{D}_4(z_\Delta) \quad \text{if} \quad z_\Delta \leq 1 - 6cq \\ \frac{1}{6} + 3qc + \frac{1}{3}z_\Delta & \equiv \overline{D}_4(z_\Delta) \quad \text{if} \quad z_\Delta > 1 - 6cq \end{cases} \\
&\quad \text{truncated above at } P_{4B}(1) \text{ or below at } P_{4B}(0)
\end{aligned}
$$

The English rule ($t = 1$) belongs to this case.

Case 4B defines a neighborhood of the English rule in which the court fee is always shifted to the losing party and hence the bids are as in Proposition 2.

5 Litigation versus settlement

We can now generalize the result about the irrelevance of fee-shifting for the litigation rate, which we proved in Proposition 3 limitedly to the American and the English rule. Litigation occurs if $P(z_\Pi) > D(z_\Delta)$. By

[39] Note that these subcases depend on c and do not correspond to the two subcases drawn in Figure 7, which instead depend on q. The latter need to be distinguished in the analysis but yield the same bid functions and hence do not manifest themselves in the results presented here.

substituting the various bid functions from the four cases above, this condition can be rewritten in an identical way for any fee-shifting rule t and is $z_\Pi > z_\Delta + 6c - 1$, which is the same mutual optimism condition that we derived in (3). Figure 8 helps visualize this general result. The settlement line $z_\Pi = z_\Delta + 6c - 1$ is the same in all cases and only depends on c, which implies that neither the quality of the case nor the fee-shifting rule affects the litigation rate.

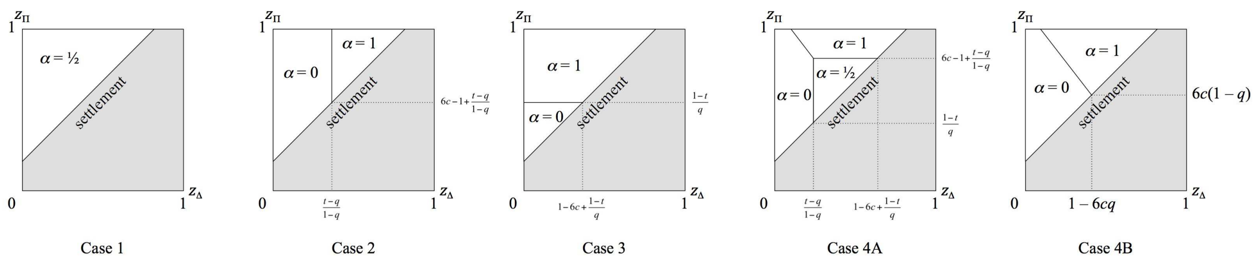


Fig. 8: Litigation and settlement rates ($c > \frac{1}{6}$)

The probability of litigation—that is, the probability that, given any defendant's signal, the plaintiff's signal is such that the plaintiff's demand is above the defendant's offer—is simply the area above the settlement line:

$$L(c) = \int_0^1 \Pr\left[P(z_\Pi) > D(z_\Delta)\right] dz_\Delta = \int_0^1 \Pr\left[z_\Pi > z_\Delta + 6c - 1\right] dz_\Delta$$

Proposition 9. *The litigation rate is not affected by fee-shifting and is given by:*

$$L(c) = \begin{cases} 1 - \frac{(6c)^2}{2} & \text{if} \quad c \leq \frac{1}{6} \\ \frac{(2-6c)^2}{2} & \text{if} \quad \frac{1}{6} < c \leq \frac{1}{3} \\ 0 & \text{if} \quad c > \frac{1}{3} \end{cases}$$

In particular, L decreases in c but is independent of q and t.

Proposition 9 confirms well-understood results: the probability of litigation decreases in the cost of litigation and increases in the amount at stake. Our variable c captures the amount of the court fee relative to the amount at stake, which is normalized to 1. Hence c might increase because the court fee increases or because the amount at stake decreases. Proposition 9 also proves new results, generalizing Proposition 3: the probability of litigation does not depend on the merits of the case and the fee-shifting rule, although these two variables affect the parties' bid functions. As we have observed in relation to the American and the English rule, also in the general case the reason is that the parties adjust their bidding strategies to changes in q and t, in order to capture the greatest possible share of the joint gains from settlement, which only depend on c. Changes in t and q shift both bids by the same amount or affect the thresholds at which a shift occurs but leave the horizontal distance between the parties' bids unaltered. Independence of q also means that the probability of litigation does not change if we vary the degree to which the parties are asymmetrically informed, as long as the game remain sufficiently balanced.[40]

Figure 8 shows that, at the equilibrium, the shifts in the plaintiff's demand and in the defendant's offer correspond to each other at the margin, that is, at the boundary between litigation and settlement. The plaintiff's demand shifts at the point where the plaintiff settles at the margin with a defendant whose offer

[40] Note that this result can be compared to Proposition 3 in Daughety and Reinganum (1994). In their model the degree of asymmetric information is captured by the distance between the good and the bad signal (high damages minus low damages for the plaintiff and high probability of liability minus low probability of liability for the defendant). They find that varying the degree of asymmetric information of the parties affects the probability of litigation.

has also shifted. Yet, although the settlement rate does not depend on case quality and fee-shifting, the settlement amount does.

Proposition 10. *The amount* $S \equiv \frac{p+d}{2}$ *for which the parties settle is equal to:*

Case 1	$\frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{1}{2}\right)c$
Case 2	$\begin{cases} \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{2}{3}\right)c & \text{if} \quad z_\Pi<6c-1+\frac{t-q}{1-q} \quad \text{and} \quad z_\Delta<\frac{t-q}{1-q} \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{7}{12}\right)c & \text{if} \quad z_\Pi<6c-1+\frac{t-q}{1-q} \quad \text{and} \quad z_\Delta\geq\frac{t-q}{1-q} \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{1}{2}\right)c & \text{if} \quad z_\Pi\geq 6c-1+\frac{t-q}{1-q} \quad \text{and} \quad z_\Delta\geq\frac{t-q}{1-q} \end{cases}$
Case 3	$\begin{cases} \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{1}{2}\right)c & \text{if} \quad z_\Pi\leq\frac{1-t}{q} \quad \text{and} \quad z_\Delta\leq 1-6c+\frac{1-t}{q} \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{5}{12}\right)c & \text{if} \quad z_\Pi\leq\frac{1-t}{q} \quad \text{and} \quad z_\Delta> 1-6c+\frac{1-t}{q} \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{1}{3}\right)c & \text{if} \quad z_\Pi>\frac{1-t}{q} \quad \text{and} \quad z_\Delta> 1-6c+\frac{1-t}{q} \end{cases}$
Case 4A	$\begin{cases} \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{2}{3}\right)c & \text{if} \quad z_\Pi<6c-1+\frac{t-q}{1-q} \quad \text{and} \quad z_\Delta<\frac{t-q}{1-q} \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{7}{12}\right)c & \text{if} \quad z_\Pi<6c-1+\frac{t-q}{1-q} \quad \text{and} \quad \frac{t-q}{1-q}\leq z_\Delta\leq 1-6c+\frac{1-t}{q} \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{1}{2}\right)c & \text{if} \quad z_\Pi<6c-1+\frac{t-q}{1-q} \quad \text{and} \quad z_\Delta>1-6c+\frac{1-t}{q} \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{1}{2}\right)c & \text{if} \quad 6c-1+\frac{t-q}{1-q}\leq z_\Pi\leq\frac{1-t}{q} \quad \text{and} \quad \frac{t-q}{1-q}\leq z_\Delta\leq 1-6c+\frac{1-t}{q} \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{5}{12}\right)c & \text{if} \quad 6c-1+\frac{t-q}{1-q}\leq z_\Pi\leq\frac{1-t}{q} \quad \text{and} \quad z_\Delta>1-6c+\frac{1-t}{q} \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{1}{3}\right)c & \text{if} \quad z_\Pi>\frac{1-t}{q} \quad \text{and} \quad z_\Delta>1-6c+\frac{1-t}{q} \end{cases}$
Case 4B	$\begin{cases} \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{2}{3}\right)c & \text{if} \quad z_\Pi<6c\left(1-q\right) \quad \text{and} \quad z_\Delta\leq 1-6c \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{1}{2}\right)c & \text{if} \quad z_\Pi<6c\left(1-q\right) \quad \text{and} \quad z_\Delta> 1-6c \\ \frac{z_\Pi+z_\Delta+2}{6}+3\left(q-\frac{1}{3}\right)c & \text{if} \quad z_\Pi\geq 6c\left(1-q\right) \quad \text{and} \quad z_\Delta> 1-6c \end{cases}$

Substituting the appropriate bids, in each case we obtain a settlement amount with two components. The first component is the parties' estimate of the judgment and linearly increases in both signals: the stronger a party's signal the more favorable the outcome.[41] The second component is the parties' estimate of the fee payment and depends on q and c in an intuitive way. If $q=\frac{1}{2}$ the parties have identical ex ante prospects of victory and hence the amount for which they settle does not depend on the court fee. If instead the case is unbalanced, the settlement amount increases in c if $q>\frac{1}{2}$ and decreases in c otherwise. The settlement amount changes in favor of the party with the better case and this change is greater if the court fee increases. At the settlement stage, the court fee weighs more heavily on the party with the weaker case.

The second component of the settlement amount is also affected by the fee-shifting rule and naturally changes across cases. The various possibilities in Proposition 10 correspond to the partitions of the settlement region in the various cases in Figure 8. While in Case 1 the settlement amount is uniformly determined, the other cases exhibit subdivisions that depend on the shifts in the parties' bid functions. In Case 2 there are three possibilities due to the fact that a low-demanding plaintiff might settle both with a low-offering defendant and with a high-offering defendant, while a high-demanding plaintiff settles only with a high-offering defendant. The settlement region of the corresponding graph in Figure 8 is therefore divided into three areas. The same happens in Cases 3 and 4B, while Case 4A, which is the most complex, exhibits 6 different settlement areas and is analyzed in more detail in Figure 9. Within each area, the settlement is constant along the negatively-sloped "iso-settlement" lines (where the sum of the parties' signals is constant) and increases as we move north-east. This is because the settlement amount mimics the expected judgment.

Across regions, the settlement amount increases discontinuously as we move north or east, as indicated by a darker shade of gray. These shifts mimic the fee-shifting outcome that would result if the parties went

[41] The term 2 added to the signals is a normalization factor that guarantees the symmetry of the settlement amount to the evidence brought by the parties. For instance, it guarantees that if $q=\frac{1}{2}$, then the settlement amount is exactly equal to $\frac{1}{2}$ if $z_\Pi=1-z_\Delta$, that is, if the parties' bring evidence with the same strength.

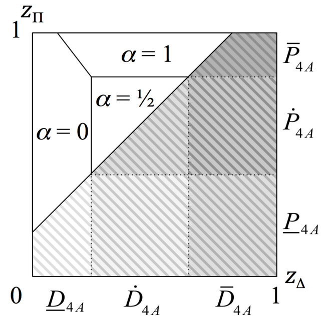


Fig. 9: Settlement amount (Case 4A with $c > \frac{1}{6}$ and $q < \frac{1}{2}$)

to trial. The lightest-colored area corresponds to a settlement in the shadow of fee-shifting to the plaintiff, which reduces the plaintiff's bargaining power. Vice versa for the darkest-colored area. Naturally, these cases settle for correspondingly very low and very high amounts. The intermediate areas correspond to cases that would not have triggered fee-shifting at trial, $\alpha = \frac{1}{2}$. Nevertheless, since a party cannot perfectly predict the evidence that the other party has, the different areas correspond to the possible types of the counterpart.

Finally, note that the settlement amounts in Proposition 10 reflect the information that the parties possess. Cases 2 and 3 exhibit interesting asymmetries. As we have observed, in Case 2 the defendant has an informational advantage over the plaintiff because fee-shifting only depends on the defendant's signal; hence the defendant can perfectly predict fee-shifting while the plaintiff cannot. The opposite happens in Case 3. As a result the settlement amounts in Case 2 are consistently lower than in Case 3, reflecting the parties' different informational advantages in these two cases.

6 Characteristics of litigated cases

6.1 Case selection

Although the amount of litigation is not affected by the merits of the case, changes in case quality q affect the composition of cases that go to trial. The judicial decision depends on the evidence signals submitted by the parties and, in turn, these signals are random draws from a distribution that depends on q; therefore, the judicial decision is only statistically related to the true merits of the case. To study how J and q are related, we need to examine the probability density function of the judgment J conditional on the case going to trial.

Proposition 11. *The density of the trial judgment J conditional on litigation is a triangle if $c \leq \frac{1}{6}$ and a tent if $c > \frac{1}{6}$, with vertex at $J = q$.*

As expected, this density is the same as in Friedman and Wittman (2006) if $q = \frac{1}{2}$. Note that the court fee c directly determines which cases go to trial. The effect of q is due to the fact that it determines the distribution of the parties' signals and, hence, indirectly, puts restrictions on the feasible judgments. Instead, t is irrelevant because the fee-shifting rule does neither affect the parties' choice between settlement and trial nor the court decision on the merits. The modal judgment corresponds to the true merits of the case but, on average, judgments are clearly biased—that is, the expected value of J is different from q—because the court interprets the evidence submitted by the parties in a non-Bayesian way. (Hence, this result does not hold in a model of Bayesian courts.)

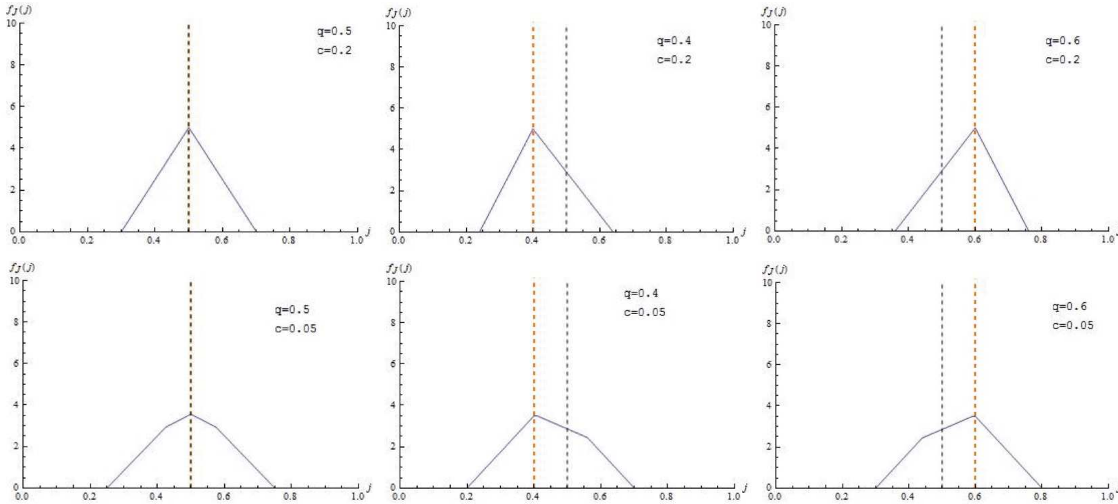


Fig. 10: Density of the judgment conditional on litigation (top: $c \leq \frac{1}{6}$, bottom: $c > \frac{1}{6}$)

6.2 Accuracy: fairness and incentives for primary behavior

Fee-shifting determines both directly the net outcome—that is, net of the court fees—resulting from litigation and indirectly the settlement amount; hence, it might bring the outcome of a dispute either closer to or further away from the true merits of the case. In so far as the merits of the case q reflect the outcome that is considered just or reflect the proper legal sanction on primary behavior, accuracy is important (Cooter and Rubinfeld, 1989; Kaplow, 1994; Bebchuk and Chang, 1996; Katz and Sanchirico, 2012).

To examine the accuracy judicial decisions let us define a new variable $G \equiv J + \left(\alpha - \frac{1}{2}\right) c$ that captures both the decision on the merits and fee-shifting. (Note that $G = J$ if the fee is not shifted, that is, with $\alpha = \frac{1}{2}$.) Note that the plaintiff receives $G - \frac{c}{2}$ and the defendant pays $G + \frac{c}{2}$. The settlement amount S includes fee-shifting only implicitly, since we have shown that it responds to the prospect that the court may shift the court fee (Proposition 10). Ex ante, before the parties collect evidence, the expected outcome of a dispute is:

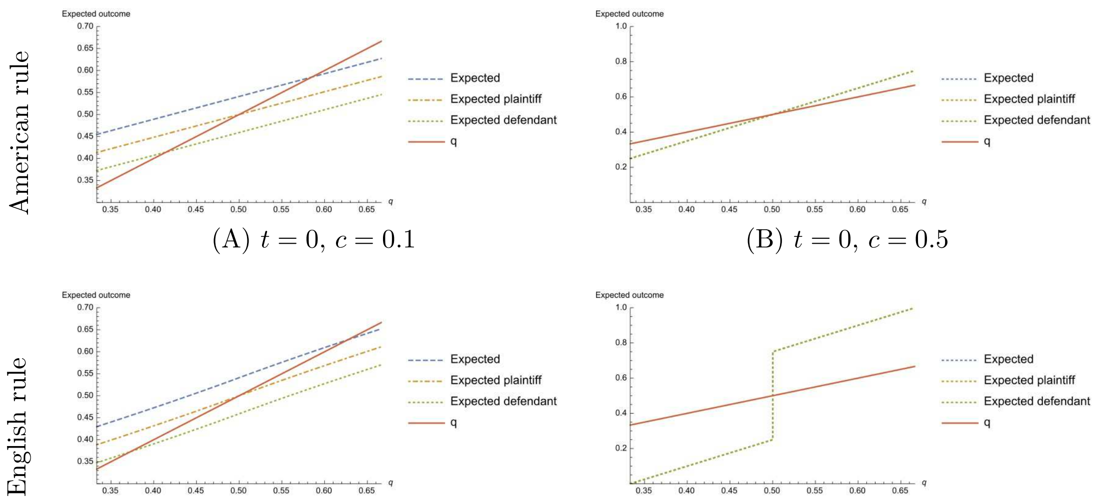
$$E = \begin{cases} \int_0^{1-6c} \int_0^1 G dz_\Pi dz_\Delta + \int_{1-6c}^1 \left(\int_0^{6c-1+z_\Delta} S dz_\Pi + \int_{6c-1+z_\Delta}^1 G dz_\Pi \right) dz_\Delta & \text{if} \quad c \leq \frac{1}{6} \\ \int_0^{2-6c} \left(\int_0^{6c-1+z_\Delta} S dz_\Pi + \int_{6c-1+z_\Delta} G dz_\Pi \right) dz_\Delta + \int_{2-6c}^1 \int_0^1 S dz_\Pi dz_\Delta & \text{if} \quad c > \frac{1}{6} \end{cases} \tag{5}$$

The limits of integration are easily derived from the areas of settlement and litigation in the unit squares describing the normalized signal space in Figure 8. The two lines in (5) capture two cases: in the first the settlement line is below the diagonal, while in the second the settlement line is above the diagonal (the case shown in Figure 8). The parties' expected payoffs are readily obtained by subtracting the expected court fee; accordingly, the plaintiff expects to receive $E - L(c) \frac{c}{2}$, while the defendant expects to pay $E + L(c) \frac{c}{2}$. Note that the parties' expected payoffs sum up to zero only when all cases settle. Since $L(c)$ does not depend on t or q, we can focus on the calculation of E.

Ideally, the outcome of adjudication, which is based on the evidence collected by the parties, should be as close as possible to the true merits of the case, which the court does not observe. Therefore, a natural measure of accuracy of judicial decisions is the distance between the expected outcome E and the merits q.

Proposition 12. *Whether the American or the English rule produces more accurate outcomes depends on the court fee.*

Visual inspection of Figure 11 shows that if the court fee c is small, the English rule brings the outcome of the case closer to the merits of the case and hence yields more accurate outcomes. Compare graphs A and C. This is due to the fact that fee-shifting tends to correct the court bias against the winning party. If instead the court fee is large, the English rule overshoots on the losing party and polarizes settlement, eventually bringing the expected outcome further away from q than the American rule does. This is more so as q moves away from $\frac{1}{2}$.[42] From a different angle: increasing court fees make the American rule more accurate (compare A and B) while making the English rule less accurate (compare C and D, and note that in B and D all cases settle and hence the difference between the parties' payoffs, which is due to the court fee, disappears). Fee-shifting does not necessarily improve the accuracy of adjudication. The outcome depends heavily on a combination of various factors.



(A) $t = 0$, $c = 0.1$ (B) $t = 0$, $c = 0.5$

(C) $t = 1$, $c = 0.1$ (D) $t = 1$, $c = 0.5$

Fig. 11: Outcomes

Proposition 13. *The optimal fee-shifting rule may be an intermediate rule* $0 < t < 1$.

Specific cases require different fee-shifting rules. Figure 12 shows the level of accuracy of different fee-shifting rules as measured by the square distance between expected outcome and merits. The most accurate fee-shifting rule in this specific case—which involves both litigation and settlement, since $c < \frac{1}{3}$—is neither the American nor the English rule. An intermediate fee-shifting rule with $t = 0.75$ fares better than the two extremes.

6.3 Decisions to file and contest lawsuits

Here we offer some informal considerations on how fee-shifting may affect the plaintiff's filing decision and the defendant's decision to contest the plaintiff's claim.[43] As Figure 13 shows, fee-shifting, combined with a particularly high court fee, can bring the plaintiff's expected value of litigation and settlement below 0 (the plaintiff might not file) and, symmetrically, the cost for the defendant above 1 (the defendant might not contest the plaintiff's claim).[44]

[42] Note also that the outcome is always perfectly accurate if $q = \frac{1}{2}$ as in Friedman and Wittman (2006).

[43] For analyses of filing decisions see Shavell (1982); P'ng (1983); Nalebuff (1987).

[44] Note that, for simplicity, we have chosen a value of $c > \frac{1}{3}$, so that the plaintiff gains what the defendant pays because all cases settle and hence the court fee is not paid; yet, there is a shift corresponding to fee-shifting which is due to the fact that settlement mimics the outcome of the trial.

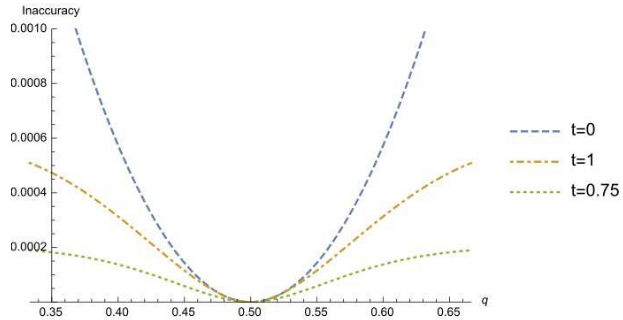


Fig. 12: A case of maximal accuracy with intermediate fee-shifting ($c = 0.25$; inaccuracy= $(E - q)^2$)

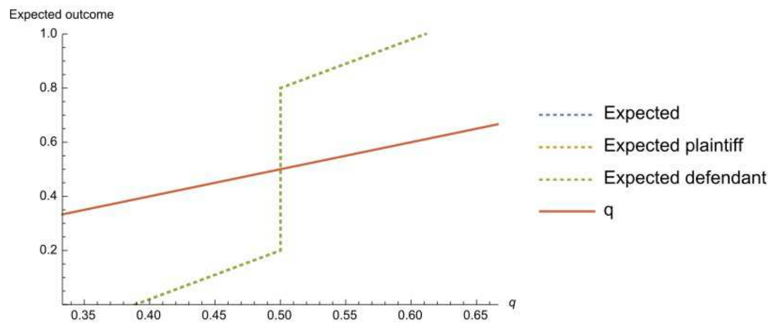


Fig. 13: Expected outcome with $c = 0.6$ and $t = 0.7$

Thus, fee-shifting might restrict filing although it does not affect settlement rates. Cases that are filtered out are those with very unequal merits and a large amount of asymmetric information (low q or high q). The larger the fee-shifting parameter t the narrower the range of cases that are not filtered out. This implies that, given the same costs c, courts under the English rule see not only fewer cases but also more balanced cases than courts under the American rule.

7 Endogenous expenditures on lawyers

In this section we introduce an augmented model in which parties can choose a lawyer to assist them. The lawyer's fee $\lambda > 0$, contrary to the court fee c, is non-refundable under fee-shifting. In virtually all legal systems, lawyers' fees are not fully refundable. The refundable part is usually capped, limited to certain categories of costs or predetermined (Reimann, 2012), so that the refundable part of a lawyer's fee can be considered as a fixed amount and subsumed under c. The variable λ captures the value of non-refundable fees that can be determined by the parties through their choice of a more or less expensive lawyer. The fee reflects a lawyer's ability to influence the court's interpretation of the evidence. A capable lawyer (high λ) is able to undermine the significance of evidence brought by the other party and boost the weight of his or her own evidence. (We do not model the principal-agent problem that characterizes the lawyer-client relationship.)

As a result of the lawyers' efforts, the court sees the signal θ_Π but interprets it as $\hat{\theta}_\Pi = \beta\theta_\Pi$, where $\beta > 1$ if the plaintiff's lawyer has more weight than the defendant's lawyer (and vice versa when $\beta < 1$). Symmetrically, for the defendant's signal, we have $\hat{\theta}_\Delta = (\theta_\Delta - q)\,\frac{1-\beta q}{1-q} + \beta q$. Intuitively, we must have $\beta = 1$ if the parties spend the same amounts on lawyers ($\lambda_\Pi = \lambda_\Delta$), that is, with equally able lawyers, neither party is able to sway the court ans signals are interpreted correctly. With equal merits ($q = \frac{1}{2}$), the party with the better lawyer is able to sway the court. If instead the parties' merits differ ($q \neq \frac{1}{2}$), a lawyer's weight in court depends on the combined effect of the merits of the case and the relative abilities of the lawyers. The following simple formulation captures these ideas:

$$\beta = \frac{\lambda_\Pi}{q\lambda_\Pi + (1-q)\,\lambda_\Delta}$$

For convenience, let us define $\hat{q} \equiv \beta q$ and notice that $\hat{q} \in [0,1]$. Since $\hat{\theta}_\Pi$ and $\hat{\theta}_\Delta$ are linear transformations of θ_Π and θ_Δ, they are uniformly distributed on the intervals $\hat{\theta}_\Pi \in [0,\hat{q}]$ and $\hat{\theta}_\Delta \in [\hat{q},1]$. Therefore, this augmented model preserves the analysis of the previous sections; we only need to replace q with $\hat{q}$. Note that this formulation naturally implies that a capable lawyer wins arguments at the margin—that is, in the neighborhood of q—and hence effectively expands the signal space for his or her client. The timing of the game is now as follows:

Time 0: Choice of lawyer. Both parties jointly observe the quality of the plaintiff's case q and simultaneously decide which lawyer $\lambda > 0$ to hire.

Time 1: Evidence collection. Both parties jointly observe the lawyers' abilities λ_Π and λ_Δ and the distribution of the evidence. The plaintiff privately draws a signal $\hat{\theta}_\Pi \sim U[0,\hat{q}]$; simultaneously, the defendant privately draws a signal $\hat{\theta}_\Delta \sim U[\hat{q},1]$.

Time 2: Settlement negotiations. At the settlement stage, the parties make simultaneous bids as in the basic model.

Time 3: Adjudication and fee-shifting. At trial, the court receives evidence $\hat{\theta}_\Pi$ and $\hat{\theta}_\Delta$ from the parties' lawyers and decides on adjudication and fee-shifting as in the basic model.

When choosing their lawyers the parties face the following payoffs:

$$\begin{aligned} \hat{\Pi} &= E(\hat{q}) - L(c)\tfrac{c}{2} - \lambda_\Pi \\ \hat{\Delta} &= E(\hat{q}) + L(c)\tfrac{c}{2} + \lambda_\Delta \end{aligned}$$

The first term is the expected payment that the plaintiff receives, also accounting for settlement and fee-shifting as defined in (5); the second term is the expected court fee; the third term is the lawyer's fee. Note that the second term is independent of q and hence does not affect the choice of lawyer. While choosing a lawyer, the plaintiff maximizes $\hat{\Pi}$ and the defendant minimizes $\hat{\Delta}$, so that the first order conditions yield:

$$\lambda_\Delta \quad = \quad \tfrac{1}{E'(\hat{q})}\tfrac{(q\lambda_\Pi+(1-q)\lambda_\Delta)^2}{q(1-q)} \quad = \quad \lambda_\Pi$$

which implies $q = \hat{q}$ and hence:[45]

$$\lambda_\Pi = \lambda_\Delta = q\,(1-q)\,E'(q)$$

The factor $q\,(1-q)$ is increasing in the uncertainty of the outcome of adjudication and is maximal at $q = \frac{1}{2}$. The last factor is constant in q and depends on c and t, both of which increase it.

Proposition 14. *At the margin, expenditures on lawyers*

1. *increase in the uncertainty of the case; that is, increase in q for $q < \frac{1}{2}$ and decrease in q for $q > \frac{1}{2}$;*

[45] The second order conditions are verified since $E(q)$ is nearly linear and hence $E''(q) = 0$ nearly everywhere. Hence, the dominant term is the second derivative of $\hat{q}$, which has the right sign.

2. *increase in the court fee c;*

3. *increase in fee-shifting t.*

The last two points can be easily understood by noting that both the court fee and fee-shifting raise the stakes of the litigation game. This dominates the decrease in litigation rates due to increases in c. In addition, an increase in c magnifies the effect of t and vice versa. The presence of discontinuities in the expected payoff functions for certain values of c and t only reinforces these results.

8 Extensions

8.1 Uncertainty about the probability of victory

Our analysis has focused so far on uncertainty about the award. Here we show that our results are valid also in a model with uncertainty about the probability of victory. For instance, the parties may litigate about who owns a disputed asset of value equal to 1; in this case, the court determines whether the plaintiff or the defendant owns the asset—that is, who will receive 1—rather than the amount of the award.

To capture this scenario, we define a new variable J^W which can take the following values:

$$J^W(\theta_\Pi, \theta_\Delta) = \begin{cases} \eta J(\theta_\Pi, \theta_\Delta) & \text{if} \quad \theta_\Pi < 1 - \theta_\Delta \\ \frac{1}{2} & \text{if} \quad \theta_\Pi = 1 - \theta_\Delta \\ 1 - \eta + \eta J(\theta_\Pi, \theta_\Delta) & \text{if} \quad \theta_\Pi > 1 - \theta_\Delta \end{cases}$$

If $\eta = 1$ we obtain the previous model with uncertainty about the amount of the award. If $\eta = 0$, the model captures uncertainty over the probability of winning an award of certain value equal to 1. In this case, the judgment can only take three values: 1 when the plaintiff's evidence is stronger than the defendant's evidence and the court assigns ownership of the disputed asset to the plaintiff; 0 when the opposite occurs and the court assigns the asset to the defendant; and, finally, $\frac{1}{2}$ when the asset is split because evidence is indecisive. The greater the plaintiff's signal the more likely it is that the plaintiff wins, and vice versa for the defendant. When η takes intermediate values we obtain a model with some uncertainty both about the amount at stake and about the probability of victory.

This model includes a discontinuity in the judgment function which adds to the discontinuity in the fee-shifting function. To keep the analysis simple, we focus on the comparison between the American rule ($t = 0$) and the English rule ($t = 1$) when the parties have equal merits ($q = \frac{1}{2}$), as in Section 3.3. The analysis yields stepwise bid functions similar to the basic model.

Proposition 15. *With uncertainty about the probability of victory and $q = \frac{1}{2}$, the equilibrium bid functions at the settlement stage are:*

American rule

$$P_A^W(z_\Pi) = \begin{cases} \frac{\eta}{2} - c + \frac{\eta}{3} z_\Pi & \text{if} \quad z_\Pi \leq 3\frac{c}{\eta} \\ 1 - \frac{\eta}{2} - c + \frac{\eta}{3} z_\Pi & \text{if} \quad z_\Pi > 3\frac{c}{\eta} \end{cases}$$
truncated above at $D_A^W(1)$ *or below at* $D_A^W(0)$

$$D_A^W(z_\Delta) = \begin{cases} \frac{\eta}{6} + c + \frac{\eta}{3} z_\Pi & \text{if} \quad z_\Pi \leq 1 - 3\frac{c}{\eta} \\ 1 - \frac{5\eta}{6} + c + \frac{\eta}{3} z_\Pi & \text{if} \quad z_\Pi > 1 - 3\frac{c}{\eta} \end{cases}$$
truncated above at $P_A^W(1)$ *or below at* $P_A^W(0)$

English rule

$$P_E^W(z_\Pi) = \begin{cases} \frac{\eta}{2} - \frac{3}{2}c + \frac{\eta}{3} z_\Pi & \text{if} \quad z_\Pi \leq 3\frac{c}{\eta} \\ 1 - \frac{\eta}{2} - \frac{1}{2}c + \frac{\eta}{3} z_\Pi & \text{if} \quad z_\Pi > 3\frac{c}{\eta} \end{cases}$$
truncated above at $D_E^W(1)$ *or below at* $D_E^W(0)$

$$D_E^W(z_\Delta) = \begin{cases} \frac{\eta}{6} + \frac{1}{2}c + \frac{\eta}{3} z_\Pi & \text{if} \quad z_\Pi \leq 1 - 3\frac{c}{\eta} \\ 1 - \frac{5\eta}{6} + \frac{3}{2}c + \frac{\eta}{3} z_\Pi & \text{if} \quad z_\Pi > 1 - 3\frac{c}{\eta} \end{cases}$$
truncated above at $P_E^W(1)$ *or below at* $P_E^W(0)$

The mutual optimism condition for litigation is therefore:

$$z_\Pi > z_\Delta + \frac{6}{\eta}c - 1 \tag{6}$$

Note that, as expected, with $\eta = 1$ the parties' bid functions and the mutual optimism condition are as in Section 3.3.[46] Our findings shed new light on the question whether fee-shifting affects the probability of litigation in different ways depending on whether uncertainty revolves around the amount of damages rather than the probability of being found liable. While previous literature supports this result (Katz and Sanchirico, 2012, p. 15), the mutual optimism condition in (6) shows that this is not the case in a model of balanced two-sided asymmetric information, where the difference in how well the parties are informed is not too large. The mutual optimism condition is independent if the fee-shifting rule also when we allow for uncertainty about the probability of victory. It is worth stressing that we have allowed fee-shifting to depend on the judgment also in the model with uncertainty about the amount of the award (contrary to what is common in the literature), thereby staking the deck against our main claim.

8.2 Fee-shifting based on the margin of victory

To model endogenous fee-shifting we have so far fixed the notion of victory at $\frac{1}{2}$ and we have maintained that under the English rule, with sufficiently precise evidence, if $J < \frac{1}{2}$ the plaintiff pays the court fee, while if $J > \frac{1}{2}$ the defendant pays the court fee. If $J = \frac{1}{2}$ there is no scope for fee-shifting. Bebchuk and Chang (1996) offer a model of endogenous fee-shifting based on a more general formulation of the margin of victory. In this model $m \in [0, 1]$ is the margin-of-victory threshold, with $m = 0$ for the American rule and $m = 1$ for the English rule. If $J < \frac{m}{2}$ the plaintiff pays the court fee, while if $J > \frac{2-m}{2}$ the defendant pays the court fee; if $\frac{m}{2} \leq J \leq \frac{2-m}{2}$ there is no scope for fee-shifting.

In this section, we show that our results remain valid in this model. For simplicity and to keep our framework as close as possible to Bebchuk and Chang (1996) we omit to consider the precision of the

[46] As we discuss in the Appendix, the equilibria break down for some values of η and c for the same reasons that cause a breakdown in the basic model for values of q below $\frac{1}{3}$ and above $\frac{2}{3}$. This however does not affect our results: in all those cases in which our pure-strategy equilibria hold, there is no difference in litigation rates between the American and the English rule.

evidence, which was an important variable in our previous analysis. We need to redefine the variable α as follows:

$$\alpha_m^M(\theta_\Pi,\theta_\Delta) = \begin{cases} 0 & \text{if} \quad \theta_\Pi+\theta_\Delta < m \\ \frac{1}{2} & \text{if} \quad m \le \theta_\Pi+\theta_\Delta \le 2-m \\ 1 & \text{if} \quad \theta_\Pi+\theta_\Delta > 2-m \end{cases}$$

After normalizing the signals we have:

$$\alpha_m^M(z_\Pi,z_\Delta) = \begin{cases} 0 & \text{if} \quad z_\Pi q + z_\Delta(1-q)+q < m \\ \frac{1}{2} & \text{if} \quad m \le z_\Pi q + z_\Delta(1-q)+q \le 2-m \\ 1 & \text{if} \quad z_\Pi q + z_\Delta(1-q)+q > 2-m \end{cases}$$

Although fee-shifting is governed by a different formula, the structure of the game is the same as in the basic model and yields similar stepwise bid functions.

Proposition 16. *With fee-shifting based on the margin of victory and $q=\frac{1}{2}$, the equilibrium bid functions at the settlement stage are:*

$$P^M(z_\Pi) = \begin{cases} \frac{1}{2}-\frac{3}{2}c+\frac{1}{3}z_\Pi & \text{if} \quad z_\Pi < 3c-1+m \\ \frac{1}{2}-c+\frac{1}{3}z_\Pi & \text{if} \quad 3c-1+m \le z_\Pi \le 3c+1-m \\ \frac{1}{2}-\frac{1}{2}c+\frac{1}{3}z_\Pi & \text{if} \quad z_\Pi > 3c+1-m \end{cases}$$
truncated above at $D^M(1)$ or below at $D^M(0)$

$$D^M(z_\Delta) = \begin{cases} \frac{1}{6}+\frac{1}{2}c+\frac{1}{3}z_\Delta & \text{if} \quad z_\Delta < m-3c \\ \frac{1}{6}+c+\frac{1}{3}z_\Delta & \text{if} \quad m-3c \le z_\Delta \le 2-m-3c \\ \frac{1}{6}+\frac{3}{2}c+\frac{1}{3}z_\Delta & \text{if} \quad z_\Pi > 2-m-3c \end{cases}$$
truncated above at $P^M(1)$ or below at $P^M(0)$

The mutual optimism condition for litigation is $z_\Pi - z_\Delta > 6c-1$ as in Section (3.3), which confirms our main result concerning the irrelevance of fee-shifting for the litigation rates also in a model with fee-shifting based on the margin of victory.

9 Generalization of the results: a mechanism design approach

In this section we change perspective. We tackle the problem of designing fee-shifting rules that minimize the probability of settlement by adopting a mechanism design perspective. In doing so, we follow the approach in Spier (1994) very closely. The main difference between our model and Spier (1994) is that in her model fee-shifting α is a function of the parties bids p and d. In our model this is not possible, because the court does not observe pretrial activity. Conversely, in our model, the court perfectly observes the parties' evidence and hence α can be conditioned on θ_Π and θ_Δ; in Spier (1994) the court does not observe the parties' signals, it only observe a noisy realization of J. Despite these differences, the analysis in Spier (1994) applies with minor changes to a generalization of our model.

Consider anew the basic formulation of the problem, where the parties' observe signals θ_Π and θ_Δ. We are interested in the properties of the mechanism that induces them to settle with the greatest possible probability. The fee-shifting rule α will be an important ingredient of this optimal mechanism. As customary, we can restrict attention to direct-revelation mechanisms without loss of generality and hence we look for the mechanism that minimizes the probability of litigation while inducing the parties to participate and to reveal their evidence truthfully at the settlement stage.

Before proceeding with the analysis note that, while we retain the assumption that the evidence is uniformly distributed for simplicity and ease of comparison, it is easy to see that this is not an essential assumption. Moreover, note that we make two important generalizations with respect to our basic model. First, we relax the Assumption of "balanced asymmetric information" ($\frac{1}{3} \leq q \leq \frac{2}{3}$) and allow $q \in (0,1)$. This is important because it allows us to view one-sided asymmetric-information models are limit cases of our model. Hence this section applies generally to situations of asymmetric information however balanced between the parties. Second, we do not restrict attention to the specific fee-shifting rules discussed in the previous sections but rather consider a general fee-shifting rule $\alpha(\theta_\Pi, \theta_\Delta)$ with the only requirement that it be continuously differentiable almost everywhere. The Appendix provides proves and details of the derivations. Here we discuss the main steps and the results.

The mechanism is characterized by three functions: the probability of going to trial $L(p,d)$, (if the case is settled) the settlement amount $S(p,d)$, and (if the case is litigated) the fee-shifting function $\alpha(\theta_\Pi, \theta_\Delta)$. While the latter depends on the evidence submitted by the parties, the former two are a function of the parties' demand and offer at the settlement stage. In the optimal direct-revelation mechanism both parties need to earn a rent from participating in the mechanism, conditional on them revealing their signals truthfully. In turn, the rent is simply the difference between the payoff from the mechanism and that from going to trial directly. Assuming that the other party reveals his or her signal truthfully, we have, respectively:

$$\begin{array}{rcl} \Pi^M(p|\,\theta_\Pi) & = & \int_q^1 \left[1 - L(p, \theta_\Delta)\right] \left[S(p, \theta_\Delta) - \frac{\theta_\Pi + \theta_\Delta}{2} + (1 - \alpha(\theta_\Pi, \theta_\Delta))\,c\right] \frac{d\theta_\Delta}{1-q} \\ \Delta^M(d|\,\theta_\Delta) & = & \int_0^q \left[1 - L(\theta_\Pi, d)\right] \left[S(\theta_\Pi, d) - \frac{\theta_\Pi + \theta_\Delta}{2} - \alpha(\theta_\Pi, \theta_\Delta)\,c\right] \frac{d\theta_\Pi}{q} \end{array}$$

Since we require the parties to reveal their signals truthfully, the optimal mechanism must satisfy $\Pi^M(\theta_\Pi|\,\theta_\Pi) \geq 0$ and $\Delta^M(\theta_\Delta|\,\theta_\Delta) \leq 0$: the plaintiff expects to earn more from the mechanism than from going directly to trial and the defendant expects to pay less in the mechanism than when going directly to trial.

The plaintiff that earns the smallest rent is the plaintiff that has drawn the best possible evidence $\theta_\Pi = q$. This is because this is this plaintiff who has the weakest incentives to claim to have received a different signal. In fact, he or she has no incentives to lie at all. Larger information rents have to be paid to plaintiffs with greater incentives to lie and those are precisely the plaintiffs with bad signals. A similar reasoning shows that the defendant who earns the smallest rent (that is, who saves the least costs in the mechanism) is the one with the best signal $\theta_\Delta = q$, as all other defendants have greater incentives to lie. These observations allow us to focus the analysis on the mechanism that ensures participation when $\theta_\Pi = q = \theta_\Delta$, conditional on truth-telling, because all other plaintiffs and defendants will earn a larger rent and hence will necessarily participate. Note that the point $\theta_\Pi = q = \theta_\Delta$ corresponds to the point $(z_\Pi = 1, z_\Delta = 0)$ in our graphs and that these are the cases that are most difficult to settle because they are deepest in the litigation area.

Applying these observations and following the approach in Spier (1994), we have the following necessary condition:

$$\begin{array}{rl} & \Pi^M(q|\,q) - \Delta^M(q|\,q) \\ = & \int_0^q \int_q^1 \left[1 - L(\theta_\Pi, \theta_\Delta)\right] \left(c - \theta_\Pi \left[\frac{1}{2} + \frac{\partial \alpha}{\partial \theta_\Pi} c\right] - (1 - \theta_\Delta) \left[\frac{1}{2} + \frac{\partial \alpha}{\partial \theta_\Delta} c\right]\right) \frac{d\theta_\Delta}{1-q} \frac{d\theta_\Pi}{q} \\ \geq & 0 \end{array}$$

The latter condition needs to be satisfied for a mechanism to induce truthful revelation and participation from both parties. These observations lead to the following general result.

Proposition 17. *The optimal mechanism requires fee-shifting rules to be "flat"—that is,* $\frac{\partial \alpha}{\partial \theta_\Pi} = \frac{\partial \alpha}{\partial \theta_\Delta} = 0$*— almost everywhere. Rules that have this property induce the same settlement rate in the optimal mechanism.*

Fee-shifting rules that are commonly used around the world have the property that court fees may be shifted to the loser. This implies that, in the real world, we have $\frac{\partial\alpha}{\partial\theta_\Pi} \geq 0$ and $\frac{\partial\alpha}{\partial\theta_\Delta} \geq 0$, that is, a party may only benefit from a better signal. In turn, this implies that the necessary condition for the optimal mechanism is most easily satisfied if those derivatives are equal to zero whenever they are defined, that is, almost everywhere. Moreover, rules that have this feature are equivalent in terms of the mechanism they induce. Hence, they result in the same probability of litigation and settlement at the optimum.

The rules that we have used in the game-theoretic analysis of the previous sections have precisely this characteristic. Proposition 17 shows that our main result is not confined to our model. In particular, it generalizes to any model of asymmetric information, including one-sided models. Instead, previous literature finds that the English rule induces higher litigation rates than the American rules if there is uncertainty about the probability of victory but not about the amount of the judgment. This difference in results can be better understood through the lens of Proposition 17. The American rule is characterized by a constant $\alpha = \frac{1}{2}$ and hence meets the proposition's marginal requirements. The English rule, in a traditional model with uncertainty about the probability of victory, has the form $\alpha = J$, where J is interpreted as the probability that the court rules for the plaintiff and whoever loses the case also pays the court fee. This implies $\alpha\left(\theta_\Pi, \theta_\Delta\right) = \frac{\theta_\Pi+\theta_\Delta}{2}$, with $\frac{\partial\alpha}{\partial\theta_\Pi} = \frac{\partial\alpha}{\partial\theta_\Delta} = \frac{1}{2}$. This particular description of the English rule is not flat and would discourage settlement in the game-theoretic model presented in the previous sections.[47]

Our analysis in the previous sections and our last result in this section show that the reason why the English rule may underperform is that uncertainty about the probability of litigation may easily result in a fee-shifting rule that is effectively not "flat". Yet, this is not a general principle but rather a particular corner case, as the analysis in Section 8 shows. In fact, if the court were to shift the fee to the winner rather than to the loser, as in Talley (1995), that is if $\frac{\partial\alpha}{\partial\theta_\Pi} < 0$ and $\frac{\partial\alpha}{\partial\theta_\Delta} < 0$, then fee-shifting would encourage settlement. Even without resorting to winner-pays rules, there is a broad scope for designing fee-shifting rules that can be implemented without reducing settlement. The real-life rules that we have used as an inspiration for our model seem to have these characteristics. Yet, it remains an open question whether and to what extent this is true in reality, a question that invites empirical research.

Finally, the mechanism-design approach presented here can be used to investigate whether the settlement protocol used in the game-theoretic analysis implements the optimal mechanism. As we show in details in the Appendix, our settlement protocol is not a full implementation of the optimal mechanism. Yet, it has the crucial feature of implementing optimal "flat" fee-shifting rules, which are defined irrespective of the optimal probability of litigation. Hence, our game-theoretic model can be seen as a partial implementation of the optimal mechanism, limitedly to the design of fee-shifting rules, which are the main focus of the analysis. Ours is a model of optimal fee-shifting rules given a plausible (but not optimal) settlement protocol.

10 Conclusion

In this paper, we have introduced a model of litigation where both parties are asymmetrically informed to different degrees, the merits of the case vary, and there is (endogenous) fee-shifting. In our general model, the decision to shift the litigation costs is different from the judgment on the merits of the case and is based on the quality of the evidence submitted by the parties. The usual American and English rules emerge as special cases of this general formulation. We have demonstrated that, although the parties hold different pieces of information, fee-shifting does not necessarily affect the settlement rate. We have studied a family

[47] This point is easy but tedious to verify and the analysis is omitted. Note further that a flat fee-shifting rule implemented in a traditional one-sided asymmetric information model does not necessarily have the optimality properties that we find in the optimal mechanism and in our game-theoretic model with balanced two-sided asymmetric information.

of “flat” fee-shifting rules that have this feature and, through a mechanism design approach, we have showed that this is a general principle and that it applied beyond our game-theoretic model.

However, fee-shifting does affect other important characteristics of settled and litigated cases and, in particular, the settlement amount, the decision to file suits, the choice of lawyers and the distribution of decisions over litigated cases. Fee-shifting, as under variations of the English rule commonly used in Europe, improves the fairness of judicial decisions and settlements when the court fees are relatively modest and yields litigation on fewer and more balanced cases. In contrast, the American rule improves the fairness of judicial decisions and settlements when the court fees are higher and yields litigation on more numerous and less balanced cases, which in turn affects the pool of cases that reach the American courts and causes more extreme trial outcomes. These results match stylized facts about the difference between the American and the European judicial systems.

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