# Fee-Shifting Rules in Litigation with Contingency Fees

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This article theoretically compares the British and American fee-shifting rules in their influences on the behavior of the litigants and the outcomes of litigation. We build up a comprehensive litigation model with asymmetric information and agency costs, which makes it possible to make comparison on a broad arrays of issues in a single unified framework. We then solve for the equilibria under both American and British rules, and thereby compare their equilibrium settlement amounts and rates, expenditures incurred in trials, as well as the plaintiff's chances of winning and incentive to sue. The theoretical results are broadly consistent with existing empirical evidence.

## 1. Introduction

The comparison between the British and American rules for litigation, in particular their influences on the incentives of the litigants and the results they imply, has been a topic subject to close scrutiny by legal and economics scholars. (See Rowe 1982, 1984 for review of the issues.) Theoretical interests aside, it is also of great practical value, especially in the United States. This is because the British rule, with its mandatory designation which forces the losing plaintiff to reimburse the defendant's litigation cost, is believed by some to have the potential to deter frivolous suits and liberate the overcrowded U.S. courts[1] and encourages out-of-court settlement.[2] Moreover, some also believe that it lends leverage to financially constrained victims against wealthy injurers, as it allows the former to initiate a legal process whose legal fee might be prohibitive under the American rule (Ehrenzweig

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1. See, for example, Greenberger (1964), Ehrenzweig (1966), Stoebuck (1966), and Mause (1969).

2. See Dayton (1933), Greenberger (1964), and Stoebuck (1966).

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1966). The second claimed advantage of the British rule is not so much an issue now, as the contingency fees arrangement commonly used in U.S. civil disputes essentially gives full leverage to the plaintiffs. In this article we are concerned with the first claimed advantage of the British rule. Specifically, we are concerned with the changes in litigation results—including incentives to sue, settlement rates and amounts, resources spent during litigation, and probability of winning—if the American system (with its contingency fees arrangement) shifts to the British system.

Most of the literature that makes comparison between the two systems has adopted what we will call a partial equilibrium approach, taking other elements as fixed when analyzing a particular element under the two rules. For example, in analyzing the settlement rates, the standard approach adopted in the literature is to assume that the litigants have different perceptions of winning probability in trial. Based on their perception, they compute the expected gains of going to court. This implies a minimum acceptable value of settlement for the plaintiff and a maximum acceptable settlement for the defendant. If the maximum is greater than minimum (i.e., if the range for settlement is not empty), then they will settle; otherwise, they go to court. The comparison of the settlement rate between the two rules is essentially to compare the respective size of their settlement ranges, taking the litigation costs and prevailing probability as fixed across rules. That is, the frequency of settlement or trial is analyzed by assuming that the resources spent in litigation (and thus probability of prevailing) and the pretrial negotiation processes are independent of fee-shifting rules and that different systems give exactly the same incentives to the lawyers.[3] This ignores the fact that the decisions (including incentives of whether to file complaints, decisions in pretrial negotiation, and tactics in trial) of the litigants during any stage of litigation are interrelated. If a fee-shifting rule changes the behavior of litigants or lawyer in a particular stage, then it inevitably changes their behaviors in all other stages of the litigation, which again will have a feedback effect on the behavior being analyzed. Put differently, in order to properly compare the two rules, we must take into account their effects on the litigants' behaviors in all stages of litigation *simultaneously*.

Related to this theoretical problem is the comparison of theoretical results to empirical findings. As the empirical results are by nature computed from aggregate data, a direct verification of theoretical result by empirical findings might be inadequate. For example, since different systems result in different thresholds for the cases that would be filed, the distribution functions for cases that are actually filed have different supports under the two systems. Even if we can theoretically show that, say, given the value of damage, the settlement offer is greater for the British rule, the prediction might not be corroborated in empirical data, since the latter is the *average* computed from two

3. See, for example, Shavell (1982) and Posner (1992). This is also the basic model used in the excellent survey of Cooter and Rubinfeld (1989).

distribution functions of damage with different supports.[4] For a proper comparison, a model is called for that can determine the values of settlement and these thresholds at the same time. This again highlights the flaw of partial equilibrium analysis and accentuates the need for a unified model that can incorporate the interaction of the litigants' behavior in different stages of a legal dispute into a single framework.

A second problem of the literature in comparing the two systems is that the role of the lawyer is often ignored. Given that the lawyers are the architects of litigations and that there are widespread complaints that they do not fully take into consideration the interests of clients,[5] there is substantial agency cost between the lawyers and their clients. This agency problem is important for the purpose of this article because the lawyers in U.S. civil disputes are often paid by contingency fees, whereas this arrangement is prohibited in Britain. This implies very different incentive structures for the lawyers. Consequently, the comparison of the two systems is not only a comparison about the effect of fee-shifting rule but also a comparison about the effects of the ways the lawyers are paid. Although there are many studies investigating the effect of contingency fees on the incentives of the lawyers and results of litigation,[6] attempts have not been made to incorporate agency cost consideration into the comparison between the two systems.[7] In order to compare the same pure effects of fee-shifting rules, we assume that lawyers are paid by contingency fees in both systems. That is, we are interested in what would happen if America were to adopt the British rule. This not only affords a direct answer to the first claim mentioned earlier but also provides a chance to make direct comparison with the empirical findings in Snyder and Hughes (1990) and Hughes and Snyder (1995), who collected data for the period 1980–85 when Florida had mandatory adoption of the British rule for medical malpractice litigations to compare the outcomes of a switch to the British rule (see Section 2 for discussion).

4. To explain this with a more concrete example, suppose the values of possible damage ($w$) are distributed in [0, 10] uniformly. Further assume that under the American rule only cases in which the damage of the victim is greater than 2 will be filed, for which the settlement (if reached) is $0.9w$. Under the British rule, only cases with damage above 6 will enter, and the settlement is $0.85w$. Fix the value of damage, and the value of settlement offer is greater under the American rule ($0.9w > 0.85w$). However, the average settlement offer is $\int_2^{10} \frac{1}{8} 0.9w \, \mathrm{d}w = 5.4$ under the American rule and is $\int_6^{10} \frac{1}{4} 0.85w \, \mathrm{d}w = 6.8$ under the British rule. That means given the value of damage, although the American rule has a higher settlement offer, since the threshold values of damage that enter the pretrial negotiation are higher for the British rule, the latter actually has higher average value of settlement.

5. See Hazard (1993, 87–88). Miller (1987) also theoretically demonstrates that in deciding whether to settle or litigate a claim, the attorneys will accept settlement lower than the claimant's optimum. Thomason (1991), using data from New York workers' compensation claims, shows that claimants who retain legal council will expect to receive a lower gross award than who do not, implying an agency cost in legal council.

6. See, for example, Schwartz and Mitchell (1970), Miller (1987), Dana and Spier (1993), Rubinfeld and Scotchmer (1993), Hay (1996), and Polinsky and Rubinfeld (2002, 2003).

7. The only article we are aware of in this regard is Gravelle and Waterson (1993). It is, however, not game theoretical. As such, it has not investigated the interaction of the litigants' behavior in different stages of litigation that is emphasized in this article.

In summary, this article has two objectives. First, it attempts a comprehensive comparison between the British and American rules by using a model that simultaneously and endogenously determines the incentive for the plaintiffs to file suits, the behavior of litigants in pretrial negotiation, the level of resources spent during trial, and trial outcome under each rule. Second, it is recognized that the lawyer acts as an agent for the litigants. Since the objectives of the litigants and their lawyers are not necessarily congruent, there is agency cost in their relationships. This agency cost is modeled by assuming that the lawyer makes decisions for the plaintiff and that these decisions are made according to his/her own interest, rather than the plaintiff's. The litigation process is modeled as a bargaining game with asymmetric information, and the equilibria of the games under the British and American rules are derived. Based on the equilibria, we then compare the difference between the two rules, including incentives to file suit, amount of settlement offer, rate of settlement, amount of resources spent in trial, and prevailing probability. Our findings are broadly consistent with the empirical results in Snyder and Hughes (1990) and Hughes and Snyder (1995). In particular, we show that the British rule induces less suits filed, higher settlement rates when the distribution of damage is sufficiently skewed to the right, more resources spent during trial, and higher prevailing rate for the defendant. In order to obtain closed-form solutions, we impose several assumptions on the functional forms. As such, the contribution of the article is not to provide arguments in favor of either of the two rules but to provide a workhorse that can be employed to analyze and compare different litigation systems.

## 2. Literature Review

There is an enormous body of literature comparing the differences between the American and the British rules in several aspects. Here we only survey the works that are most relevant to this article.

The seminal works in comparing the two systems with economic analysis are those of Posner (1973) and Shavell (1982). The basic model is that the litigants have different perceptions of the probability that the plaintiff will prevail in the trial. They then use these perceptions to compute the expected profits of going to court. This implies a minimum settlement amount that the plaintiff is willing to accept and a maximum that the defendant is willing to pay. It is assumed that the litigants will settle out of court if and only if the computed maximum is greater than the minimum. By changing the expected costs of litigation, the two rules imply different settlement ranges, and thus different settlement rates. Their common conclusion is that the settlement rate is higher under the American system. Results in Shavell (1982) also imply that the British rule is better at discouraging suits that have low probability of prevailing (frivolous suits), in the sense that the incentive of the plaintiff to file a claim is lower. But conditional on a suit having been brought, its settlement rate is lower. Polinsky and Rubinfeld (1998), however, show that this is not necessarily true when the settlement process is taken into account.

Braeutigam et al. (1984) show that the combined expenditure in trial is higher under the British than under the American system, although neither the plaintiff's nor the defendant's expenditure necessarily increases. Donohue (1991) shows that under contingency fee arrangement, the British rule results in a lower settlement rate. He thus predicts that fewer cases will settle if the United States were to adopt the British fee-shifting rule.[8] Hause (1989) shows that, when expenditure in trial and thus prevailing probability is endogenously determined, the English rule is likely to result in a higher settlement rate, but once the litigants go to trial, it also induces them to spend more. On the technical aspect, Hause (1989) improves greatly upon previous literature, as he formally models the fact that different rules will induce different expenditures by the litigants, thereby changing the probability that the plaintiffs will prevail. In fact, a more detailed modeling of trials is exactly the reason why he reached a different conclusion from Posner (1973) and Shavell (1982). On the other hand, he still relies on the assumption that litigants have different perceptions on the probability of prevailing, and settlement will be reached if and only if the minimum amount the plaintiff is willing to accept is smaller than the maximum the defendant is willing to pay. As such, he has not formally analyzed the strategic behavior in the pretrial negotiation process. Beside being partial equilibrium analysis, all the studies have based their analysis on the assumption that the plaintiff and defendant have different assessments of the probability of prevailing.[9] Not only is it difficult to explain exactly where these expectations come from but also this assumption is at odds with recent game-theoretical analysis, which requires rational expectation.

Reinganum and Wilde (1986) use a game-theoretic model with asymmetric information on damage to show that when the litigants agree on the probability that the plaintiff will prevail and the plaintiff retains the entire settlement, then cost allocation rules do not affect equilibrium trial probability. Moreover, settlement can be either greater or smaller under the American rule as compared with the British rule. In contrast to our setup, in their model it is the party who possesses private information (the plaintiff) that makes offer and uses the offer as a signaling device. Other literature using game-theoretic approach includes P'ng (1983), Nalebuff (1987), and Chen et al. (1997). There are also studies discussing other fee-shifting rules under asymmetric information. For example, Spier (1994) compares American rule and rule 68. She shows that depending on the extent of informational asymmetry on damage, settlement rate can be either higher or lower under rule 68.

Hylton (2002) is closest to the present article in that he also builds a model that encompasses many stages of litigation. There are two important

8. Although Donohue obtains the same conclusion as Posner (1973) and Shavell (1982), he argues that the latter obtain the result with incorrect reasoning. He also qualified these results by recognizing other factors that might also affect the analysis. For example, the incentives of the litigants to "hard bargain" might affect their incentives to settle when the range of settlement is large. Degree of risk aversion of the litigants might also influence the results.

9. Under this assumption, it might occur that, say, one party believes that he/she has a probability of 0.8 to prevail and the other might believe that it is 0.3, whereas the true probability is 0.5.

differences. First, he does not aim for a complete solution of the litigation game or the comparison between the two rules. Instead, he is mainly interested in explaining how the legal environment (e.g., litigation costs, legal errors, etc.) affects the outcome of a dispute. Second, although he shows that the British rule results in high social welfare, this is obtained by simulation, rather than tight theoretical derivation. It is difficult to directly compare his results with ours, mainly because he compares the outcomes between the two rules as a function of litigation cost. In our model the litigation cost is endogenous.[10]

On the empirical side, Snyder and Hughes (1990) use data from Florida's mandatory adoption of the British rule for medical malpractice litigations for the period June 1980–September 1985 to show that when the United States switched to the British rule under contingency fees, (a) claims are more likely to be dropped without payment and (b) the probabilities of both settlement and litigation decrease. However, conditional on claims not being dropped, the probability of litigation falls and (c) the expenditures by the defendants during trials increase. A follow-up study (Hughes and Snyder 1995) uses the same database to show that after shifting to the British rule, (a) the win rate of the plaintiffs increases, (b) judgments awarded to winning plaintiffs increase, and (c) the amounts of settlement increase.

## 3. The Process of Litigation

A victim (plaintiff, P) suffers a loss in an accident. The value of damage, $w$, is common knowledge. It is assumed that the values of all possible damages in the society are distributed on $[0,\bar{w}]$ with density function $f(w)$ and distribution function $F(w)$. Since $w$ is known, $f(w)$ is the empirical density for $w$, not the prior for its possible values. The liability of the injurer (defendant, D) for this damage, $q$, is his/her private information but is known to distribute uniformly on the interval $[0,\bar{q}]$. Thus, if the values of both $q$ and $w$ were known, then the injurer should compensate the victim by an amount $qw$. Assume that $w$ and $q$ are independently distributed.[11] Given the value of damage $w$, the plaintiff first decides whether to file a legal claim. If he/she does not, then the payoff for everyone is 0. If he/she does, then he/she hires a lawyer on his/her behalf. Given the value of $w$ and the distribution of $q$, the lawyer computes his/her expected payoff from taking the case and will take it if and only if the expected payoff is positive. If he/she accepts the case, he/she proposes a settlement $S$ to

10. There are also many studies that model the result of trial as a function of (endogenously determined) expenditure spent during trial. For example, in Gong and McAfee (2000), litigants use the updated information in pretrial bargaining to decide the legal outlays; Bernado et al. (2000) and Baye et al. (2005) model trial as an all-pay auction and derive the equilibrium legal expenditure under different fee-shifting rules. The latter also show that litigants' expenditures are higher under the British rule.

11. The uniform distribution assumption on $q$ is actually not as serious as it seems. We will later see that what affects the payoff of the litigants is $qw$, rather than the separate values of $q$ or $w$. By assuming uniform distribution of $q$ while keeping $w$ distribution free, we can replicate any distribution that $qw$ might have, as long as it has finite support. Moreover, with the possibility of punitive damages, $\bar{q}$ can be greater than 1.

the defendant. The defendant decides whether to accept the offer. If he/she accepts $S$, then the payoffs for the plaintiff's attorney, the defendant, and the plaintiff are $m(S)$, $S - m(S)$, and $-S$, respectively, where $m(S) \geq 0$ is the payoff for the lawyer when the settlement is $S$. If the lawyer is paid by contingency fee, then $m(S) = \alpha S$, where $0 < \alpha < 1$.[12] If the defendant turns down the offer, then the lawyer can decide whether to drop the case or to go to court. If he/she drops the case, the payoff for everyone is 0. If he/she goes to court, then based on the value of $q$, the plaintiff's lawyer and the defendant spend resources during litigation,[13] $e_p$ and $e_d$, respectively, in order to influence the plaintiff's prevailing probability, $p(e_p, e_d)$.[14] For simplicity and tractability, we assume that $p(e_p, e_d) = a^{-\gamma\frac{e_d}{e_p}}$, where $\gamma > 0$ and $a > 1$.[15] The value of $a^{-\gamma}$ or, equivalently, $-\gamma \log a$, can be thought of as the "strength" of the case for the plaintiff. The greater its value, the more likely that the plaintiff prevails in trial, ceteris paribus. This prevailing function exhibits several properties. First, it is an increasing function of $e_p$ and a decreasing function of $e_d$. This captures the intuition that the more effort a litigant exerts, the more likely he/she will prevail. Moreover, $p_{11} < 0$ and $p_{22} > 0$, meaning that the effort of the litigants exhibits diminishing marginal returns. Finally, $p(e_p, e_d)$ approaches 0 (1) as $e_d/e_p$ approaches infinity (0), meaning that a litigant, by spending an amount of resource far greater than that of his/her opponent, can ensure his/her own probability of winning is as close to 1 as desired.[16] Let $v(e_p) = e_p + \lambda$ and $v(e_d) = e_d + \lambda$ be the total value of resource that the plaintiff's lawyer and the defendant spend during trial, respectively, where $\lambda$ is the fixed cost of going through litigation.[17] We assume that during trial the value of $q$ will be revealed,[18]

12. In the United States, $\alpha$ is usually one-third. Some of our results later will depend on the fact that $\alpha = 1/3$. We will explicitly mention it when they do.

13. We assume that the defendant defends the case by himself. This is because contingent fees are forbidden for defense lawyers, and the literature comparing the British and American rules has mostly focused on the incentives for the plaintiff to file suits and the corresponding settlement properties. If we assume that the defendant also hires a lawyer who is paid a fixed fee $F > 0$ if case is won, and 0 if lost, then our main conclusions only change quantitatively, not qualitatively. For example, winning rate for the plaintiff will increase in both systems, but it remains true that the plaintiff has higher winning rate under American rule. Also, both litigants still spend more during trial under the British rule.

14. The probability that the dependent prevails is thus $1 - p(e_p, e_d)$.

15. A function often used as winning probability is $\exp\left(-\gamma\frac{e_d}{e_p}\right)$. Our specification is more general since $a$ can take other values than the exponential $e$.

16. Our model for the trial stage is very similar to that of Bernado et al. (2000). Although using a different functional form, in their model the winning probability also depends both on the expenditures spent and a parameter representing the strength of a case for the plaintiff (see equation (2) of Bernado et al. [2000, 11]).

17. $\lambda$ can be, for example, the administrative cost charged by the public court.

18. This is a common assumption made in the literature that models litigation as a sequential game, for example, Nalebuff (1987) and Chen et al. (1997). Bernado et al. (2000) assume that the value of damage is fixed and known during litigation. Since we assume that the litigants spend resource only after the plaintiff learns the value of $q$, our assumption is equivalent to theirs at the stage of trial.

and the plaintiff is compensated by an amount $qw$ if he/she wins, and 0 if he/she loses.

Under the American rule, the plaintiff and the defendant pay for their own expenses incurred during litigation, regardless of the outcome of trial. Under contingency fee, the lawyer for the plaintiff receives a proportion, $\alpha$, of the settlement or recovery as his/her fee for service. In this case, the payoff vector for the plaintiff's lawyer, the defendant, and the plaintiff is $(\alpha qw - v(e_p), -qw - v(e_d), (1 - \alpha)qw)$ if the plaintiff wins and is $(-v(e_p), -v(e_d), 0)$ if the defendant wins. Under the British rule, the party who loses the trial will have to pay for the trial cost for the other party. The payoff vectors are thus $(\alpha qw - v(e_p), -(1 + \alpha)qw - v(e_d), qw)$ if the plaintiff wins and $(-v(e_p), 0, -v(e_d))$ if the defendant wins.[19] The game trees for litigation process under the American and British systems are depicted in Figures 1 and 2, respectively.

The litigation process consists of three stages: In the first stage, the victim with a damage $w$ decides whether to file suit by contracting with a lawyer, and, if yes, the latter decides whether to accept the case. The second stage is the stage of pretrial negotiation, in which the plaintiff's lawyer proposes a settlement and the defendant decides whether to accept. If the proposal is rejected, the lawyer decides whether to drop the case or to go to court. Since the defendant has private information regarding his/her own liability, the second stage is a bargaining game with asymmetric information.[20] It is similar to the litigation model in Nalebuff (1987) and Chen et al. (1997) but is substantially more complicated as we incorporate the decision of whether to file suit, the lawyer's role, and a trial stage. The third stage is the stage of trial, in which the litigants fight in court and the trial outcome is revealed. This stage is essentially an all-pay auction.

In order to emphasize the fact that the plaintiff's lawyer is the plaintiff's agent who makes decisions on behalf of the plaintiff, we assume that the lawyer has complete discretion over how the litigation should proceed. Specifically, he/she decides how much settlement to propose, whether to go to court if this proposal is rejected, and how much resources to spend during court trial. Moreover, we assume that the lawyer only attempts to maximize his/her own payoff during litigation.[21] We can see from the payoff vectors in Figures 1 and 2 that there is a divergence between the plaintiff's and his/her attorney's objectives. The optimal decision rule for the lawyer is thus different from that for the plaintiff.

19. Following the convention (see Hazard 1993), we assume that the losing party pays only for the lawyer's fee. Since $v(e_d)$ is the only cost incurred for the defendant, the plaintiff will pay for this cost if he/she loses the case.

20. If it is the defendant who proposes the settlement, then since he/she is the one with private information, the bargaining process will be a signaling game, and the solution will be substantially more complicated. This is exactly the issue taken by Reinganum and Wilde (1986).

21. We thus have an extreme case of agency problem between a lawyer and a client. In reality, the lawyer's utility is more likely to be the weighted sum of his/her and his/her client's payoffs. Our results hold true if the lawyer cares sufficiently about his/her own payoff.

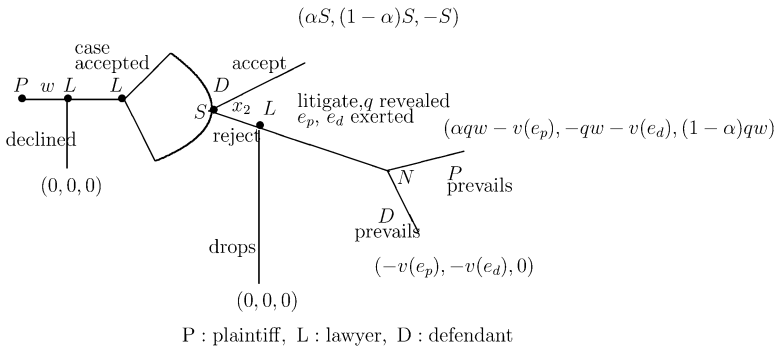


Figure 1. American Rule with Contingency Fees.

## 4. American Rule with Contingent Fees

In this section we will solve for the sequential equilibrium of the litigation game under the American rule. Since the whole litigation process is very complicated, we will first consider the part of the game after a suit is filed. It is convenient to further separate this part into two natural stages: the stage of pretrial bargaining and the stage of trial. Since the game is solved by backward induction, we consider the stage of trial first.

### 4.1 Stage of Trial

The expected payoff for the plaintiff's lawyer at the stage of trial is

$$\alpha pqw - v(e_{\mathrm{p}}),$$

and that for the defendant is

$$-pqw - v(e_{\mathrm{d}}).$$

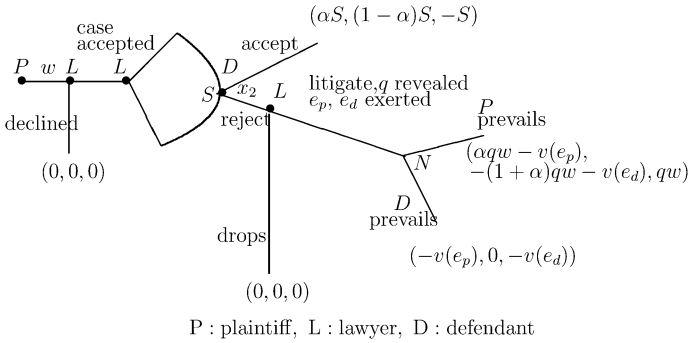


Figure 2. British Rule with Contingency Fees.

The litigants exert $e_p$ and $e_d$ to maximize expected utilities. The corresponding first-order conditions are

$$\alpha p_1 q w = v'(e_p), \tag{1}$$

$$-p_2 q w = v'(e_d), \tag{2}$$

where $p = p(e_p, e_d)$, $p_1 = \frac{\partial p}{\partial e_p}$, and $p_2 = \frac{\partial p}{\partial e_d}$. Under the assumed specific functional form, we have

$$e_p^A(q, w) = \gamma q w a^{-\frac{\gamma}{\alpha}} \log a,$$

$$e_d^A(q, w) = \frac{\gamma \log a}{\alpha} q w a^{-\frac{\gamma}{\alpha}},$$

$$p^A(q, w) \equiv p(e_p^A(q), e_d^A(q)) = a^{-\frac{\gamma}{\alpha}}. \tag{3}$$

As is expected, for both litigants the resources spent in the court are increasing functions of the amount liable ($qw$), and the prevailing probability of the plaintiff increases with the strength of his/her case. Also, the plaintiff is more likely to win if his/her attorney receives a higher percentage of judgment.

Given this outcome, we solve for the equilibrium of the stage of pretrial bargaining.

## 4.2 Stage of Pretrial Bargaining

Since the value of damage ($w$) is public information and its value affects the value of recovery if the plaintiff wins, the settlement proposed by the plaintiff's lawyer is a function of damage. Basically, the settlement proposed is an increasing function of damage and has three broad regions. Specifically, let $w^A = 2\lambda / a^{-\frac{\gamma}{\alpha}}(\alpha - \gamma \log a)\bar{q}$ and $w_1^A = \lambda(3\alpha + 5\gamma \log a + \alpha(\alpha - \gamma \log a))/(\alpha - \gamma \log a) a^{-\frac{\gamma}{\alpha}} \bar{q}(\alpha + \gamma \log a) > w^A$. If the value of damage $w$ is smaller than $w^A$, then it is too small to justify going to court. The lawyer thus proposes a settlement of zero, which is accepted. For intermediate values of damage ($w_1^A \geq w \geq w^A$), the lawyer proposes a fixed settlement, and whether the defendant accepts depends on the value of his/her liability (which is private information). Finally, if the value of damage is large ($w > w_1^A$), then the settlement proposal is an increasing function. The details of the equilibrium are summarized in the following proposition.

*Proposition 1.* The settlement proposed by the lawyer as a function of damage is

$$S^A(w) = \begin{cases} 0, & \text{if } w < w^A; \\ S^A \equiv \frac{2\lambda(\alpha + \gamma \log a)}{\alpha(\alpha - \gamma \log a)} + \lambda, & \text{if } w^A \leq w \leq w_1^A; \\ S^*(w) \equiv \alpha \frac{a^{-\frac{\gamma}{\alpha}}(1 + \frac{\gamma}{\alpha}\log a)^2}{\alpha + 3\gamma \log a} \bar{q} w - \lambda \frac{1 + \frac{\gamma}{\alpha}\log a - 2\gamma \log a}{\alpha + 3\gamma \log a}, & \text{if } w > w_1^A. \end{cases}$$

If $S^A(w) = 0$, then it is accepted. If $S^A(w) = S^A$, the defendant with liability $q \geq (<) q_1^A(w) \equiv 2\lambda / a^{-\frac{\gamma}{\alpha}}(\alpha - \gamma \log a) w$ accepts (rejects) it. If $S^A(w) = S^*(w)$,

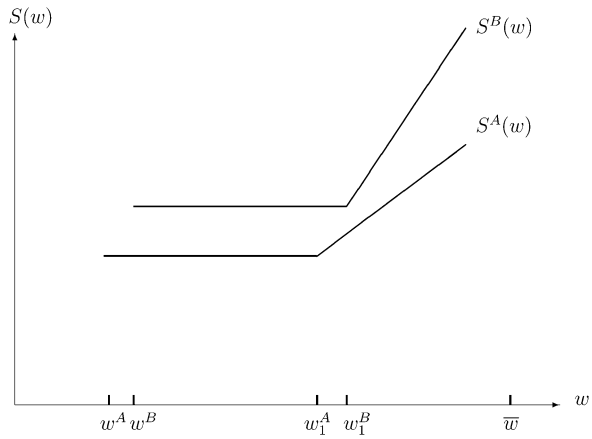


Figure 3. Settlement as a Function of Damage.

the defendant with liability $q > (\leq) q_2^{\mathrm{A}}(w) \equiv (S^*(w) - \lambda)/a^{-\frac{\gamma}{\alpha}}\left(1 + \frac{\gamma}{\alpha}\log a\right)w$ accepts (rejects) it. If a settlement offer is rejected, the plaintiff goes to court with probability 1.

*Proof.* See Appendix A.

Assuming that $\alpha = 1/3$, then $S^{\mathrm{A}}(w)$ is plotted in Figure 3. We can see clearly that it is an increasing function of damage. This equilibrium outcome is fairly intuitive. For low values of $w$, the expected payoff of going to court is negative even under the most optimistic belief on the defendant's liability. Thus, the lawyer will ask for nothing, and they settle out of court. When the value of damage is in a medium range, the plaintiff will ask for a fixed amount $S^{\mathrm{A}}$. The reason for this is that there are two variables under the lawyer's control which affect his/her expected payoff: The value of settlement ($S$) and the probability of going to court if it is rejected ($\beta(S)$). When $w \in [w^{\mathrm{A}}, w_1^{\mathrm{A}}]$, the optimal strategy for the lawyer is always to ask for the maximal settlement he/she can, $S^{\mathrm{A}}$, and to adjust the value of $\beta(S)$ so that he/she is indifferent between going to court and dropping the case when $S^{\mathrm{A}}$ is rejected.[22] Finally, when the damage is large enough, the settlement offer will be strictly increasing. The reason is that now damage is so large that the lawyer finds it strictly better to go to court than have $S^{\mathrm{A}}$ accepted, even if $\beta(S) = 1$. In that case he/she should ask for a settlement higher than $S^{\mathrm{A}}$. Moreover, the higher the value of $w$, the more he/she should ask for.

Define $q^{\mathrm{A}}(w)$ to be such that

$$q^{\mathrm{A}}(w) = \begin{cases} q_1^{\mathrm{A}}(w), & \text{if } w^{\mathrm{A}} \leq w \leq w_1^{\mathrm{A}}, \\ q_2^{\mathrm{A}}(w), & \text{if } w \geq w_1^{\mathrm{A}}. \end{cases}$$

22. If $S > S^{\mathrm{A}}$, then in order to make him/her indifferent, $\beta(S)$ has to be greater than 1, which is impossible. This means that $S^{\mathrm{A}}$ is the maximum he/she can ask for.

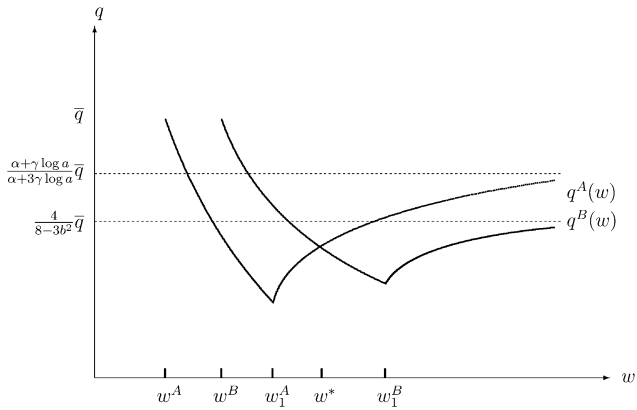


Figure 4. Cutoff Liabilities as a Function of Damage.

Assuming that $\alpha = 1/3$, we also depict $q^{\mathrm{A}}(w)$ as a function of $w$ in Figure 4. $q^{\mathrm{A}}(w)$ is the threshold value of liability for a defendant who is indifferent between rejecting and accepting $S^{\mathrm{A}}(w)$. Note that it first decreases (when $w < w_1^{\mathrm{A}}$) and then increases in $w$. This is because when $w \leq w^{\mathrm{A}}$, the defendant is offered the same value of settlement ($S^{\mathrm{A}}$). Naturally, those with higher values of damage are more likely to settle, and $q^{\mathrm{A}}(w)$ is therefore a decreasing function of $w$. However, when $w > w^{\mathrm{A}}$, the settlement offer ($S^*(w)$) is an increasing function of damage. It turns out that $S^{\mathrm{A}}(w)$ is increasing at a rate greater than $w$ so that, in contrast to the case when $w < w^{\mathrm{A}}$, the defendant is now less likely to settle when $w$ increases.

### 4.3 Lawyer's Decision of Whether to Accept a Case

In this subsection we characterize the lawyer's decision of whether to take a case brought by a victim with damage $w$. Let $V(S)$ be the payoff of the lawyer when he/she offers $S$ as settlement. If $w \leq w^{\mathrm{A}}$, then from Proposition 1 we know that the lawyer's payoff of initiating a pretrial negotiation is $V(0) = 0$, and he/she is thus indifferent between accepting and declining the case. We assume that the lawyer declines to take the case when he/she is indifferent.[23]

If $w > w^{\mathrm{A}}$, then the lawyer's payoff is either $V(S^{\mathrm{A}})$ if $w \leq w_1^{\mathrm{A}}$, or $V(S^*(w))$ if $w > w_1^{\mathrm{A}}$. Since both are positive, we know that the lawyer will accept the case. In other words, the lawyer accepts a case brought by a victim with damage $w$ if and only if $w > w^{\mathrm{A}}$. Consequently, $w^{\mathrm{A}}$ is also the minimum value of damage for which a victim will seek legal advice.

23. This can be justified if going through the pretrial negotiation incurs a very small, but positive, administrative cost.

We can now summarize the equilibrium of the litigation process under the American rule in Theorem 1.

*Theorem 1.* The sequential equilibrium under the American rule is as follows. The lawyer accepts a case brought by a victim with damage $w$ if and only if $w > w^{\mathrm{A}}$. If a case is taken, he/she will propose a settlement of $S^{\mathrm{A}}(w)$. The defendant whose liability is greater (smaller) than $q^{\mathrm{A}}(w)$ accepts (rejects) $S^{\mathrm{A}}(w)$. If the proposal is rejected, the lawyer goes to court with probability 1. Once in court, the lawyer (respectively, defendant) spends an amount of resource $e_{\mathrm{p}}^{\mathrm{A}}$ (respectively, $e_{\mathrm{d}}^{\mathrm{A}}$), and the plaintiff prevails with probability $a^{\frac{\gamma}{\alpha}}$ (respectively, $1 - a^{\frac{\gamma}{\alpha}}$).

## 5. The British Rule with Contingency Fee

In this section, we will go through the same procedure as in Section 4 to characterize the sequential equilibrium under the British rule.

### 5.1 Stage of Trial

The expected payoffs for the plaintiff's lawyer and the defendant at the stage of trial are, respectively,

$$pqw\alpha - v(e_{\mathrm{p}}), \quad \text{and} \quad -p(1+\alpha)qw - pv(e_{\mathrm{d}}).$$

The corresponding first-order conditions for $e_{\mathrm{p}}$ and $e_{\mathrm{d}}$ are thus

$$p_1 qw\alpha = v'(e_{\mathrm{p}}),$$

$$-p_2(1+\alpha)qw - p_2 v(e_{\mathrm{d}}) = pv'(e_{\mathrm{d}}). \tag{4}$$

Under our particular functional form, we have

$$a^{-\gamma\frac{e_{\mathrm{d}}}{e_{\mathrm{p}}}}\frac{e_{\mathrm{d}}}{e_{\mathrm{p}}^2}\alpha\gamma qw\log a = 1, \quad \text{and} \quad a^{-\gamma\frac{e_{\mathrm{d}}}{e_{\mathrm{p}}}}\frac{\gamma}{e_{\mathrm{p}}}[(1+\alpha)qw + e_{\mathrm{d}}]\log a = a^{-\gamma\frac{e_{\mathrm{d}}}{e_{\mathrm{p}}}}.$$

The two equations imply that

$$e_{\mathrm{d}} = \frac{e_{\mathrm{p}}}{\gamma\log a} - (1+\alpha)qw.$$

We thus have

$$\left[1 - \frac{\gamma(1+\alpha)qw}{e_{\mathrm{p}}}\log a\right]\left(\frac{\gamma(1+\alpha)qw}{e_{\mathrm{p}}}\log a\right)\exp\left[\frac{\gamma(1+\alpha)qw}{e_{\mathrm{p}}}\log a - 1\right]$$
$$= \frac{\gamma(1+\alpha)}{\alpha}\log a. \tag{5}$$

Let

$$b = \gamma(1+\alpha)qw\frac{\log a}{e_{\mathrm{p}}}.$$

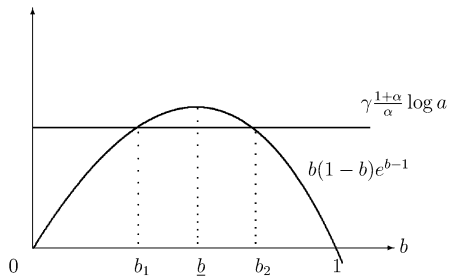


Figure 5. Determination of $b$.

Then equation (5) becomes

$$b(1-b)e^{b-1} = \gamma\frac{1+\alpha}{\alpha}\log a. \tag{6}$$

We can then solve for effort levels and winning probability as

$$e_{\mathrm{p}}^{\mathrm{B}}(q,w) = \frac{\gamma(1+\alpha)qw}{b}\log a,$$

$$e_{\mathrm{d}}^{\mathrm{B}}(q,w) = (1-b)\frac{(1+\alpha)qw}{b},$$

$$p^{\mathrm{B}} \equiv p(e_{\mathrm{p}}^{\mathrm{B}}(q,w), e_{\mathrm{d}}^{\mathrm{B}}(q,w)) = a^{\frac{1}{\log a}(b-1)} = e^{b-1}. \tag{7}$$

There are two solutions for $b$ (see Figure 5) with different properties. An increase in the strength of the case for the defendant ($\gamma\log a$) will raise the value of $b_1$ (and thus the winning probability of the plaintiff, $e^{b-1}$) but will decrease the value of $b_2$ and reduce the plaintiff's winning probability. Although a theoretical possibility, we believe that in reality the former case is rather unlikely even if the litigants spend different levels of resources in trial. We thus make the following assumption:

*A1.* $p^{\mathrm{B}} = e^{b-1}$ is a decreasing function of $\gamma$.

Under A1, the solution for equation (6) is $b_2$, rather than $b_1$. Moreover, since $b(1-b)e^{b-1}$ has maximum when $b = \underline{b} \equiv (\sqrt{5}-1)/2 > 1/2$, in order for equation (6) to have a solution we must make the following assumption:

*A2.* $\frac{1+\alpha}{\alpha}\gamma\log a < \underline{b}(1-\underline{b})e^{\underline{b}-1}$.

It is easy to see from equation (6) and Figure 5 that the value of $b_2$ must be such that $1 > b_2 > 1/2$.

### 5.2 Stage of Pretrial Negotiation

The qualitative property of the equilibrium under British rule is very similar to that under American rule. Let $w^{\mathrm{B}} \equiv 2\lambda/\alpha b e^{b-1}\bar{q}$ and $w_1^{\mathrm{B}} \equiv (4(1+\alpha)-(1-\alpha)b^2)/\alpha(1+\alpha)be^{b-1}\bar{q} > w^{\mathrm{B}}$. The equilibrium settlement offer of the lawyer is 0 if damage is smaller than $w^{\mathrm{B}}$, a constant if damage is between $w_1^{\mathrm{B}}$ and $w^{\mathrm{B}}$, and is an increasing function if damage is greater than $w_1^{\mathrm{B}}$. Moreover, whether a defendant accepts the offer depends on his/her liability:

*Proposition 2.* The equilibrium settlement offer as a function of damage is

$$S^{\mathrm{B}}(w) = \begin{cases} 0, & \text{if } w < w^{\mathrm{B}}, \\ S^{\mathrm{B}} \equiv \frac{2(1+\alpha)}{\alpha b^2}, & \text{if } w^{\mathrm{B}} \le w \le w_1^{\mathrm{B}}, \\ S^{**}(w) \equiv \alpha \frac{e^{b-1}}{b}(1+\alpha)^2 w\bar{q} - \lambda \frac{1-\alpha^2+\alpha b^2}{2\alpha(1+\alpha)-\alpha b^2}, & \text{if } w > w_1^{\mathrm{B}}. \end{cases}$$

If $S^{\mathrm{B}}(w) = 0$, then it is accepted. If $S^{\mathrm{B}}(w) = S^{\mathrm{B}}$, the defendant with liability $q \ge (<) q_1^{\mathrm{B}}(w) \equiv 2\lambda/\alpha b e^{b-1} w$ accepts (rejects) it. If $S^{\mathrm{B}}(w) = S^{**}(w)$, the defendant with liability $q \ge (<) q_2^{\mathrm{B}}(w) \equiv (S^{**}(w) - \lambda)/e^{b-1}(1+\alpha)w$ accepts (rejects) it. If a settlement offer is rejected, the plaintiff goes to court with probability 1.

*Proof.* See Appendix B.

Assuming $\alpha = 1/3$, $S^{\mathrm{B}}(w)$ is plotted in Figure 3 against $S^{\mathrm{A}}(w)$. Several relations between $S^{\mathrm{A}}(w)$ and $S^{\mathrm{B}}(w)$ can be easily verified. First, $w^{\mathrm{A}} < w^{\mathrm{B}}$.[24] By numerical comparison we can also show $w_1^{\mathrm{A}} < w_1^{\mathrm{B}}$ when $\alpha = 1/3$. Second, $S^{\mathrm{A}} < S^{\mathrm{B}}$, $S^{\mathrm{A}}(w) < S^{\mathrm{B}}(w)$, and $S^{\mathrm{B}} > S^{\mathrm{A}} w_1^{\mathrm{A}}$. That means $S^{\mathrm{A}}(w)$ must lie everywhere below $S^{\mathrm{B}}(w)$. Figure 3 clearly visualizes the fact that the value of settlement is higher under the British rule.[25]

Define

$$q^{\mathrm{B}}(w) = \begin{cases} q_1^{\mathrm{B}}(w), & \text{if } w^{\mathrm{B}} \le w \le w_1^{\mathrm{B}}, \\ q_2^{\mathrm{B}}(w), & \text{if } w > w_1^{\mathrm{B}}. \end{cases}$$

$q^{\mathrm{B}}(w)$ is the value of liability which makes a defendant with damage $w$ indifferent between accepting or rejecting $S^{\mathrm{B}}(w)$. Similar to the American rule, it is first a decreasing function, then increases when $w$ is sufficiently large.

Under the assumption that $\alpha = 1/3$, the value of $q^{\mathrm{B}}(w)$ as a function of $w$ is depicted in Figure 4. Note that there exists $w^* \in (w_1^{\mathrm{A}}, w_1^{\mathrm{B}})$ such that $q^{\mathrm{A}}(w) > (<) q^{\mathrm{B}}(w)$ for $w > (<) w^*$.

Exactly the same argument as in the case of American rule shows that the lawyer accepts a case brought by a victim with damage $w$ if and only if $w > w^{\mathrm{B}}$. We can now summarize the equilibrium under the British rule in Theorem 2.

24. This is because from the definition we have $\alpha b e^{b-1} = \alpha e^{b-1} - \frac{\gamma \log a}{b}(1+\alpha) < (\alpha - \gamma \log a) a^{\frac{-\gamma}{\alpha}}$.

25. An algebraic proof is given in Section 6.4.

*Theorem 2.* The sequential equilibrium under the British rule is as follows. The lawyer accepts a case brought by a victim with damage $w$ if and only if $w > w^{\mathrm{B}}$. If a case is taken, the lawyer will propose a settlement of $S^{\mathrm{B}}(w)$. The defendant whose liability is greater (smaller) than $q^{\mathrm{B}}(w)$ accepts (rejects) $S^{\mathrm{B}}(w)$. If settlement is rejected, the lawyer goes to court with probability 1. Once in court, the lawyer (respectively, defendant) spends resources in an amount $e_{\mathrm{p}}^{\mathrm{B}}$ (respectively, $e_{\mathrm{d}}^{\mathrm{B}}$) and wins with probability $e^{b-1}$ (respectively, $1 - e^{b-1}$).

## 6. Comparison

Equipped with the equilibria of the American and British rules derived in the previous two sections, we can now compare their equilibrium outcomes. Special attention will be paid to comparing our theoretical predictions with the empirical findings in Snyder and Hughes (1990) and Hughes and Snyder (1995).

### 6.1 Incentives to Sue

Since the lawyer only accepts the case of a victim whose damage is greater than $w^{\mathrm{A}}$ ($w^{\mathrm{B}}$) under the American (British) rule, and since $w^{\mathrm{B}} > w^{\mathrm{A}}$, the threshold at which a victim will seek compensation via the legal system is higher under the British than the American rule. In other words, a victim's incentive to sue is lower under the British rule. This also implies that the average value of damage for cases filed against the defendants is higher under the British rule. Also note that $a^{-\gamma}$ represents the strength of the case for the plaintiff, and that both $w^{\mathrm{B}}$ and $w^{\mathrm{A}}$ are increasing in $a^{-\gamma}$. Suppose the value of $a^{-\gamma}$ is small so that the strength of case is weak for the plaintiff. Then since $w^{\mathrm{B}} > w^{\mathrm{A}}$, given the value of $a^{-\gamma}$, the victim needs a greater value of damage in order to have his/her case accepted by the lawyer under British rule. If we interpret "frivolous suits" as suits that are weak in the sense of having low values of $a^{-\gamma}$, then the British rule can more strongly deter frivolous suits, as under the rule a victim needs a higher value of damage to have his/her case accepted by a lawyer. This is consistent with the theoretical result in Shavell (1982).[26]

### 6.2 Resources Spent During Trial

Given the value of $w$, we know that

$$\frac{e_{\mathrm{p}}^{\mathrm{A}}(w)}{e_{\mathrm{p}}^{\mathrm{B}}(w)} = \frac{ba^{\frac{-\gamma}{\alpha}}}{1+\alpha} < 1,$$

26. Note that we are using a different definition to Shavell (1982). He defines a frivolous suit as one having low win rate for the plaintiff. This definition cannot be used in our study since win rate is endogenous. We can also define frivolous suit as one having negative expected payoff (Nalebuff 1987). However, as a referee points out, such a definition loses its bite in our setting as different fee-shifting rules have different payoff structures.

where the inequality comes from the fact that $b < 1$. Thus, given the value of damage caused, the plaintiff spends more resources during trial under the British system. It can also be shown that

$$\frac{e_{\mathrm{d}}^{\mathrm{A}}(w)}{e_{\mathrm{d}}^{\mathrm{B}}(w)} = \frac{b}{1-b}\frac{\gamma \log a}{\alpha(1+\alpha)}a^{\frac{-\gamma}{\alpha}} = \left(\frac{b}{1+\alpha}\right)^2 a^{\frac{-\gamma}{\alpha}} e^{b-1} < 1.$$

The defendant therefore also spends more resources during trial under the British rule. The intuition that both litigants spend more resources during court trial is straightforward: The losing side will pay more, and the winning side less, under the British system. Since the payoff gap between winning and losing is widened under the British rule, the marginal return of resources spent is higher, which prompts both sides to spend more. Moreover, $\frac{e_{\mathrm{p}}^{\mathrm{A}}(w)}{e_{\mathrm{p}}^{\mathrm{A}}(w)} \Big/ \frac{e_{\mathrm{d}}^{\mathrm{A}}(w)}{e_{\mathrm{d}}^{\mathrm{A}}(w)} = (1+\alpha)e^{1-b}/b > 1$, meaning that the proportional increase in resources is greater for the defendant than the plaintiff. That is, although a switch to the British rule will increase resources spent during trial on both sides, this is more pronounced for the defendant.

The above comparison, however, is made under the same value of $w$. As is emphasized in Section 1, since the threshold value of damage for cases that go to court are different under the two rules, the average resources spent in the court might not be greater under the British rule. For this purpose, we must compute the average resource spent for all cases that enter the court, which is

$$\bar{e}_j^i \equiv \frac{1}{1-F(w^i)}\int_{w^i}^{\bar{w}} e_j^i(w)f(w)\mathrm{d}w,$$

where $i = \mathrm{A}, \mathrm{B}$, and $j = \mathrm{p}, \mathrm{d}$. Since $w^{\mathrm{B}} > w^{\mathrm{A}}$ and $e_j^{\mathrm{B}}(w) > e_j^{\mathrm{A}}(w)$ for all $w$, we know that $\bar{e}_j^{\mathrm{B}} > \bar{e}_j^{\mathrm{A}}$ for $j = \mathrm{p}, \mathrm{d}$. As a result, not only do both litigants spend more for a given value of damage but also the average value of resources spent is also higher under the British rule. These results are consistent with both the theoretical prediction in Hause (1989) and Baye et al. (2005) and the empirical finding in Snyder and Hughes (1990).

### 6.3 Prevailing Probability

Since $\frac{p^{\mathrm{A}}}{p^{\mathrm{B}}} = \exp\left[(1-b)\left(1-\frac{be^{b-1}}{1+\alpha}\right)\right] > 1$,[27] the prevailing probability of the plaintiff in court is higher under the American than the British rule. That is, so far as only the winning rate in court is concerned, the American rule is preferable to the plaintiff. Intuitively, this is because the defendant spends more resources relative to the plaintiff under the British rule. But the advantage of the American rule for the plaintiff is actually more than merely the increase in winning probability. Since (as we have shown) litigants spend less resources

27. The inequality comes from the fact that $b < 1$, and thus $1 - \frac{be^{b-1}}{1+\alpha} > 0$.

in court under the American rule, the plaintiff will then not only win with higher probability under the American rule but also spends less resources. For the defendant, however, the British rule is a mixed blessing. Although he/she is more likely to win when switched to the British rule, he/she needs to spend more resources to achieve that.

Our prediction that the plaintiff has higher probability to prevail under the American rule contradicts the empirical findings in Hughes and Snyder (1995). There might be two possible reasons for this. First, in our model the winning probability depends only on relative resource spent during trial. Another potential source of influence on this probability, which is not incorporated in our specification, is the liability ($q$) of the defendant. Intuitively, the greater his/her liability, the more likely he/she will lose to the plaintiff. If that is the case, then the greater the value of $q$, the greater will be the winning chance of the plaintiff relative to our prediction. This additional effect on win rate will be more pronounced under British rule since the litigants spend more resource. If this effect is strong enough, then our result can very well be reversed. In other words, the plaintiff might have greater winning probability under the British than the American rule if the winning probability is positively related to liability.

Second, consider a model in which the litigation cost is fixed and the winning probability depends on the care taken by the defendant before the accident. The higher the care that had been taken, the greater the winning chance of the defendant. (This can be taken to be the value of $a^{-\gamma}$ in our specification.). Hylton (2002) argues that British rule has two offsetting effects on win rate. On the one hand, it induces litigation by spreading the expected litigation payoffs of the plaintiffs and the defendants. On the other hand, it also dampens litigation by imposing penalty on plaintiffs with weak claims. The first effect encourages litigation of all claims and has no clear implication for the win rate. The second discourages litigation of weak claims and thus increases the plaintiff's win rate. Overall effect is ambiguous. His simulation result, however, shows that the plaintiff has higher (lower) win rate under British (American) rule when damages are low (high). If the winning function in our model, $p(e_p, e_d)$, is modified in a way to become less sensitive to $e_p$ and $e_d$ but more sensitive to the strength of case $a^{-\gamma}$ (so that it corresponds more closely to Hylton's assumption), and is more concentrated on the high-damage region (as is the case for medical malpractice litigations), then our result can also be reversed.

### 6.4 Settlement Offer

We have already shown that $S^B(w) > S^A(w)$ for all $w$; that is, given the same value of damage, the settlement offer is greater under the British system. Again, since claims are filed with different thresholds of damage under different rules, the average settlement might be greater under either rule. To compute the average settlement, first note that $w^B > w^A$, and $w_1^B > w_1^A$ when $\alpha = 1/3$. There are thus only two possible cases to consider. The first is $w^A < w_1^A < w^B < w_1^B$. The second is $w^A < w^B < w_1^A < w_1^B$.

In the first case, the average value of settlement under British rule, $E(S^{\mathrm{B}}(w))$, is

$$\begin{aligned}
E(S^{\mathrm{B}}(w)) &= \frac{1}{1-F(w^{\mathrm{B}})}\left[\int_{w^{\mathrm{B}}}^{w_1^{\mathrm{B}}} S^{\mathrm{B}} f(w)\mathrm{d}w + \int_{w_1^{\mathrm{B}}}^{\bar{w}} S^{**}(w) f(w)\mathrm{d}w\right] \\
&> \frac{1}{1-F(w^{\mathrm{A}})}\left[\int_{w^{\mathrm{A}}}^{w_1^{\mathrm{A}}} S^{\mathrm{B}} f(w)\mathrm{d}w + \int_{w_1^{\mathrm{B}}}^{\bar{w}} S^{**}(w) f(w)\mathrm{d}w\right] \\
&> \frac{1}{1-F(w^{\mathrm{A}})}\left[\int_{w^{\mathrm{A}}}^{w_1^{\mathrm{A}}} S^{\mathrm{A}} f(w)\mathrm{d}w + \int_{w_1^{\mathrm{A}}}^{\bar{w}} S^{*}(w) f(w)\mathrm{d}w\right] \\
&= E(S^{\mathrm{A}}(w)).
\end{aligned}$$

Regardless of the density function of $w$, the average value of settlement demand is greater under the British rule, which is consistent with Hughes and Snyder (1995). The proof for the case when $w_1^{\mathrm{B}} < w_2^{\mathrm{A}}$ is exactly the same.

## 6.5 Settlement Rate

One of the important questions asked in the literature is whether the British rule is better at inducing out-of-court settlement. In our model, this amounts to comparing the settlement rates in the two systems. It turns out that no definite conclusion can be drawn from the model. We can see clearly from Figure 4 that there are two forces that influence the relative settlement rate between the two systems. First, since the defendants who will settle with the plaintiff are those whose liabilities lie above the curve $q^{\mathrm{A}}(w)$ or $q^{\mathrm{B}}(w)$, they are more likely to settle under the American (British) rule when damage is low (high). The relative average settlement rate will thus critically depend on the distribution of damage and the shape of $q^i(\cdot)$. Second, the density functions of damage for claims that enter pretrial negotiation have different supports under the two rules. Under the American rule, only injurers whose damage are higher than $w^{\mathrm{A}}$ will enter pretrial negotiation, whereas under the British rule it is $w^{\mathrm{B}}$. Specifically, the average settlement rates under both systems are

$$1 - \frac{1}{1-F(w^i)}\left[\int_{w^i}^{w_1^i} q_1^i(w) f(w)\mathrm{d}w + \int_{w_1^i}^{\bar{w}} q_2^i(w) f(w)\mathrm{d}w\right], \tag{8}$$

where $i = \mathrm{A}, \mathrm{B}$. As can be seen from equation (8), the average settlement rates will also depend on the values of $w^i$ and $w_1^i$, in addition to the shape of $q^i(\cdot)$ and $f(\cdot)$. What can be inferred from Figure 4, however, is that if the distribution of damages is skewed to the right, then the British rule will have greater settlement rate, since it tends to settle more frequently when damages are large. Moreover, since medical malpractice disputes usually involve higher stakes (so that distribution of damage does skew to the right), our model predicts that in this case the litigants will settle more frequently under the British rule. This result contradicts the theoretical result of Shavell (1982) and simulation result in Hylton (2002) but is consistent with the empirical finding in Snyder and

Hughes (1990). The possible explanation is that in both Shavell (1982) and Hylton (2002), expenditure spent during trial is exogenous. In our model, not only the expenditure spent is endogenous but also, more importantly, both litigants spend more under British rule. Since now they face a more costly litigation, there is more settlement pressure under the British rule, especially when damage is large.[28]

### 6.6 Other Issues

There are a couple of other issues relating to comparative statics results that might be of interest. For example, on the policy side, we might be interested in how a change in the fixed cost, $\lambda$, affects the litigants' behavior. Obviously, the resources spent during trial, and therefore the winning probability, is independent of $\lambda$, since it is just a sunk cost. However, since both $w^A$ and $w^B$ are increasing functions of $\lambda$, it implies that higher fixed cost of litigation deters the injurees from using the legal process as a way to recover their losses. Also note that the fixed cost is a double-edged sword in that although it forces plaintiffs to pay higher cost in trial, it also forces the defendant to more easily accept a settlement offer. When $w \leq w_1^A$ (or $w_1^B$ under British rule), the settlement offer $S^A$ (or $S^B$ under British rule) increases in $\lambda$. This is because $w^A$ (or $w^B$ under British rule) is greater when $\lambda$ is higher, but the value of settlement offer is constant over $w$. Consequently, the average value of $w$ increases when $\lambda$ is raised. In this case a higher fixed cost of litigation, contrary to intuition, will decrease the settlement rate and encourage litigation in both systems. When $w > w_1^A$ (or $w_1^B$ under the British rule), settlement offer is an increasing function of damage. In that case, an increase in the fixed cost of litigation will force the defendant to accept a settlement demand more easily. As a result, the settlement rate increases.

## 7. Conclusion

The contribution of the article is to compare the effects of American and British fee-shifting rules on the litigants' behavior—including the incentives to sue and settle, the levels and frequencies of settlement and recovery, and the amount of resources spent in trial—in a unified model. In order to capture the fact that the litigants' decisions in different stages of trial are interrelated, a single framework is constructed that allows us to solve for the litigants' strategies in all stages simultaneously.

Another advantage of our approach is that it allows us to adequately compare the theoretical predictions with the empirical findings. For example, the empirical findings regarding settlement rate must be by nature the average value of all cases that enter pretrial negotiation. But under different rules, not only are settlement rates different under the same value of damage but also cases enter pretrial negotiation with different thresholds of damage. In a word, the supports of the distributions for computing the average settlement

28. We thank a referee for pointing this out to us.

rate are different under the two systems. Thus, a theoretical model that does not recognize these differences is problematic. Our model, as it simultaneously solves for the litigants' equilibrium behavior in all stages under a single framework, can easily facilitate this comparison.

The price to pay with this approach, however, is that in order to obtain a closed-form solution, we adopt a set of parametric specifications. Although we believe that these functional forms conform to reality reasonably, we have not been able to prove our results in a more general context. As a result, the article might be better seen as an attempt to capture the empirical facts with a model as canonical as possible, rather than a bold theoretical prediction.

A topic that is also discussed in the literature, but is not touched on here, is the effects of fee-shifting rules on the incentives to comply with the law.[29] As our main purpose is to replicate the empirical results with a simple theoretical model, and since as far as we know there are no empirical results in this regard,[30] we have not made such an attempt. But it might be worthwhile to explore this area of research by making use of the framework proposed here.

## Appendix A

*Proof of Proposition 1.* We solve for the equilibrium of the game by backward induction.

### Decision of Whether to Go to Court

The lawyer's decision of whether to go to court or drop the case, after a settlement demand $S$ is rejected, depends on the expected payoff of going to court versus that of dropping the case, that is, between $E[\alpha p^{\mathrm{A}}(q)qw - v(e_{\mathrm{p}}^{\mathrm{A}}(q))|S \text{ is rejected}]$ and 0. If the former (latter) is greater, then he/she will advise the plaintiff to (not to) go to court. If they are equal, then with probability $\beta(S)$ he/she advises the plaintiff to continue.

### Stage of Pretrial Negotiation

When the defendant decides whether to settle with a demand $S$, he/she compares its payoff, $-S$, with the expected payoff if he/she rejects, $\beta(S)[-p^{\mathrm{A}}qw - v(e_{\mathrm{d}}^{\mathrm{A}}(q))]$. Define $q(S)$ such that

$$q(S) = \frac{\frac{S}{\beta(S)} - \lambda}{a^{\frac{-\gamma}{\alpha}} w\left(1 + \frac{\gamma}{\alpha}\log a\right)}.$$

A defendant with liability $q(S)$ is indifferent between accepting and rejecting the settlement offer $S$. Moreover, a defendant whose liability is greater (lesser) than $q(S)$ will accept (reject) $S$. A complication occurs when $q(S)$ is greater

29. A theoretical study on this is Hylton (1993).

30. This is essentially because it is difficult to measure the precaution a person takes against accidents.

than the maximum possible value of liability, $\bar{q}$. We thus need to distinguish between two cases.

*Case 1.* $q(S) > \bar{q}$. In this case all types of defendant will reject $S$, so the expected payoff of the plaintiff's lawyer after $S$ is rejected will be

$$E[\alpha p^{\mathrm{A}}(q)qw - v(e_{\mathrm{p}}^{\mathrm{A}}(q))] = \int_0^{\bar{q}} \left[\alpha pqw - v\left(e_{\mathrm{p}}^{\mathrm{A}}(q)\right)\right] f(q)\mathrm{d}q$$
$$= \frac{\bar{q}}{2}(\alpha - \gamma \log a) w a^{\frac{-\gamma}{\alpha}} - \lambda,$$

where the last equality follows from the uniform distribution assumption on $q$. Define $w^{\mathrm{A}}$ to be such that

$$\frac{\bar{q}}{2}(\alpha - \gamma \log a) w^{\mathrm{A}} a^{\frac{-\gamma}{\alpha}} - \lambda = 0.$$

Solving for $w^{\mathrm{A}}$ we have

$$w^{\mathrm{A}} = \frac{2\lambda}{a^{\frac{-\gamma}{\alpha}}(\alpha - \gamma \log a)\bar{q}}.$$

If the damage of the plaintiff is greater (lesser) than $w^{\mathrm{A}}$, the expected payoff for the lawyer when he/she continues to litigate is greater (lesser) than when he/she drops the case. This implies the following.

1. For a plaintiff with $w > w^{\mathrm{A}}$, $\beta(S) = 1$. That is, the plaintiff's lawyer will advise his client to go to court after settlement demand $S$ is rejected. The restriction that $q(S) > \bar{q}$ thus implies that $S > a^{\frac{-\gamma}{\alpha}}\left(1 + \frac{\gamma}{\alpha}\log a\right) w\bar{q} + \lambda$.
2. For a plaintiff with $w < w^{\mathrm{A}}$, $\beta(S) = 0$, that is, his/her lawyer will advise dropping the case after $S$ is rejected. In this case any $S > 0$ will satisfy the restriction that $q(S) > \bar{q}$.
3. If $w = w^{\mathrm{A}}$, then the lawyer is indifferent between whether to go to court. Thus, $\beta(S) \in [0, 1]$, which (by the restriction that $q(S) > \bar{q}$) implies that $\beta(S) < \frac{S}{a^{\frac{-\gamma}{\alpha}}\left(1+\frac{\gamma}{\alpha}\log a\right) w^{\mathrm{A}}\bar{q} + \lambda}$. Let $S^{\mathrm{A}} \equiv a^{\frac{-\gamma}{\alpha}}\left(1 + \frac{\gamma}{\alpha}\log a\right) w^{\mathrm{A}}\bar{q} + \lambda$. Then it implies that $\beta(S) < \frac{S}{S^{\mathrm{A}}}$ when $S \leq S^{\mathrm{A}}$ and no restriction on $\beta(S)$ when $S > S^{\mathrm{A}}$.

*Case 2.* $q(S) \leq \bar{q}$. In this case, the lawyer needs to update the belief on the value of the defendant's liability (in a Bayesian fashion) after $S$ is rejected, and his/her expected payoff of going to the court therefore is

$$E\left[\alpha p^{\mathrm{A}}(q)qw - v\left(e_{\mathrm{p}}^{\mathrm{A}}(q)\right) \middle| S \text{ is rejected}\right]$$
$$= \int_0^{q(S)} \left[\alpha pqw - v\left(e_{\mathrm{p}}^{\mathrm{A}}(q)\right)\right] \frac{f(q)}{F(q(S))}\mathrm{d}q = \frac{q(S)}{2}(\alpha - \gamma \log a) w a^{\frac{-\gamma}{\alpha}} - \lambda. \qquad \text{(A1)}$$

The payoff for the lawyer when the case is dropped is 0. Let $q_1^{\mathrm{A}}(w)$ be the value of $q(S)$ such that the right-hand side of equation (A1) equals 0, that is,

$$q_1^{\mathrm{A}}(w) \equiv \frac{2\lambda}{a^{\frac{-\gamma}{\alpha}}(\alpha - \gamma \log a)w}.$$

$q_1^{\mathrm{A}}(w)$ is the value of $q(S)$ which makes the plaintiff's lawyer indifferent between going to court and dropping the case, when the damage of the plaintiff is $w$. Since equation (A1) is an increasing function of $q(S)$, we know that the plaintiff's lawyer prefers to go to court (drop the case) if $q(S) > (<) q_1^{\mathrm{A}}(w)$. Specifically, we have the following.

1. If $q(S) > q_1^{A}(w)$, then $\beta(S) = 1$. This implies that $S > a^{\frac{-\gamma}{\alpha}}(1 + \frac{\gamma}{\alpha}\log a)wq_1^{\mathrm{A}} + \lambda = S^{\mathrm{A}}$.[31] Moreover, the restriction $q(S) \leq \bar{q}$ implies that $S \leq a^{\frac{-\gamma}{\alpha}}\left(1 + \frac{\gamma}{\alpha}\log a\right)w\bar{q} + \lambda$.
2. If $q(S) < q_1^{\mathrm{A}}(w)$, then $\beta(S) = 0$. But in this case it is impossible that $q(S) \leq \bar{q}$.
3. If $q(S) = q_1^{\mathrm{A}}(w)$, then the plaintiff's lawyer is indifferent between continuing and dropping. Thus $\beta(S) \in [0, 1]$. But since

$$\beta(S) = \frac{S}{a^{\frac{-\gamma}{\alpha}}\left(1 + \frac{\gamma}{\alpha}\log a\right)wq_1^{\mathrm{A}} + \lambda} = \frac{S}{S^{\mathrm{A}}}$$

and $\beta(S) \leq 1$, it must be that $S \leq S^{\mathrm{A}}$.

The value of $\beta(S)$ as a function of $w$ and $S$ is drawn in Figure 6. It shows that when the value of damage, $w$, is less than $w^{\mathrm{A}}$, a rejection of any settlement demand will lead the plaintiff's lawyer to believe that the expected gain of a court trial is negative for him/her, and he/she will thus advise his/her client to drop the case. If $w$ is greater than $w^{\mathrm{A}}$, the decision of whether to continue with litigation is determined by the value of rejected settlement offer $S$. If $S$ is so large so that virtually all types of defendant will reject (i.e., $S \geq S^{\mathrm{A}}$), then continuing with litigation will yield positive expected payoff (since $w > w^{\mathrm{A}}$), and therefore $\beta(S) = 1$. If, however, the rejected offer is small, then the defendant must have low value of liability. Moreover, the lower the value of $S$ that is rejected, the lower the updated value of liability and, therefore, the lower the expected payoff of going to court. The probability of going to court, $\beta(S) = S/S^{\mathrm{A}}$, will thus be an increasing function of rejected settlement offer.

### The Optimal Settlement Offer for the Plaintiff

First note that when $w < w^{\mathrm{A}}$, the expected payoff of the lawyer in trial is negative even under the most optimistic assessment of the defendant's liability (i.e., even when all types of defendant go to court). Consequently, the case will be dropped for any value of $S$ that is rejected (i.e., $\beta(S) = 0$ for all $S$). Thus, any value of $S$ will constitute an equilibrium. For convenience, we assume that when $w < w^{\mathrm{A}}$, the equilibrium settlement is $S^* = 0$ and is accepted. Next we consider the case when $w \geq w^{\mathrm{A}}$.

31. Note that $wq_1^{\mathrm{A}}(w) = w^{\mathrm{A}}\bar{q}$.

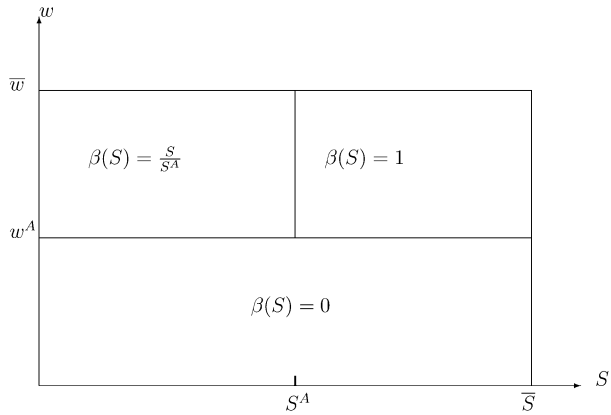


Figure 6. Litigation Probability as a Function of Settlement Offer and Damage.

The expected utility of the plaintiff's lawyer for settlement demand $S$ is

$$V(S) = \int_{q(S)}^{\bar{q}} (\alpha S) f(q) \mathrm{d}q + [1 - \beta(S)] F(q(S))(0)$$
$$= \alpha S \frac{\bar{q} - q(S)}{\bar{q}} - \lambda \beta(S) \frac{q(S)}{q} + \beta(S)(\alpha - \gamma \log a) a^{\frac{-\gamma}{\alpha}} w \frac{(q(S))^2}{2\bar{q}}.$$

It can be easily verified that for any $S < S^{\mathrm{A}}$,

$$V(S) = \alpha S(1 - F(q^{\mathrm{A}})) < \alpha S^{\mathrm{A}}(1 - F(q^{\mathrm{A}})) = V(S^{\mathrm{A}}).$$

This implies that the equilibrium offer must be at least $S^{\mathrm{A}}$.

Since we already know that $\beta(S) = 1$ when $w \geq w^{\mathrm{A}}$, the expected payoff of the plaintiff demanding $S$ is

$$V(S) = \alpha \frac{\bar{q} - \frac{S-\lambda}{a^{-\frac{\gamma}{\alpha}} w\left(1 + \frac{\gamma}{\alpha} \log a\right)}}{\bar{q}} S - \frac{\lambda}{\bar{q}} \frac{S - \lambda}{a^{-\frac{\gamma}{\alpha}} w\left(1 + \frac{\gamma}{\alpha} \log a\right)}$$
$$+ (\alpha - \gamma \log a) \frac{a^{-\frac{\gamma}{\alpha}} w}{2\bar{q}} \left( \frac{S - \lambda}{a^{-\frac{\gamma}{\alpha}} w\left(1 + \frac{\gamma}{\alpha} \log a\right)} \right)^2.$$

The first-order condition for the optimal value of $S$ is

$$V'(S) = \alpha \frac{\bar{q} - \frac{S-\lambda}{a^{-\frac{\gamma}{\alpha}} w\left(1 + \frac{\gamma}{\alpha} \log a\right)}}{\bar{q}} - \frac{\alpha S}{\bar{q} a^{-\frac{\gamma}{\alpha}} w\left(1 + \frac{\gamma}{\alpha} \log a\right)}$$
$$- \frac{\lambda}{\bar{q} a^{-\frac{\gamma}{\alpha}} w\left(1 + \frac{\gamma}{\alpha} \log a\right)} + \frac{(\alpha - \gamma \log a)(S - \lambda)}{a^{-\frac{\gamma}{\alpha}}\left(1 + \frac{\gamma}{\alpha} \log a\right)^2 \bar{q} w}$$
$$= 0. \tag{A2}$$

It can be easily shown that when $w \leq w_1^{\mathrm{A}}$, $V'(S^{\mathrm{A}}) \leq 0$. This implies that if $w \leq w_1^{\mathrm{A}}$, the value of $S$ that maximizes $V(S)$ is $S^{\mathrm{A}}$. If $w > w_1^{\mathrm{A}}$, solving for equation (A2) yields $S^*(w) = \alpha\bar{q}\frac{a^{-\frac{\gamma}{\alpha}}\left(1+\frac{\gamma}{\alpha}\log a\right)^2}{\alpha+3\gamma\log a}w - \lambda\frac{1+\frac{\gamma}{\alpha}\log a-2\gamma\log a}{\alpha+3\gamma\log a}$. QED

## Appendix B

*Proof of Proposition 2.*

### Decision of Whether to Go to Court

The plaintiff's criterion of whether to continue with litigation, when settlement demand is turned down, is exactly the same as in Appendix A, with $p^{\mathrm{A}}(q)$ and $e_{\mathrm{p}}^{\mathrm{A}}(q)$ in that appendix replaced by $p^{\mathrm{B}}(q)$ and $e_{\mathrm{p}}^{\mathrm{B}}(q)$.

### Stage of Pretrial Negotiation

Under the British rule, the cutoff value of liability for the defendant is

$$q(S) = \frac{\frac{S}{\beta(S)} - \lambda}{e^{b-1}(1+\alpha)w}b.$$

Similarly, there are two cases to consider.

*Case 1.* $q(S) > \bar{q}$. In this case all types of defendant reject $S$, and we can define a term similar to $w^{\mathrm{A}}$,

$$w^{\mathrm{B}} \equiv \frac{2\lambda}{\alpha b e^{b-1}\bar{q}},$$

which is the value of damage that makes the lawyer indifferent between dropping the case and continuing with litigation. With exactly the same reasoning as in Appendix A we can show the following.

1. For any plaintiff with $w > w^{\mathrm{B}}$, $\beta(S) = 1$, which in turn implies that $S > \frac{e^{b-1}(1+\alpha)w\bar{q}}{b} + \lambda$.
2. For any plaintiff with $w < w^{\mathrm{B}}$, $\beta(S) = 0$. In this case any $S > 0$ satisfies the restriction that $q(S) > \bar{q}$.
3. For a plaintiff with $w = w^{\mathrm{B}}$, $\beta(S) \in [0, 1]$, which implies that $\beta(S) < \frac{S}{\frac{e^{b-1}}{b}(1+\alpha)w^{B}\bar{q}+\lambda}$. Thus, $\beta(S) < \min\left[1, \frac{S}{\frac{e^{b-1}}{b}(1+\alpha)w^{\mathrm{B}}\bar{q}+\lambda}\right]$.

*Case 2.* $q(S) \leq \bar{q}$. Define $q^{\mathrm{B}}(w)$ as

$$q_1^{\mathrm{B}}(w) = \frac{2\lambda}{\alpha b e^{b-1}w}.$$

$q_1^{\mathrm{B}}(w)$ is the cutoff value of liability that would make the lawyer indifferent between going to court and dropping the case, when damage is $w$. Then we have the following.

1. For $q(S) > q_1^{\mathrm{B}}(w)$, $\beta(S) = 1$. This implies that

$$\bar{q} \geq \frac{S-\lambda}{e^{b-1}(1+\alpha)w} b > q_1^{\mathrm{B}}(w).$$

That is,

$$\frac{e^{b-1}}{b}(1+\alpha)w\bar{q} + \lambda \geq S > \frac{e^{b-1}}{b}(1+\alpha)wq_1^{\mathrm{B}}(w) + \lambda \equiv S^{\mathrm{B}}.$$

2. It is easy to show that $q(S) < q_1^{\mathrm{B}}(w)$ is impossible.
3. If $q(S) = q_1^{\mathrm{B}}(w)$, then

$$\beta(S) = \frac{S}{S^{\mathrm{B}}}.$$

Since $\beta(S) \in [0, 1]$, it must be that $S \leq S^{\mathrm{B}}$.

The value of $\beta(S)$ as a function of $S$ and $w$ is the same as in Figure 6, with $S^{\mathrm{A}}$, $w^{\mathrm{A}}$, and $a^{\frac{-\gamma}{\alpha}}\left(1+\frac{\gamma}{\alpha}\log a\right)\overline{wq} + \lambda$ replaced by $S^{\mathrm{B}}$, $w^{\mathrm{B}}$, and $\frac{e^{b-1}(1+\alpha)}{b}\overline{qw} + \lambda$, respectively. The intuition is exactly the same as for the American rule.

### The Optimal Settlement Offer for the Plaintiff

The proof is almost the same as for the American rule. We only need to note that when $S \geq S^{\mathrm{B}}$, the expected payoff of the lawyer in demanding $S$ is

$$V(S) = \alpha\left(1 - \frac{S-\lambda}{\frac{e^{b-1}}{b}(1+\alpha)\bar{q}w}\right)S - \frac{\lambda(S-\lambda)}{\frac{e^{b-1}}{b}(1+\alpha)\bar{q}w} + \frac{\alpha b e^{b-1}}{2\bar{q}w}\left(\frac{S-\lambda}{\frac{e^{b-1}}{b}(1+\alpha)}\right)^2.$$

The first-order condition for the optimal value of $S$ is

$$\begin{aligned} V'(S) &= \alpha\left(1 - \frac{S-\lambda}{\frac{e^{b-1}}{b}(1+\alpha)\bar{q}w}\right) - \frac{\alpha S + \lambda}{\frac{e^{b-1}}{b}(1+\alpha)\bar{q}w} \\ &\quad + \frac{\alpha b e^{b-1}}{\frac{e^{b-1}}{b}(1+\alpha)\bar{q}w}\left(\frac{S-\lambda}{\frac{e^{b-1}}{b}(1+\alpha)}\right) \\ &= 0. \end{aligned} \tag{B1}$$

It can be easily shown that when $w < w_1^{\mathrm{B}}$, $V'(S^{\mathrm{B}}) \leq 0$, meaning that the optimal value for $S$ is $S^{\mathrm{B}}$. When $w \geq w_1^{\mathrm{B}}$, solving for first-order condition (B1) yields the value $S^{**}(w)$. It is easy to check that $V''(S^{**}(w)) < 0$ so that second-order condition holds. QED

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