An Attorney Fee as a Signal in Pretrial Negotiation

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May 31, 2012

Abstract

In this paper, we consider the signaling role of an attorney fee which has been assumed as exogenous in the literature on pretrial negotiation. We show that there exists an equilibrium in which the informed plaintiff uses both the attorney fee and the settlement demand as signals of his damage amount. However, if attorney service is not so productive that the winning probability does not depend on the size of the legal expenditure, this equilibrium is Pareto dominated by the separating equilibrium using solely the settlement demand as a signal. Moreover, the former equilibrium does not survive D1 criterion, while the latter equilibrium does. If attorney service is productive, the opposite is true. The separating equilibrium using a combination of a high attorney fee and a high settlement demand as signals Pareto dominates the separating equilibrium using only a settlement demand as a signal, and the former equilibrium survives D1 criterion, while the latter equilibrium does not. This result has an interesting policy implication that regulating attorney fees may not be socially desirable because it discourages settlements.

JEL Classification Code: K13

Key Words: pretrial negotiation, settlement demand, attorney fee, signal

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1 Introduction

In recent decades, the United States has been an increasingly litigious society due to major increases in lawsuits involving such areas as health care, product liability, intellectual property, venture capital, energy, elder, antitrust, and environmental law.[1] Time series data show that, over the course of the 20th century, there is an upward trend in civil cases filed as percentage of the population in many American jurisdictions. However, a striking increase in legal expenditures is not limited to the United States. It has been a great social concern in other common and civil law countries as well. There have been growing policy debates over the need for reform of the American justice system. Most importantly, settlements out of court have been encouraged and various proposals promoting settlements have been made.[2] Also, an excessively large number of lawyers and the contingent fee system for lawyers have been attributed to the litigiousness. As of 2010, there are over 1 million lawyers in the United States, according to the American Bar Association, more per capita than any other country. As the number of lawyers has increased, so has the number of civil claims. Accordingly, several proposals to limit contingent fees have been considered.[3]

Roughly, there are three ways for attorneys to charge for legal services; hourly, fixed fee or contingency fee.[4] Although a significant amount of research has been devoted to contingency fees and hourly fees, fixed fees have been largely ignored in literature. In this paper, we explore a signaling role of an attorney fee in pretrial negotiation by assuming a

[1] According to Baye, Kovenock and de Vries (2005), Americans spend more on civil litigation than any other industrialized country, and twice as much on litigation as on new automobiles.

[2] Many legal devices have been designed to reduce court congestion and legal expenditures. These devices include fee-shifting rules such as Rule 68 of the Federal Rules of Civil Procedure, discovery requirements, a shift in a certain tort from a rule of negligence to a rule of strict liability, and Rule 408 of the Federal Rules of Evidence etc. See Sobel (1989), Spier (1994) and Daughety and Reinganum (1995) for an economic analysis of mandatory discovery, Rule 68 and Rule 408 respectively.

[3] For example, California Proposition 106, which was defeated on the November 8, 1988 statewide ballot, was an attempt to limit attorney contingency fees. In 2003, lawyers in 13 states initiated a voluntary campaign to limit the fees on the ground that it is unethical for lawyers to charge unreasonable fees. Also, contingent fees are prohibited in U.K.

[4] Also, a conditional fee is used in U.K. A conditional fee is any fee that is paid only if there is a favorable result. It is analogous to a contingency fee in the sense that the fee depends on the trial outcome, although it does not depend on the damages awarded.

fixed fee. The assumption of a fixed fee here is simply to accentuate that the signaling result is derived even by the simplest form of the attorney fee. Also, it is the unique feature of this paper that an attorney fee is endogenously determined while most of the existing literature assumes that it is exogenously given.

We consider two models. In the first model, the expenditure on an attorney itself does not affect the winning probability. It is simply dissipative. However, we show that an informed plaintiff can use a high attorney fee (together with a high settlement demand) to signal his private information of the damage amount. In fact, a high attorney fee alone cannot be a signal of the damage amount, because signaling by an attorney fee is meaningful only if it is accompanied by the optimal settlement demand. Thus, in this model, the two signaling devices, a high attorney fee and a high settlement demand are not substitutable in the sense that signaling solely by a high attorney fee is not possible, rather complementary because a high attorney fee reinforces the signaling effect of a high settlement demand, thereby increasing the probability that the demand is accepted. Then, the natural question that arises is how effective the signaling of using a high attorney fee in addition to a high settlement demand is in terms of the plaintiff's payoff or welfare. There are two effects of using a high attorney fee. On one hand, it is dissipative in the sense that it is unproductive. So, it directly reduces the plaintiff's payoff. On the other hand, due to its signaling effect, it increases the acceptance probability, thereby leading to a higher settlement rate. We show that the former effect dominates the latter effect so that the separating equilibrium in which only a separating demand is used as a signal always Pareto dominates the separating equilibrium in which a separating attorney fee as well as a separating demand is used. The intuitive reason why a settlement demand is a more efficient signal than an attorney fee is that an increase in the settlement demand incurs different costs over types, while an increase in the attorney fee is equally costly to both types. Moreover, the settlement demand is just of a zero-sum nature, whereas an increase in the attorney fee is dissipative, i.e., incurring efficiency loss. We also show that the separating equilibrium in which the plaintiff uses an attorney fee as well as a settlement demand as signals does not pass D1 criterion which is a more refined solution concept than perfect Bayesian equilibrium, while the separating equilibrium in which the plaintiff signals his type only by a separating demand satisfies D1 criterion.

In the second model, the attorney's legal service is productive and the productivity increases with the attorney's fee. Then, we obtain the opposite result. Using a combination of a high attorney fee and a high settlement demand as signals is not only possible in a separating equilibrium but also the separating equilibrium Pareto dominates the separating equilibrium using a separating demand only. The reason is that in this case an attorney fee is not just dissipative but contributes to the trial outcome through increasing the winning probability. Moreover, we show that only the separating equilibrium using a high attorney fee as well as a high demand survives D1 criterion, while the separating equilibrium using a high settlement demand only as a signal does not. This has an interesting policy implication. Our result suggests that limiting attorney fees may not be socially desirable, because permitting a more capable lawyer a high legal fee has the welfare-enhancing effect of increasing the settlement rate and the winning probability insofar as a legal service by a more capable lawyer that can be obtained only by a high expenditure is productive.[5]

A high attorney fee can be a signal of a high damage amount due to the consideration that a low damaged plaintiff could not pay such a high attorney fee and demand such a high amount which has a high risk of being rejected. However, using a high attorney fee alone cannot be an effective signal. The reason is as follows. Signaling by a separating fee would be profitable only when it would induce the correspondingly high settlement demand. However, if the settlement demand must be pooling at the optimal level of the low-damaged plaintiff, such a low demand will be always accepted. Then, the high-damaged plaintiff will have no incentive to use a costly signal of a high attorney fee. This intuition is valid even if the legal expenditure is productive. If a high attorney fee cannot affect the subsequent settlement demand, a high damaged plaintiff has no reason to use a high upfront investment on an attorney fee.

Rubinfeld and Scotchmer (1993) demonstrated the signaling role of contingent fees under two opposite information structures. First, they showed that if a client has private informa-

[5]In the past, the Korean Attorney-at-Law Act provided that the Korean Bar Association control the attorney fees, but the provision was abolished in 2000 on the ground that it violates the spirit of the fair competition law by fostering collusion among lawyers, and thereafter attorney fees have been virtually competitively determined in the free market, although the regulation on the attorney fee still remains in the criminal cases to protect financially constrained defendants.

tion regarding the strength of his case, a client with a strong case will be willing to pay a high fixed fee and a low contingency percentage, while a client with a weak case will prefer the opposite. Second, they also showed that if an attorney has private information about his ability, an attorney with high ability will signal his ability by his willingness to take a low fixed fee and high contingency percentage. However, they did not consider the pretrial negotiation between the plaintiff and the defendant. Dana and Spier (1993) also considered the effect of contingent fees when lawyers are better informed than the clients, and showed that the lawyers' recommendations would be more truth-revealing under contingent fees. Recently, Fong and Xu (2011) offered an interesting signaling explanation for why defense attorney's fee structure is often flat. There is also extensive literature on the effect of attorney fee arrangements on the attorney's unobservable effort level. Contrary to the traditional view that contingent fees lead to excessive litigation, Schwartz and Mitchell (1970) argued that an attorney spends fewer hours per case under a contingent fee arrangement than under an hourly fee arrangement. Accepting their conclusion, Clermont and Currivan (1978) proposed a solution to the moral hazard problem. Danzon (1983) discussed the optimal contingent percentage, and showed that the contingent fee induces the same amount of risk neutral attorney's effort that would be chosen by a fully informed plaintiff under the hourly fee. Emons and Garoupa (2006) and Emons (2007) considered conditional fees as well as contingent fees. In particular, Emons (2007) showed that if there is asymmetric information about the expected level of abjudication, attorneys will offer only conditional fees, and if there is asymmetric information about the risk of the case, they will offer only contingent fees. The role of the lawyer in those moral hazard literature is to increase the probability that his client will win by making efforts, while the role in Rubinfeld and Scotchmer is to increase the winning probability by using the lawyer's expertise. In this paper, we show that the signaling outcome does not rely on the expertise of a lawyer nor the effort to increase the winning probability. Even without such assumptions on the winning probability, paying an upfront fixed fee to lawyers can signal the quality of the case, which facilitates the settlement between the legal parties to enhance social efficiency.

In the following section, we provide a simple model of pretrial negotiation. In Section 3, we consider the case in which the winning probability at trial is exogenous so that it is not affected by the legal expenditure. In Section 4, we consider the alternative case in which the winning probability is increased by the legal expenditures. Concluding remarks follow in Section 5. All proofs are contained in Appendix.

2 Model

A potential defendant (D) has inflicted some damages to a potential plaintiff (P) by accident. Both of them are assumed to be risk-neutral. The size of the injury that P suffers is his private information. D only knows the probability distribution of the injury size. If P files the case, the dispute can be resolved either by going to trial or by settling the case out of court. The procedure of the pretrial negotiation goes as follows. P first pays an attorney an upfront fixed fee to delegate his case. Then, P (or his attorney) makes a settlement demand to D on a take-it-or-leave-it basis prior to trial. D can either accept it or reject it. If he rejects it, they go to trial. For simplicity, we assume that the filing cost is negligible. The following notation will be used throughout the paper.

$w =$ accident losses caused by an injurer ($w = H, L$ where $H > L$)
$\lambda =$ prior probability (or belief) that $w = H$ where $\lambda \in (0, 1)$
$q =$ probability that P will prevail at court where $q \in (0, 1)$.
$c =$ the plaintiff's attorney fee where $c \in \mathbb{C} \equiv [\underline{c}, \infty)$
$s =$ the plaintiff's settlement demand ($s \geq 0$)
$c_p =$ other trial costs of the plaintiff ($c_p > 0$)
$C_d =$ overall trial costs of the defendant ($C_d > 0$)
$T = c_p + C_d$
$\Delta w = H - L$

Among them, c and s are the plaintiff's choice variables, whereas all other variables are exogenous. While in most of the literature on pre-trial negotiation, the plaintiff's trial cost is assumed to be exogenously given, we treat it as an endogenous variable. This is a unique feature of this model. One can think of $c + c_p \equiv C_p$ as overall trial costs of the plaintiff. The upfront fixed attorney fee c is observable to the defendant.[6] So, after observing the attorney

[6]If the plaintiff does not hire a lawyer, it can be interpreted as paying the minimum fee $\underline{c}$ possibly equal to zero. We could assume that $\underline{c} = 0$, but for more generality, we do not impose the assumption. Our result

fee and the settlement demand, D updates his posterior belief that $w = H$.[7] This posterior belief as well as the prior belief λ is common knowledge. Also, not that q does not depend on c in this basic model. The next section provides an analysis for this case of exogenous winning probability. The alternative case that q depends on c, which is more realistic, will be analyzed in Section 4.

3 Exogenous Winning Probability

Before we start the analysis, we define the strategies and beliefs. Let $\Omega = \{w \mid L, H\}$ be the set of P's possible damage amounts. We will call P with information L (H *resp.*) type L (H *resp.*). A strategy for P consists of two components during the attorney delegation stage and during the pretrial negotiation stage. The first component which is defined at the initial decision node is a map from P's type set to the possible choices of his attorney fee i.e., $c : \Omega \rightarrow \mathbb{C}$. We will call this P's fee strategy. The second component which is defined at his demand node during the pretrial negotiation stage is a map from his type set and the set of his fee payments to the possible choices of his settlement demand i.e., $s : \Omega \times \mathbb{C} \rightarrow \mathbb{R}_+$. We will call this P's demand strategy. A strategy for D is a map from the set of possible past observations into $\Delta(A)$, $r : \mathbb{C} \times \mathbb{R}_+ \rightarrow [0, 1]$, where $A = \{0, 1\}$ and 1 indicates "accept", 0 indicates "reject", and $\Delta(A)$ is the set of all the probability distributions over A. This means that we allow mixed (behavioral) strategies of D. Letting $m = (c, s)$, we can interpret $r(c, s)$ as the probability that D accepts the settlement demand s given the fee c. Also, D's posterior belief over the P's possible types, denoted by $\hat{\lambda}$, will be defined as a map from the set of possible past observations to $\Delta(\Omega)$, i.e., $\hat{\lambda} : \mathbb{C} \times \mathbb{R}_+ \rightarrow [0, 1]$.

The payoff functions of P and D are written as $U_i(c, s, r, w)$, $i = P, D$. Although c does not directly affect the payoff of the uninformed player U_D, it affects his expected payoff through $\hat{\lambda}$.

does not depend on whether $\underline{c} > 0$ or $\underline{c} = 0$ at all.

[7] Alternatively, we can think of two-stage belief updating first after observing the attorney fee and second after observing the settlement demand. However, the first updated belief is updated later anyhow, and all that D needs is the finally updated belief. So, in terms of equilibrium characterization, the two-stage belief updating is equivalent to the one-time updating assumed in this paper.

As a solution concept, we will use the Perfect Bayesian Equilibrium. As is well known, the Perfect Baysian Equilibrium allows any arbitrary belief off the equilibrium path and the arbitrariness of the off-the-equilibrium belief usually generates a large set of equilibria. To characterize the set of all possible Perfect Bayesian Equilibria, we will assign the most pessimistic belief off the equilibrium path, $\hat{\lambda}(m) = 0$ for any out-of-equilibrium message m, i.e., D believes that any unexpected message comes from a low type. Also, we will invoke a more refined concept, D1 criterion, whenever necessary.[8]

This game has many equilibria. There are two kinds of separating equilibria as well as pooling equilibria. One is the separating equilibrium in which the type of P is separated by only one signaling device of P, and the other is the separating equilibrium in which it is separated by his fee strategy as well as the settlement demand strategy. Also, we will call a separating equilibrium trivial if both types earn the same payoff in both equilibrium strategies so that they are indifferent between imitating each other and not, that is, for equilibrium messages m_1 and m_2 and the corresponding equilibrium strategies of D r_1 and r_2, $U_P(m_1, r_1, w) = U_P(m_2, r_2, w)$ for all $w = L, H$.[9]

3.1 Separating Fee Equilibrium (SFE)

When an informed player wants to separate his type, he does not need to use both signaling devices. P may signal his type by using only one of the attorney fee and the settlement demand. Separating equilibria with separating fees will be called separating fee equilibria (SFE), and those with separating settlement demands will be called separating demand equilibria (SDE). First, we are interested in the possibility of SFE.

Lemma 1 *In equilibrium, for any $c \in \mathbb{C}$, $r(c, s) = 1$ if $s < s_L \equiv qL + C_d$ and $r(c, s) = 0$ if $s > s_H \equiv qH + C_d$.*

Intuitively, D expects his losses at court to be either $qL + c_d$ or $qH + c_d$. Thus, it is clear that he will always accept a demand lower than s_L and reject a demand higher than s_H.

[8]This concept proposed by Cho and Kreps (1987) is essentially a redefinition of universal divinity by Banks and Sobel (1987).

[9]A trivial equilibrium requires more than that both types earn the same payoff in equilibrium. Additionally, it requires that both types earn the same payoff if they deviate to the equilibrium strategy that the other type is supposed to play.

Lemma 2 *$c^*(L) = \underline{c}$ and $s^*(L) = s_L$ in any separating equilibrium, and this is supported by $r(\underline{c}, s_L) = 1$.*

This lemma implies that in any separating equilibrium, the low-type's equilibrium messages are not distorted, i.e., $c^*(L) = \underline{c}$, $s^*(L) = s_L$. The intuition is clear. Under the most pessimistic belief, any deviation of a low-type P is perceived to come from L. Thus, if $c^*(L) \neq \underline{c}$ or $s^*(L) \neq s_L$, he would deviate to $\underline{c}$ or s_L.

Now, since we focus on the separating equilibrium in which P uses only the separating fee strategy, $s^*(H) = s^*(L) = s_L$. Therefore, we have only to determine the equilibrium fee of the high type, $c^*(H)$. However, unfortunately, any $c^*(H)$ strictly higher than $\underline{c}$ cannot be a separating equilibrium fee. The intuition is that a high-type P may have an incentive to expend a high amount on attorney service only if it could make D believe that he is severely damaged and this enables him to make a higher settlement demand. Insofar as the plaintiff must use a pooling demand, a high-type plaintiff always finds it in his interest to save the expenditures on the lawyer by selecting the lowest possible fee $\underline{c}$.

Proposition 1 *There is no SFE.*

This proposition implies that signaling only by the attorney fee is not possible. This result is not surprising, because the signaling costs of the attorney fee do not differ across types in the sense that an increase of the fee by one unit affects the payoffs of both types equally.

3.2 Separating Demand Equilibrium (SDE)

Next, we consider the alternative possibility of an equilibrium in which P reveals his type only by using a separating demand strategy, while he uses a pooling fee strategy. A series of lemmas are put in order.

Lemma 3 *If s_1 and s_2 are two distinct equilibrium demands with $s_1 < s_2$, it must be that $r^*(s_1) > r^*(s_2)$.*[10]

[10] Since the acceptance probability is not directly affected by c, we suppress the argument c as $r(s)$. However, we will use the argument whenever the suppression might cause confusion.

This is intuitively clear. If $r^*(s_1) \leq r^*(s_2)$, s_1 will never be demanded in equilibrium.

Lemma 4 *(i)* $r^*(s_L) = 1$. *(ii)* $r^*(s^*(H)) < 1$.

If both equilibrium demands are accepted with probability one, the low-type P will always have an incentive to mimic a high type by asking the high-type equilibrium demand.

Lemma 5 *If* $r^*(s^*(H)) > 0$, $s^*(H) = s_H$. *If* $r^*(s^*(H)) = 0$, *any* $s^*(H) \geq s_H$ *can be an equilibrium demand of a high type* P *if* $q\Delta w > T$.

We will call a settlement demand s inducing $r(s) > 0$ a meaningful demand, because if $r(s) = 0$ so that a demand is rejected for sure, the demand amount itself is meaningless. This lemma implies that the meaningful equilibrium demand by a high-type P is also not distorted as the equilibrium demand by a low-type P, but is rejected with a positive probability. However, this lemma also suggests the possibility of meaningless (or vacuous) equilibrium settlement demands which induce D to reject them with probability one. Then, we have the following proposition.

Proposition 2 *There are two types of SDE: (i)* $c(H) = c(L) = \underline{c}, s^*(H) = s_H, s^*(L) = s_L, r^*(s_H) \in I, r^*(s_L) = 1$ *where* $I = \{r^* \in [0,1] \mid \frac{T-q\Delta w}{T} \leq r^* \leq \frac{T}{q\Delta w+T}\}$ *and (ii)* $c(H) = c(L) = \underline{c}, s^*(H) \geq s_H, s^*(L) = s_L, r^*(s_H) = 0, r(s_L) = 1$.

This proposition suggests that this type of SDE is not unique. We have a continuum of separating equilibrium demand corresponding to a continuum set of D's equilibrium mixed strategies. Consider the first equilibrium associated with the meaningful equilibrium demand. The equilibrium probability $r^*(s_H)$ must satisfy two incentive compatibility conditions. First, it must be low enough to discourage a low type from imitating the high demand, and at the same time it must be high enough for a high type not to deviate from it. The upper bound of I is the acceptance probability that makes the low-type P indifferent between demand s_H and s_L, meaning that the high-type P strictly prefers demand s_H. If $q\Delta w < T$, the lower bound of I, $\frac{T-q\Delta w}{T}$, is indifferent between demanding s_H and s_L, while the low-type P strictly prefers demand s_L. If $q\Delta w > T$, the lower bound of I is zero. This implies that if $q\Delta w > T$, that is, the gain from separation exceeds the trial costs, demanding s_H is always strictly preferred by a high-type P in any equilibrium.

The important feature of this proposition is that the probability of accepting the high demand gets lower as q or H is higher. If the high-type P asks a high settlement demand, he must bear the risk of being rejected with higher probability. This is the cost that the high-type P must bear for separation. In this sense, the high-type P uses a costly signal in the separating equilibrium even if his demand is not distorted.

3.3 Separating Fee-Demand Equilibrium (SFDE)

We now consider separating equilibria in which P uses a separating demand strategy in combination of a separating fee strategy. We will call them separating fee-demand equilibria (SFDE). As we saw in Section 3.1, a separating fee strategy alone cannot reveal full information, but it must be accompanied by a complementary use of a separating demand strategy. From Lemma 2, we know that $c(L) = \underline{c}$. Since his type is revealed in a separating equilibrium, the best he can do is to maximize his payoff during the delegation stage by minimizing the attorney fee. On the other hand, the high type P must choose a fee high enough for a low type to be unable to imitate, and it depends on the low-type's payoff in the subsequent game, that is, the probability that the high-type's settlement demand is accepted. Lemma 6 and 7 characterize D' equilibrium acceptance probability and P's equilibrium settlement demand respectively.

Lemma 6 *(i) If $r^*(c^*(H), s^*(H)) = 1$, the trivial equilibrium is the only SFDE. (ii) If the equilibrium is not trivial, $r^*(c^*(H), s^*(H)) < 1$.*

This is clear, because if $r^* = 1$, the low-type P can always imitate the high type, except when the low type is indifferent between the the high type equilibrium strategy and the low type equilibrium strategy. If the high type is indifferent between them as well, both types are indifferent between the two equilibrium strategies, meaning a trivial equilibrium. For a non-trivial separating equilibrium, it must be that $r^* < 1$.

Lemma 7 *In a nontrivial equilibrium, $s^*(H) = s_H$ if $r^*(s^*(H)) > 0$. If $r^*(s^*(H)) = 0$, $s^*(H) \geq s_H$.*

Since D is indifferent between accepting and rejecting s_H, $r^*(s_H)$ could be anything from D's point of view, but it must give the right incentive to both types of P. The incentive compatibility conditions require

$$(qL + C_d) - \underline{c} \geq r^*(qH + C_d) + (1 - r^*)(qL - c_p) - c^*(H), \tag{1}$$

$$r^*(qH + C_d) + (1 - r^*)(qH - c_p) - c^*(H) \geq qL + C_d - \underline{c}. \tag{2}$$

Inequality (1) is the incentive compatibility condition for a low-type P, while inequality (2) is the incentive compatibility condition for a high-type P.[11] The two inequalities give

$$\frac{T - q\Delta w + c^*(H) - \underline{c}}{T} \leq r^* \leq \frac{T + c^*(H) - \underline{c}}{q\Delta w + T}. \tag{3}$$

The upper bound is to make inequality (1) binding and the lower bound is to make inequality (2) binding. To summarize, we have

Proposition 3 *There are two types of nontrivial SFDE: (i)* $c^*(L) = \underline{c}$*,* $c^*(H) \in (\underline{c} + q\Delta w - T, \underline{c} + q\Delta w)$*,* $s^*(w) = qw + C_d$ *for* $w = H, L$*,* $r^*(s_L) = 1$*,* $r^*(s_H) \in I'$ *satisfying inequality (3), and (ii)* $c^*(L) = \underline{c}, \underline{c} < c^*(H) \leq \underline{c} - T + q\Delta w, s^*(H) \geq s_H, s^*(L) = s_L, r(s_L) = 1, r^*(s_H) = 0$.

This proposition says that a high attorney fee can be a signal for high damage if it is not used solely but used together with the settlement demand. Using wasteful expenditures on the attorney helps signal the damage because it can increase the probability that s_H is accepted in the sense that it shifts the interval for r^* upward from I to I'. The higher acceptance probability is a consequence of a high-type's persuasive signaling by a high attorney fee that he is H. An interesting feature is that contrary to the common expectation, a high attorney fee is not accompanied by a high settlement amount; rather, it is associated with a higher acceptance rate. Thus, the widely held belief that P will want to be compensated for a high attorney fee by passing it on the settlement amount proportionately is not perfectly correct in this sense. Also, note that insofar as the demand is meaningful, the high type's equilibrium demand premium, which is $s^*(H) - s^*(L) = (qH - C_d) - (qL - C_d) \equiv q\Delta w$, is strictly higher than his extra premium for the attorney, $q\Delta - \alpha$, where $0 < \alpha < T$.

[11] Of course, we should check the incentive of each type to deviate only in the pretrial negotiation stage. In the appendix, we prove that inequalities (1) and (2) automatically imply such incentive compatibility conditions.

3.4 Comparison

We are now in a position of comparing the two equilibrium outcomes. Since the SDE outcome is essentially the same as the equilibrium outcome without the option of choosing an attorney, our main interest is whether P can be made better off by hiring an expensive attorney strategically, that is, whether P's payoff can be higher in SFDE than in SDE.

Using a totally mixed strategy $r^* \in (0, 1)$ in both equilibria implies that D's loss is $s_L - \underline{c}$ in both equilibria. The low-type P's payoff is also the same in both equilibria, so we can focus only on the high-type P's payoff. It depends on D's probability of accepting P's equilibrium demand s_H. Note that the acceptance probability is higher in SFDE in which $c^*(H) > \underline{c}$ than in SDE ($c^*(H) = \underline{c}$). Moreover, it gets higher as $c^*(H)$ increases. So, two conflicting effects coexist. In SFDE, the high-type P must pay a higher attorney fee but at the expense of it faces a higher probability that his demand is accepted, that is, a higher settlement rate. Which one dominates the other? The next proposition shows that the former effect dominates the latter, that is, the effect of a higher fee dominates the effect of a higher settlement rate.

Proposition 4 *In SFDE, (i) a settlement rate is higher, (ii) a high-type P's payoff cannot be higher and (iii) the social welfare is higher.*

This proposition implies that if a high attorney fee is used as a signal together with a high settlement demand in equilibrium, it induces more settlements, but the equilibrium is Pareto dominated by the equilibrium using only the settlement demand as a signal.[12] However, if the attorney's payoff is taken into consideration, the social welfare, which is the sum of the payoffs of P, D and the attorney is higher in SFDE.

The intuitive reason behind this apparently contradictory result is quite clear. In this model, there are two sources of inefficiency; trial and upfront expenditures on legal service. The upfront expenditures occur regardless of whether the case is settled or litigated, while trial costs are usually assumed to be paid *ex post* if the case goes to trial. In SFDE, the

[12]By Pareto dominance, we compare the payoffs of the active players, P and D in those two equilibria. The attorney is not an active player in this model in the sense that he has no strategy to choose. Thus, the attorney's payoffs are not compared. This is reasonable since the equilibrium selection is a matter that should be resolved by pre-play communication between active players.

trial cost is saved due to a higher settlement rate, but the saving is obtained only at the expense of a high attorney fee. This proposition says that the effect of direct expenditures dominate the indirect effect of less trial on the welfare. This also suggests that a settlement demand is a more efficient signal than an attorney fee, that is, signaling by an attorney fee requires more welfare loss than signaling by a demand. Why is an attorney fee less efficient in signaling? Raising an attorney fee entails the same signaling cost to a high type and a low type, while increasing the settlement demand and the consequent lowering the acceptance probability incurs a higher cost to a low type. Because of this, the attorney fee alone cannot be a signal and this is the main reason for inefficiency of signaling by an attorney fee. The main signaling channel is how c or s affects the acceptance probability r. D's decision to accept s, however, depends on the size of s, not on the size of c. Whether he accepts s or not, c is equally spent. In this regard, c does not affect the acceptance decision, implying that s is more efficient. The attorney fee c can affect the acceptance probability only through the belief about the damage. As long as the belief is not affected, the acceptance probability is not affected by c, either. The third result on welfare is also intuitively clear. This is because the zero-sum nature of the attorney fee and the settlement amount leaves the effect on the settlement rate only, meaning that SFDE with a higher settlement rate yields higher social welfare than SDE.

3.5 Pooling Equilibrium

If it is too costly for a high-type P to use a separating signal, the parties may end up with a pooling equilibrium in which both types of P use the same strategy, i.e., the same attorney fee and the same settlement demand. In this subsection, we will see the possibility of a pooling equilibria.

Let c^* be a pooling attorney fee and s^* be a pooling settlement demand. One possible conjecture is that in a pooling equilibrium in which the type is not separated, P need not pay a costly attorney fee, that is, $c^* = \underline{c}$. However, this is not necessarily the case. If we assign the most pessimistic out-of-equilibrium belief, a deviation from any pooling attorney fee makes the deviator perceived as the low type. So, if the pooling fee is $c^* > \underline{c}$, any deviation $c = c^* - \epsilon (> \underline{c})$ is believed to come from a low type, and thus P would prefer being pooled by paying a high attorney fee rather than discounting it. So, the pooling message $c^* > \underline{c}$ could be supported as an equilibrium.[13]

Let r^* be D's equilibrium mixed strategy. Then, we have

Lemma 8 *In any pooling equilibrium, $r^*(s^*) > 0$.*

The intuition is clear. If the pooling equilibrium demand s^* is always rejected, a low type would prefer deviating by demanding s_L which is always accepted.

Lemma 9 *$s^* > s_M \equiv qM + C_d$ cannot be a pooling equilibrium demand, where $M = \lambda H + (1-\lambda)L$.*

The intuition is also clear. If $s^* > s_M$, D will never accept s^*. This violates Lemma 8. This lemma gives an upper bound for equilibrium pooling demands.

For characterization of pooling equilibria, the next lemma will be useful.

Lemma 10 *In a pooling equilibrium, given the most pessimistic out-of-equilibrium belief, if the incentive compatibility condition for a low type (IC_L) is satisfied, so is the incentive compatibility condition for a high type (IC_H), but not* vice versa.

This lemma implies that a low type has a stronger incentive to deviate from a pooling equilibrium in the sense that the low type's gain from the most profitable deviation is larger (or the loss is smaller). So, if a low type has no incentive to deviate from an equilibrium, a high type does, neither.

Now, let us consider the incentive compatibility condition for a low type (IC_L). Since the most profitable deviation is $(c, s) = (\underline{c}, s_L)$ and this will be accepted with probability one, (IC_L) condition requires

$$r^* s^* + (1-r^*)(qL - c_p) - c^* \geq qL + C_d - \underline{c}. \tag{4}$$

Note that $0 < r^*(s^*) < 1$ or $r^*(s^*) = 1$ by Lemma 8. In particular, if $0 < r^*(s^*) < 1$, D must be indifferent between accepting s^* and rejecting it, which implies that $s^* = \lambda qH +$

[13] However, any equilibrium fee $c^* > \underline{c}$ can be ruled out by D1 criterion. We will discuss the refinement shortly.

$(1-\lambda)qL + C_d \equiv s_M$. If $r^*(s^*) = 1$, it implies that D prefers accepting s^*, that is, $s^* \leq s_M$ and (IC_L) condition is reduced to

$$s^* - c^* \geq s_L - \underline{c}.$$

Thus, it must be that $s^* \geq s_L + c^* - \underline{c}$. To summarize, we have

Proposition 5 *There exists pooling equilibria. The set of pooling equilibria is* $E = \{(c^*, s^*, r^*) \mid c^* \geq \underline{c}, s_L + c^* - \underline{c} \leq s^* \leq s_M, r^* = 1\} \cup \{(c^*, s^*, r^*) \mid c^* \geq \underline{c}, s^* = s_M, \frac{T+c^*-\underline{c}}{s_M-(qL-c_p)} \leq r^* < 1\}$.

The set of pooling equilibria is illustrated in Figure 1.

3.6 Refinement

So far, we characterized all possible separating equilibria and pooling equilibria. A plethora of equilibria is definitely troublesome in predicting the outcome of this game. Thus, we need to resort to a stronger solution concept in order to sharpen the cutting power and select a more reasonable outcome among the set of equilibria. For the purpose, we will invoke D1 criterion by Cho and Kreps (1987). In short, D1 criterion requires $\hat{\lambda}(c, s)$ to put probability one to the type who is most likely to deviate to (c, s).

A series of observations lead to our main proposition. First, vacuous SDE do not satisfy D1 criterion. The intuition is clear. Vacuous settlement demands are always rejected. However, if a high-type P asks a slightly lower demand which can be accepted, he can be definitely better off unless D uses $r = 0$, while a low-type P is not. Therefore, such a deviation must be believed to be made by a high type, and so the high-type P will always deviate by demanding a slightly higher amount. Second, trivial separating equilibria do not satisfy D1 criterion, either. Trivial separating equilibria are basically to reflect the difference in equilibrium attorney fees exactly into settlement demands, so that $c^*(H) - \underline{c} = s^*(H) - s_L$. Now, if a high-type P cuts his high attorney fee slightly, it is reasonable to believe that the message was sent by a high type, because he is more likely to use such a fee than a low type. Third, no pooling equilibrium nor SFDE satisfies D1 criterion.

Proposition 6 *Only meaningful SDE satisfy D1 criterion.*

This proposition implies that SFDE are not only Pareto dominated but also fail to satisfy D1 criterion. In fact, all equilibria using $c > \underline{c}$ are eliminated by D1 criterion. It suggests that signaling by a high attorney fee is not an equilibrium phenomenon in terms of D1 criterion in this model.[14] In the next section, we will see that if the legal service by attorneys is useful in the sense that it can increase the winning probability, a high attorney fee can be a signal in equilibrium even if we invoke D1 criterion.

4 Endogenous Winning Probability

In the previous section, we assumed that no matter how expensive lawyer the plaintiff may hire, the winning probability is not affected by the ability of the lawyer. In this section, we consider a more realistic situation in which the legal service is productive so that P's winning probability is increased with respect to his expenditures of the legal service. More specifically, we assume that $q = q(c)$ where $q'(c) > 0$ and $q''(c) < 0$. Here, higher expenditures on an attorney is interpreted as hiring a more expensive or a more capable attorney.

4.1 Full Information

For simplicity, we assume that $\underline{c} = 0$. To avoid the corner solution, we also assume that $q'(0)w > 1$ for $w = L, H$.

If the damage amount w is fully known to D, P will choose c so as to maximize $q(c)w + C_d - c$. Thus, the first-order condition requires that the optimal expenditure c^f satisfies

$$q'(c^f)w = 1 \tag{5}$$

because P of type w will demand $q(c)w + C_d$ and this will be accepted by D with probability one. Differentiating equation (5) with respect to w, we get $dc^f(w)/dw = -q'/q'' > 0$, implying that $c^f(H) > c^f(L)$. This has the following implication on the efficiency of legal services.

Lemma 11 $q(c^f(H))H - q(c^f(L))L > c^f(H) - c^f(L)$.

[14] We can easily see from the proof of Proposition 6 that the Intuitive Criterion by Cho and Kreps (1987) does not eliminate SFDE, since $D(H, \mathbf{m}), D(L, \mathbf{m}) \neq \emptyset$.

Under the assumption that $q'(0)w > 1$ for $w = L, H$, both types of P spend a positive amount on attorneys, because the marginal benefit of the initial expenditure $(q'(0)w)$ exceeds the marginal cost equal to one. Moreover, this lemma implies that a high type's increase in the legal expenditure is exceeded by its subsequent gain through a higher winning probability, so that the the net gain of a high-type P is higher than that of a low-type P.

4.2 Separating Equilibrium

The important difference of the case of endogenous winning probability from the previous case is that the probability that D accepts a settlement demand s is affected by c, since the trial outcome depends on c. Thus, Lemma 1 and Lemma 2 must be accordingly modified.

Let $c_w = c^f(w)$, $q_w = q(c_w)$ and $\tilde{s}_w = q_w w + C_d$. Then, we have

Lemma 12 *$c^*(L) = c_L$ and $s^*(L) = \tilde{s}_L$ in any separating equilibrium.*

Then, it is not difficult to see that the counterpart of Proposition 1 still holds. That is, there is no separating equilibrium in which P signals his type only by using the attorney fee.

Next, consider SDE in which P separates the type by using only the separating demand. We have

Proposition 7 *There are the following meaningful SDE if $T \geq q_H H - q_L L - \Delta c$: (i) $c^*(H) = c^*(L) = c_L, s^*(H) = q_L H + C_d, s^*(L) = \tilde{s}_L, r^*(s^*(H)) \in I, r^*(\tilde{s}_L) = 1$ where $I = \{r^* \in [0,1] \mid \frac{T - q_L \Delta w}{T} \leq r^* \leq \frac{T}{q_L \Delta w + T}\}$ and $q_w = q(c^*(w))$.*

Since the attorney fees of both types are the same, the equilibrium values for $r^*(s^*(H))$ are obtained from the following two incentive compatibility conditions;

$$r^*(q_L H + C_d) + (1 - r^*)(q_L H - c_p) \geq q_L L + C_d, \tag{6}$$

$$q_L L + C_d \geq r^*(q_L H + C_d) + (1 - r^*)(q_L L - c_p). \tag{7}$$

Thus, it must be that

$$\frac{T - q_L \Delta w}{T} \leq r^*(s^*(H)) \leq \frac{T}{q_L \Delta w + T}. \tag{8}$$

If $q_H H - q_L H - \Delta c \leq T$, i.e., if the expert effect is not large, the high-type P will not deviate by increasing legal expenditures. On the other hand, if $q_H H - q_L H - \Delta c > T$, i.e., the efficiency from the legal service exceeds inefficiency from a trial (opportunity cost of a trial), he will find it more beneficial to use a separate fee strategy rather than a pooling fee strategy. Thus, the equilibrium critically depends on the relative size of efficiency in legal expenditures and inefficiency of trial. This feature was not inherent in the case of constant winning probability. Since there was no efficiency gain in legal expenditures, it was just a waste and a high-type P had no incentive to increase it unless it can affect the belief about w. With the expert effect, he may have an incentive if the expert effect is large enough to exceed the higher expected trial cost due to a higher demand and corresponding higher rejection probability.

Let us compare this outcome with the corresponding outcome with the constant winning probability. In this model, the high expenditure on the attorney has the investment effect via increasing the winning probability. We call this expert effect. Due to the expert effect, $c^*(L) = c_L > \underline{c}$ especially under the assumption that $q'(0)w > 1$. This makes the winning probability $q(c_L)$ higher than the default probability q. Since $q(c_L) > q$, the equilibrium demand by a high-type P $s^*(H) = q(c_L)H + C_d$ is higher than s_H, and accordingly the acceptance probability is lower due to the higher demand. This implies that there will be fewer settlements. But this does not imply that P is made worse off because his equilibrium demand is higher.

Finally, we consider SFDE in which P uses both the attorney fee and the settlement demand as a signal of his damage amount. As we saw in Section 4.1, the first-best undistorted outcome is $c = c_w$, $s = q_w w + C_d$ for $w = L, H$ and both of the demands are accepted with probability one. Under incomplete information, this first-best outcome cannot be an equilibrium because $q_H H - c_H > q_L L - c_L$ from Lemma 11 so that a low-type always wants to mimic a high type. Therefore, the outcome should be distorted in the way that either $c^*(H) \neq c_H$ or $r^*(s^*(H)) < 1$. Suppose $r^*(s^*(H)) = 1$. This is possible only in the trivial equilibrium. Let $\hat{c}$ be such that $q_L L - c_L = \hat{q}H - \hat{c}$ where $\hat{q} = q(\hat{c})$. Then, $c^*(H) = \hat{c}$, $c^*(L) = c_L$, $s^*(H) = \hat{q}H + C_d$ and $s^*(L) = \tilde{s}_L$ together with $r^*(s^*(H)) = r^*(s^*(L)) = 1$ constitute a trivial equilibrium. If $r^*(s^*(H)) < 1$, we have

Proposition 8 *There are two types of nontrivial SFDE: (i) $c^*(L) = c_L$, $c^*(H) \in (c_L + \hat{q}H - q_L L - T, c_L + \hat{q}H - q_L L)$, $s^*(w) = q(c*(w))w + C_d$ for $w = H, L$, $r^*(\tilde{s}_L) = 1$, $r^*(\tilde{s}_H) \in I'$ satisfying inequality (11), and (ii) $c^*(L) = c_L, c_L < c^*(H) \leq c_L + \hat{q}H - q_L L - T, s^*(L) = \tilde{s}_L$,*

$s^*(H) \geq q_H^* H + C_d$, $r^*(\tilde{s}_L) = 1$ *and* $r^*(s^*(H)) = 0$, *where* $q_H^* = q(c^*(H))$.

Two incentive compatibility conditions require

$$r^*(q_H^* H + C_d) + (1 - r^*)(q_H^* H - c_p) - c^*(H) \geq q_L L + C_d - c^*(L), \tag{9}$$

$$r^*(q_H^* H + C_d) + (1 - r^*)(q_H^* L - c_p) - c^*(H) \leq q_L L + C_d - c^*(L). \tag{10}$$

These imply that

$$\frac{T - (q_H^* H - q_L L) + c^*(H) - c^*(L)}{T} \leq r^* \leq \frac{T - (q_H^* - q_L)L + c^*(H) - c^*(L)}{q_H^*(H - L) + T}. \tag{11}$$

Comparing this with inequality (3), we can see that the probability of accepting the high-type equilibrium demand is lower. This is again because P spends more on legal service and resultantly the settlement demand is higher.

Now, we will compare the outcomes in SDE and SFDE. Proposition 9 is our main comparison result.

Proposition 9 *In SFDE, (i) the settlement rate is lower, (ii) a high-type P's payoff is higher, and consequently, (iii) the social welfare is higher.*

Interestingly, the result is completely the opposite when the legal service is productive and it is not productive. In the separating equilibrium by joint signals, a high-type P is made better off, although the settlement rate is lower, while a low-type P and D are as well off as in the separating equilibrium only by a demand signal. As in the case of unproductive legal service, using a super-normal attorney fee has two conflicting effects on P's payoff. It directly increases his expenditures, but it has the advantage of making a higher settlement demand due to separation. However, in this case, it has an extra productivity effect, that is, a higher legal expenditures increase the winning probability. Thus, if P can use an attorney fee as an additional signal, he can choose the attorney fee so as to maximize his payoff at trial. Due to this efficiency gain, SFDE is advantageous to P over SDE, and thus Pareto dominates SDE. More importantly, Proposition 9(iii) says that the social welfare is higher in SFDE. The reason is clear. In this equilibrium, a higher-type P gets a higher payoff although he pays his lawyer a higher fee. Therefore, the social welfare, which is defined by the sum of the payoffs of P, D and the attorney is higher in this equilibrium. This welfare result mainly comes from the productive nature of the high legal expenditure. It also has an interesting policy implication. Some legal authorities try to regulate attorney fees on the ground that an excessively high attorney fee promotes more trials. However, this result implies that such a regulation may mitigate the signaling effect of attorney fees so as to discourage settlements.

Proposition 10 *SFDE with $c^*(H) = c_H$ and $s^*(H) = \tilde{s}_H$ is the unique equilibrium that satisfies D1 criterion.*

The intuition is that if $c^*(H) \neq c_H$, a deviation to c_H and then $q_H H + C_d \equiv \tilde{s}_H$ must be perceived as a high-type P so that a high type always has an incentive to deviate unless his equilibrium attorney fee is c_H.

4.3 Pooling Equilibria

In the case of the unproductive legal service, there may exist pooling equilibria in which both types use the same fee strategy and the same demand strategy. Suppose that $c^*(H) = c^*(L) = c^*$ and $s^*(H) = s^*(L) = s^*$. Then, Lemma 8 will still hold. That is, in any pooling equilibrium, $r^*(s^*) > 0$. This is because if a pooling demand is always rejected, it would be better to make a slightly lower demand that can be accepted with a positive probability. Also, the counterpart of Lemma 9 will hold. That is, it must be that $s^* \leq q(c^*)M + C_d$ in any pooling equilibrium. This is because D will always reject any demand which is greater than $q(c^*)M + C_d$ and this violates Lemma 8. However, we can show that any pooling equilibrium fails D1 criterion. The intuition and the proof are exactly the same as in the case of unproductive legal service,[15] so we omit the proof and simply state the claim as a proposition for completeness.

Proposition 11 *No pooling equilibrium satisfies D1 criterion.*

5 Conclusion

In this paper, we examined the signaling effect of the attorney fee. In reality, it seems to be true that excessive expenditures on lawyers have an advantage of transmitting some

[15] This is because a slightly higher demand than the equilibrium pooling demand should be perceived to come from a high-type P.

information about the merit of the case other than litigant efficiency due to expertise, just as excessive expenditures on advertising itself rather than the content of the advertisement signals the quality of the product. Moreover, upfront expenditures on lawyers can signal not only the quality of the case in case of incomplete information, but also the subsequent settlement demand in case of complete information by the forward induction argument as in "money-burning" games. Thus, we believe that the legal policies of limiting the attorney fee should be reconsidered in the sense that they could discourage settlements.

Appendix

Proof of Lemma 1: If D rejects $s > s_H$, his loss is at most $qH + C_d \equiv s_H$, which is strictly better than accepting $s > s_H$. On the other hand, if D rejects $s < s_L$, his loss at court is at least $qL + C_d \equiv s_L$, which is strictly worse than accepting $s < s_L$.

Proof of Lemma 2: First, it is not possible that $s^*(L) < s_L$ because any s such that $s^*(L) < s < s_L$ would be better, since it is also accepted with probability one by Lemma 1. If $s^*(L) > s_L$, his equilibrium demand is rejected and he gets $qL - c_p < s_L$. Consider a deviation to s_L. Under the most pessimistic belief, $\hat{\lambda}(s_L) = 0$. D is indifferent between accepting s_L and not. Thus, the payoff that the low-type P is expected to get by deviating to s_L is $rs_L(1-r)(qL - c_p) \geq qL - c_p$ for all $r \in [0, 1]$ with equality if and only if $r = 0$. So, the deviation to s_L is profitable. Contradiction. Now, suppose $c^*(L) > \underline{c}$. A deviation to $\underline{c}$ always saves the cost at least without affecting the posterior belief. Therefore, it must be that $c^*(L) = \underline{c}$. It remains to show that $s^*(L) = s_L$ is supported by $r = 1$. If $r(s_L) < 1$, it is always better for a low type to demand $s_L + \epsilon$ since $s_L + \epsilon > rs_L + (1 - r)(qL - c_p)$. This completes the proof.

Proof of Proposition 1: We know that $c^*(L) = \underline{c}$ and $s^*(L) = s^*(H) = s_L$. Suppose $c^*(H) > \underline{c}$. Then, in equilibrium, $\hat{\lambda}(c^*(H), s_L) = 1$ and $\hat{\lambda}(\underline{c}, s_L) = 0$. Thus, the demand s_L will be accepted with probability one in both cases. Then, clearly, a high-type P will have an incentive to deviate to $(\underline{c}, s_L)$. Contradiction.

Proof of Lemma 3: Suppose that $r(s_1) \leq r(s_2)$. Then, the type of P who demands s_1 in equilibrium would have an incentive to deviate to s_2.

Proof of Lemma 4: (i) If $r(s_L) < 1$, it is always better for P to demand $s < s_L$ by Lemma 1. (ii) In a separating equilibrium, it must be that $s^*(H) > s_L$. If $r^*(s^*(H)) = 1$, it violates Lemma 3 due to Lemma 4(i).

Proof of Lemma 5: Since $0 < r^*(s^*(H)) < 1$ in the first case, D is indifferent between accepting $s^*(H)$ and rejecting it, implying that $s^*(H) = qH + C_d \equiv s_H$. If $r^*(s^*(H)) = 0$, it means that D prefers rejecting $s^*(H)$ to accepting or he is at least indifferent. This implies that $s^*(H) \geq s_H$. The high-type P has no incentive to deviate to any other demand, in particular, s_L if $qH - c_p \geq qL + C_d$, i.e., $q(H - L) \geq c_p + C_d$.

Proof of Proposition 2: First, we will find the range of equilibrium values for $r(s_H)$. If the low-type P prefers demanding s_L to s_H, the following must be satisfied;

$$s_L \geq r^*(s_H)s_H + (1 - r^*(s_H))(qL - c_p). \tag{12}$$

This implies that $r^*(s_H) \leq \frac{c_p+C_d}{s_H-qL+c_p} = \frac{T}{q\Delta w+T} < 1$. Also, since the high-type P prefers demanding s_H to s_L, it is required that

$$s_L \leq r^* s_H + (1 - r^*)(qH - c_p). \tag{13}$$

The two incentive compatibility conditions imply that

$$\frac{T - q\Delta w}{T} \leq r^*(s_H) \leq \frac{T}{q\Delta w + T}.$$

Proof of Lemma 6: We will show that if $r(c^*(H), s^*(H)) = 1$, the incentive compatibility conditions for the low type (IC_L) and the high type (IC_H) are contradictory to each other except when $s^*(H) - s_L = c^*(H) - \underline{c}$. When $r(c^*(H), s^*(H)) = 1$, the two incentive compatibility conditions are given by

$$s_L - \underline{c} \geq s^*(H) - c^*(H), \tag*{$[IC_L]$}$$

$$s^*(H) - c^*(H) \geq s_L - \underline{c}. \tag*{$[IC_H]$}$$

Since both equilibrium demands are accepted with probability one, equilibrium payoffs do not depend on the true type at all in this case. Therefore, both (IC_L) and (IC_H) can be satisfied only when $s_L - \underline{c} = s^*(H) - c^*(H)$, i.e., $s^*(H) - s_L = s^*(H) - \underline{c}$. This corresponds to the trivial equilibrium. Otherwise, $r^*(c^*(H), s^*(H)) = 1$ cannot be possible in equilibrium. Therefore, in any nontrivial equilibrium $r^*(c^*(H), s^*(H)) < 1$.

Proof of Lemma 7: If $0 < r^*(c^*(H), s^*(H)) < 1$, D must be indifferent between $s^*(H)$ and rejecting it. From this indifference condition, it directly follows that $s^*(H) = qH + C_d = s_H$. Also, the incentive compatibility condition of the high-type P requires that

$$qH - c_p - c^*(H) \geq qL + C_d - \underline{c},$$

i.e., $c^*(H) \leq \underline{c} + q\Delta w - T$.

Proof of Proposition 3: By Lemma 6, non-triviality of an equilibrium implies that $r^* = \frac{T + c^*(H) - \underline{c}}{q\Delta w + T} < 1$, or equivalently, $c^*(H) < \underline{c} + q\Delta w$. Now, due to Lemmas 6–7, it suffices to show that both types have no incentive to deviate in the pretrial negotiation stage. If a high type deviates only in the negotiation stage, $\hat{\lambda} = 0$. Then, from inequality (2), we have

$$qL + C_d \leq r^*(qH + C_d) + (1 - r^*)(qH - c_p) - c^*(H) + \underline{c} < r^*(qH + C_d) + (1 - r^*)(qH - c_p),$$

since $c^*(H) > \underline{c}$. This means that a high type has no incentive to deviate in the negotiation stage. If a low type deviates only in the negotiation stage, it must be that $\hat{\lambda} = 0$ regardless of his deviation, because he already chose $\underline{c}$. Therefore, his best demand is clearly s_L.

Proof of Proposition 4: Let r^* and r^{**} be D's equilibrium acceptance probability in SDE and in SFDE respectively. The difference in the equilibrium payoffs of a high-type P is

$$\begin{aligned} \psi &= [r^{**}(qH + C_d) + (1 - r^{**})(qH - c_p) - c^*] - [r^*(qH + C_d) + (1 - r^*)(qH - c_p) - \underline{c}] \\ &= (r^{**} - r^*)T - \Delta c, \end{aligned}$$

where $\Delta c = c^*(H) - \underline{c}$. Since I and I' are not single-valued, let us evaluate the sign of difference at the corresponding r^* and r^{**}. Then, the comparison of the upper bounds is

$$r^{**} - r^* = \frac{T + \Delta c}{q\Delta w + T} - \frac{T}{q\Delta w + T} = \frac{\Delta c}{q\Delta w + T} < \frac{\Delta c}{T}.$$

Similarly, the comparison of the lower bound is $r^{**} - r^* = \frac{T - q\Delta w + \Delta c}{T} - \frac{T - q\Delta}{T} = \frac{\Delta c}{T}$. Therefore, $\psi = (r^{**} - r^*)T - \Delta c \leq \Delta c - \Delta c = 0$.

Finally, the difference in social welfare is $\Delta W = \psi + \Delta c = (r^{**} - r^*)T > 0$.

Proof of Lemma 8: Suppose $r^*(s^*) = 0$. The low-type P will get $qL - c_p$ at court. If he lowers the demand down to $s = qL + C_d$, it will be accepted with a positive probability, and this would be preferred by him. Contradiction.

Proof of Lemma 9: If D accepts s^*, his loss is s^*. If he rejects it, the loss is s_M. If $s^* > s_M$, rejecting s^* is less costly, implying that $r^*(s^*) = 0$. This is contradictory to Lemma 8.

Proof of Lemma 10: Given the most pessimistic belief $\hat{\lambda}(c, s) = 0$ for any $(c, s) \neq (c^*, s^*)$, consider the most profitable deviation $c = \underline{c}$ and $s = s_L - \epsilon$. Since $r(s) = 1$, we have $U_P(c, s, L) = U_P(c, s, H) = s - c$. Therefore, if $U_P^*(L) \geq U_P(c, s, L)$, it follows that $U_P^*(H) \geq U_P^*(L) \geq U_P(c, s, L) = U_P(c, s, H)$.

Proof of Proposition 6: To apply D1 criterion, define the following two sets for an off-the-equilibrium message (c, s);

$$D(w, c, s) = \{r \in [0, 1] \mid U_P^*(w) < U_P(c, s, r, w)\},$$

$$D_0(w, c, s) = \{r \in [0, 1] \mid U_P^*(w) = U_P(c, s, r, w)\}.$$

$D(w, c, s)$ is the set of D's strategies that make w-type P it profitable to demand s, and $D_0(w, c, s)$ is the set of D's strategies that make w-type P indifferent between the equilibrium combination of fee and demand (c^*, s^*) and the off-the-equilibrium combination (c, s). If there exists a type $w' \neq w$ such that $D(w, c, s) \cup D_0(w, c, s) \subset D(w', c, s)$, type w' is more likely to deviate to (c, s) than type w and assign the posterior belief zero to type w.

Now, we will apply D1 criterion to separating equilibria.

Claim 1 *Vacuous SDE do not satisfy D1 criterion.*

Proof of Claim 1. Consider vacuous demand equilibria. For a deviant demand $s = s_H - \epsilon$, define $r_0(H, s)$ by the value of r satisfying

$$rs + (1 - r)(qH - c_p) = qH - c_p. \tag{14}$$

This holds for $r = 0$ and for all other values of r, the left-hand side is greater than the right-hand side. Thus, $r_0(H, s) = 0$. On the other hand, $r_0(L, s)$ is determined by

$$rs + (1 - r)(qL - c_p) = qL + C_d. \tag{15}$$

It is easy to see that $r_0(L, s) \in (0, 1)$. Therefore, it directly follows that $D(L, c, s) \cup D_0(L, c, s) \subset D(H, c, s)$, implying that s comes from a high type. This subverts the equilibrium. This completes the proof.

Claim 2 *Trivial separating equilibria do not satisfy D1 criterion.*

Proof of Claim 2: Consider a deviant fee $c = c^*(H) - \epsilon$. Then, $r_0(H)$ and $r_0(L)$ can be found from the following inequalities by replacing the inequalities with equalities;

$$rs^*(H) + (1 - r)(qH - c_p) - (c^* - \epsilon) \geq s^*(H) - c^*(H), \tag{16}$$

$$rs^*(H) + (1 - r)(qL - c_p) - (c^* - \epsilon) \geq s_L - \underline{c}. \tag{17}$$

Thus, we have $r_0(w) = \frac{s^*(H) - \epsilon - (qw - c_p)}{s^*(H) - (qw - c_p)}$. Since $r_0(w)$ is decreasing in w, we have $r_0(H) < r_0(L)$, implying that $\hat{\lambda}(s^*(H), c) = 1$. Therefore, a high-type P has an incentive to deviate to c, meaning that the trivial equilibrium fails to pass D1 criterion.

Claim 3 *No pooling equilibrium satisfies D1 criterion.*

Proof of Claim 3: For any deviant combination (c, s) such that $s > s^*$ and $c = c^*$, define $r_0(w, s)$ by the value of r satisfying

$$rs + (1 - r)(qw - c_p) = r^*s^* + (1 - r^*)(qw - c_p). \tag{18}$$

Total differentiation of equation (18) gives rise to

$$[s - (qw - c_p)]dr_0 = (r_0(w, s) - r^*)qdw. \tag{19}$$

This yields $\frac{dr_0(w,s)}{dw} < 0$ since $r_0(w, s) < r^*$ for $s > s^*$. Thus, it follows that $r_0(H, s) < r_0(L, s)$ if $s > s^*$. Since $D(w, c, s) = \{r \in [0, 1] \mid r \geq r_0(w, s)\}$, this implies that $D(L, c, s) \cup D_0(L, c, s) \subset D(H, c, s)$. Therefore, D1 criterion requires that $s > s^*$ comes from a high type. Then, the high type will have an incentive to deviate to make a slightly higher demand than s^*. This is a contradiction. This completes the proof.

Claim 4 *No SFDE satisfy D1 criterion.*

Proof of Claim 4. Consider an out-of-equilibrium message $\mathbf{m}' = (s_H, \underline{c})$. Similarly, $r_0(H, \mathbf{m}')$ and $r_0(L, \mathbf{m}')$ can be found from

$$rs_H + (1-r)(qH - c_p) - \underline{c} = r^* s_H + (1-r^*)(qH - c_p) - c^*(H), \tag{20}$$

$$rs_H + (1-r)(qL - c_p) - \underline{c} = s_L - \underline{c}, \tag{21}$$

respectively. Since the low-type P is indifferent between s_H and s_L, we have

$$r^* s_H + (1-r^*)(qL - c_p) - c^*(H) = s_L - \underline{c}. \tag{22}$$

By using equation (22), equation (21) can be rewritten as

$$rs_H + (1-r)(qL - c_p) - \underline{c} = r^* s_H + (1-r^*)(qL - c_p) - c^*(H). \tag{23}$$

Comparing equations (20) and (23) yields $r_0(L, \mathbf{m}') > r_0(H, \mathbf{m}')$. Thus, D1 criterion requires that $\hat{\lambda}(\mathbf{m}') = 1$. This implies that a high-type P has an incentive to deviate from the equilibrium by cutting the attorney fee to $\underline{c}$. Therefore, the equilibria do not satisfy D1 criterion.

It remains to show that the meaningful demand equilibrium survives D1 criterion. Consider an off-the-equilibrium demand $s = s_H - \epsilon$. Similarly defined $r_0(H, s)$ and $r_0(L, s)$ can be found by

$$rs + (1-r)(qH - c_p) = r^*(s_H)s_H + (1 - r^*(s_H))(qH - c_p), \tag{24}$$

$$rs + (1-r)(qL - c_p) = s_L, \tag{25}$$

respectively. Since $r^*(s_H)s_H + (1 - r^*(s_H))(qL - c_p) = s_L$ by the randomizing condition of the low type, equation (25) can be rewritten as

$$rs + (1-r)(qL - c_p) = r^*(s_H)s_H + (1 - r^*(s_H))(qL - c_p). \tag{26}$$

Then, we have $r_0(w, s) = r^*(s_H)\frac{s_H - (qw - c_p)}{s - (qw - c_p)}$. Since $\frac{s_H - (qH - c_p)}{s - (qH - c_p)} > \frac{s_H - (qL - c_p)}{s - (qL - c_p)}$, it follows that $r_0(H, s) > r_0(L, s)$, implying that $D(H, c, s) \cup D_0(H, c, s) \subset D(L, c, s)$. Then, D1 criterion requires that the demand s must come from a low type, and the meaningful demand equilibrium survives D1 criterion.

Proof of Lemma 11: Comparing the maximum payoff of a high-type P and a low-type P, we have

$$q(c_H^f)H + C_d - c_H^f > q(c_L^f)L + C_d - c_L^f,$$

implying that $q(c_H^f)H - q(c_L^f)L > c_H^f - c_L^f$.

Proof of Proposition 7: It suffices to show that a high-type P has no incentive to deviate from c_L. The most profitable deviation of a high-type P is to choose c_H and then demand $q_H H + C_d$. This is rejected and P gets $q_H H - c_p - c_H$. Since he gets $q_L H + C_d - c_L$ in equilibrium, he does not deviate if $q_L H + C_d - c_L \geq q_H H - c_p - c_H$, i.e., $T \geq q_H H - q_L H - \Delta w > 0$.

Proof of Proposition 9: (i) First, we compare the upper bound of the equilibrium acceptance probability. The difference is

$$\begin{aligned}
\Xi &= r^{**} - r^* \\
&= \frac{T - (\Delta q)L + \Delta c}{q_H^* y + T} - \frac{T}{q_L y + T} \\
&= \frac{T - \phi(L)}{q_H^* y + T} - \frac{T}{q_L y + T} \\
&= \left(\frac{T}{q_H^* y + T} - \frac{T}{q_L y + T}\right) - \frac{\phi(L)}{q_H^* y + T} < 0
\end{aligned} \tag{27}$$

where $y = H - L$, $\phi(w) = (\Delta q)w - \Delta c$ and $\Delta q = q_H^* - q_L$.

(ii) Let P's payoff in SFDE and in SDE be π^{**} and π^*. Then, we have

$$\begin{aligned}
\pi^{**} - \pi^* &= \phi(H) + (r^{**} - r^*)T \\
&= \phi(H) - \frac{T}{q_H^* y + T}\phi(L) + \left(\frac{1}{q_H^* y + T} - \frac{1}{q_L y + T}\right)T^2 \\
&= \frac{q_H^* y \phi(H) + \Delta q y T}{q_H^* y + T} - \frac{\Delta q y T^2}{(q_H^* y + T)(q_L y + T)} \\
&> \frac{q_H^* y \phi(H)}{q_H^* y + T} > 0
\end{aligned}$$

since $\frac{T}{q_L y + T} < 1$.

(iii) The social welfare can be defined by $W = U_P + U_D + U_A$ where U_A is the attorney's payoff. Since the attorney fee is higher in SFDE, the result is immediate.

Proof of Proposition 10: (i) First, we will show that no SDE satisfies D1 criterion. Consider a deviation to $\mathbf{m} = (c_H, q_H H + C_d)$. Similarly, $r_0(H, \mathbf{m})$ and $r_0(L, \mathbf{m})$ can be defined from

$$r(q_H H + C_d) + (1-r)(q_H H - c_p) - c_H = r^*(q_L H + C_d) + (1-r^*)(q_L H - c_p) - c_L, \quad (28)$$

$$r(q_H H + C_d) + (1-r)(q_H L - c_p) - c_H = q_L L + C_d - c_L, \quad (29)$$

respectively. Since the low-type P is indifferent between $\mathbf{m_H} = (c_H, q_H H + C_d)$ and $\mathbf{m_L} = (c_L, q_L L + C_d)$ in the equilibrium with the highest equilibrium r^*, inequality (29) can be rewritten as

$$r(q_H H + C_d) + (1-r)(q_H L - c_p) - c_H = r^*(q_L H + C_d) + (1-r^*)(q_L L - c_p) - c_L. \quad (30)$$

To compare $r_0(H, \mathbf{m})$ and $r_0(L, \mathbf{m})$, Inequalities (28) and (30) can be rewritten as

$$r(q_H H + C_d) + (1-r)(q_H w - c_p) = r^*(q_L H + C_d + \Delta c) + (1-r^*)(q_L w - c_p + \Delta c), \quad (31)$$

where $w = H, L$. To compare $r_0(H, \mathbf{m})$ and $r_0(L, \mathbf{m})$, first note that $r < r^*$ because $q_H H - c_H > q_L H - c_L$ i.e., $q_H H > q_L H \Delta c$. Differentiating inequality (35) yields $\frac{dr}{dw} = \frac{(1-r^*)q_L - (1-r)q_w}{T} < 0$. $r_0(L, \mathbf{m}') > r_0(H, \mathbf{m}')$, implying that $r_0(H, \mathbf{m}) < r_0(L, \mathbf{m})$. Thus, D1 criterion requires that $\hat{\lambda}(\mathbf{m}) = 1$. This implies that a high-type P has an incentive to deviate from the equilibrium by increasing the attorney fee to $c^f(H)$. Therefore, the equilibria do not satisfy D1 criterion.

Now, we will show that any fee-demand equilibrium cannot satisfy D1 criterion unless $c^*(H) = c_H$. Consider an off-the-equilibrium message $m = (c_H, q_H H + c_d)$. The borderlines r of each type, $r_0(H, \mathbf{m})$ and $r_0(L, \mathbf{m})$ are defined by

$$r(q_H H + C_d) + (1-r)(q_H H - c_p) - c_H = r^*(q(c^*(H))H + C_d) + (1-r^*)(q(c)H - c_p) - c^*(H), \quad (32)$$

$$r(q_H H + C_d) + (1-r)(q_H L - c_p) - c_H = q_L L + C_d - c_L, \quad (33)$$

respectively. Similarly, by using the indifference condition of the low-type P, inequality (33) can be rewritten as

$$r(q_H H + C_d) + (1-r)(q_H L - c_p) - c_H = r^*(q(c^*(H))H + C_d) + (1-r^*)(q(c^*(H))L - c_p) - c^*(H). \quad (34)$$

Inequalities (32) and (34) can be rewritten as

$$r(q_H H+C_d)+(1-r)(q_H w-c_p) = r^*(q(c)w+C_d+c_H-c)+(1-r^*)(q(c)w-c_p+c_H-c), \quad (35)$$

where $w = H, L$. Since $q_H H > q(c)H + c_H - c$ for any $c \neq c_H$, $r < r^*$. Differentiation of equation (35) yields

$$\frac{dr}{dw} = \frac{(1-r^*)q(c) - q_H(1-r)}{q_H H - q_H w + T}.$$

This implies that $r_0(H, \mathbf{m}) < r_0(L, \mathbf{m})$. Thus, D1 criterion requires that $\hat{\lambda}(\mathbf{m}) = 1$. Therefore, the equilibria do not satisfy D1 criterion unless $c^*(H) = c_H$.

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