Should lawyers lie to their clients? Biased expertise in negotiation

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Abstract

I study the role of an expert for negotiations with asymmetric information on an example of pre-trial negotiation. A plaintiff suffers a harm of random value from a defendant. The informed defendant proposes a settlement to the uninformed plaintiff who additionally receives a cheap-talk advice from her informed attorney. I show that when the plaintiff is more aggressive than her attorney the equilibrium resembles partition equilibrium from a standard cheap-talk game. However, if the attorney is more aggressive than the plaintiff the equilibrium resembles delegation of the negotiation to the attorney. I derive the optimal linear contract under which the plaintiff hires the attorney. I show that when the costs of litigation are small the plaintiff hires an attorney under an hourly wage contract which makes the attorney more aggressive than the plaintiff. When this contract is signed the plaintiff may be better-off under asymmetric than under complete information.

(key words: cheap-talk, negotiation, litigation, strategic delegation, strategic ignorance)

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1 Introduction

It is a conventional wisdom that a good lawyer is an honest lawyer. He correctly advises his client on when the case should be settled, and when it is better to go to a trial. Therefore, he helps the client to always take the right decision. Naturally, ensuring that the lawyer is honest can be costly or difficult and the advice received by the client can be biased in some way. The client should take the magnitude of the bias into account and adjust her decisions, potentially loosing some compensation on cases that are settled at too low offers or unnecessarily brought to the court.

In this paper, I show that this intuition does not hold when lawyers are involved in pre-trial negotiation. Then the bias of the lawyer influences not only the decision that the client takes, but also the offer that she receives. The main effect of this property is that a dishonest lawyer may cause a consistent increase in settlement offers and benefit the client. Moreover, when the client takes a decision she needs to take into account not only the magnitude of the bias, but also its direction, and the negotiation process looks differently when the lawyer recommends taking the case too a court too often, than we he advises it not often enough. Finally, strategic use of legal advice translates also to type of contracts signed on the market for legal services, and can explain coexistence of contingency fee contracts with hourly fee contracts.

Broadly speaking this paper analyzes the strategic role of experts during negotiation with asymmetric information, and how uninformed party can use strategic contracting with an expert to improve its bargaining position. Although the environment that I study is illustrated through an example of civil litigation and pre-trial negotiations, the results can be applied to any asymmetric information bargaining in which the uninformed party has an access to expert's advise. This can include investors relying on investment bankers advice when negotiating acquisition of a company, firms using expertise of consultants while buying means of production, or governments hiring diplomats to represent them in international summits. The paper has two focus points. First, I analyze how the outcome of the negation depend on the incentives of the expert. Second, to understand which incentives will be induced, I study the optimal linear contracts.

I model pre-trial negotiation as a sequential game of incomplete information between three players: a plaintiff, a defendant, and an attorney. The plaintiff suffers a harm of an unknown value from the defendant. To obtain a compensation for a harm the plaintiff hires an attorney by proposing him a contract, which specifies how the compensation and the costs of the litigation will be split. After signing the contract the attorney and the defendant learn the true liability value, but the plaintiff remains uninformed. To avoid a costly trial the parties negotiate an out-of-court settlement. The defendant makes a take-it-or-leave-it settlement offer to the plaintiff. However, the plaintiff can consult her attorney before taking the final decision, and the attorney makes an unverifiable and non-binding recommendation to the plaintiff on whether the settlement should be accepted or the case should be resolved by a trial.

At first, I study the problem for any fixed contract, that is, I treat the incentives of the agents as given. I begin with showing that if the incentives of the agents are perfectly aligned, that is the attorney is unbiased, then the negotiation follows a complete information scenario. In contrast, when incentives of the plaintiff and the attorney strongly misaligned that the recommendation of the attorney becomes irrelevant. In this situation the case is resolved by trial for low liability values, and is settled at a pooling offer for high liability values. Importantly, I find that in-between these extremes the result of the negotiation strongly depends on the sign of attorney's bias. If the attorney is a more aggressive party (that is there are some settlement offers at which the attorney prefers trial, but the plaintiff prefers settlement), the negotiation resembles delegating the final decision to the attorney. The attorney recommends rejecting some offers that are profitable for the plaintiff. However, upon receiving a negative recommendation, the plaintiff cannot distinguish a situation in which the case should be settled from a situation in which the offer is too low and the case should be resolved by a trial. Thus, at least for sufficiently low settlement offers, she always follows the recommendation of the attorney practically delegating the negotiation. Hence, in order to avoid the trial the defendant has to either make an offer high enough to convince the attorney and trigger a positive recommendation, or an offer high enough to convince the plaintiff to accept it despite a negative recommendation. In the opposite case, when the plaintiff is a more aggressive agent, the negotiation process resembles partition equilibria present in cheap-talk games [Crawford and Sobel, 1982]. The plaintiff considers the attorney's recommendation only for some finite set of offers and rejects any other offer. To avoid the trial the defendant needs to make the smallest offer that the plaintiff is ready to consider and the attorney willing to recommend accepting. As a result the interval of liability values is partitioned, and for each element of the partition there is one offer made by the defendant on the equilibrium path.

Secondly, I analyze which contract should the plaintiff offer to the attorney. I find that although the contract which perfectly aligns the incentives of the agents is feasible, it is never optimal. To be precise, the optimal contract can be of two types. When the costs of the litigation are high, the plaintiff proposes a contingency fee contract, which includes a share payment for the attorney and may include a small trial premium. Under a contingency fee contract the plaintiff bares very little of the trial case and is more aggressive than her attorney. Therefore, she cannot completely rely on her attorney's recommendation and she may accept some unprofitable offers. However, the defendant makes offers that on average compensate plaintiff's payoff under the trial, hence the plaintiff benefits from transferring most of the cost to her attorney. When the costs of the litigation are low, the plaintiff proposes an hourly fee contract. It includes an upfront fixed payment compensating the initial litigation cost of the attorney and a trial premium which compensates his trial cost. Because the attorney does not bear the costs of trial, he becomes aggressive and can mislead the plaintiff by recommending rejection of some settlement offers profitable for the plaintiff. Since the plaintiff accepts low settlement offers only if the attorney recommends doing so, the decision on settling is practically delegated and the defendant has to increase the settlement offer to a level acceptable for an attorney. However, this effect is present only for low liability values, as for high liability values the defendant can simply make some offer which the plaintiff is not credible to ever reject. Still, the strategic benefits from receiving biased advice under an hourly fee contract can be so high that the plaintiff is better-off under asymmetric than under complete information.

1.1 Literature review

The paper contributes primarily to the literature on strategic behavior in bargaining. Early research in this literature is is due to Schelling [1956, 1980] who observes that the parties may strengthen their bargaining position by self-commitment to a certain behavior, and proposes several ways to achieve such a commitment including transferring the costs of negotiation failure or delegating the negotiation to a different party. The literature on the latter strategy is especially developed. The idea that a principal can benefit by strategically delegating some decision to an agent who has different incentives was formally developed by Vickers [1985].

Vickers studies a Cournot duopoly environment in which the owner of one the firms can delegate the decision on setting the production level to a manager whose remuneration is based on the revenues rather than the profits. By doing so the owner credibly commits to increase of the production, changing the decision of his competitor and achieving higher profits. The idea of strategic delegation was later applied in bargaining environment by Jones [1989] in a pre-trial negotiation environment, and by Segendorff [1998] in an international negotiation environment. The role of experts in negotiation was previously considered by Fingleton and Raith [2005] who study a situation in which a seller delegates the negotiation to a career-concerned agent. The agent can be high- or low-skilled, and only high-skilled agent observes sellers valuation of the product. Fingleton and Raith focus on comparing "open doors" negotiation when the behavior of the agent is observed by the seller with "closed doors" negotiation when only the outcome of negotiation is observed. They show that the latter option is better foe the seller, since it gives less incentives for the low-skilled agent to mimic high-skilled agent through demanding too high price.

A large portion of literature on bargaining focuses directly on a pre-trial negotiation example Bebchuk and Guzman [1996] make an observation that the plaintiffs should not promise a trial premium to their attorneys, as it leads to a reduction in received settlement offers. Hay [1997] and Choi [2003] extend the strategic delegation model for a possibility in which the attorney is subject to moral hazard. Daughety and Reinganum [2014] study the effects of third-party litigation funding on pre-trial negotiation when the plaintiff is privately informed about the liability value. Spier and Prescott [2019] consider a pre-trial negotiation setting in which the litigants, who are risk averse and have divergent prior beliefs, can contract with each other or a third party to modify the payment they receive if the case goes to a court. Choi and Spier [2018] analyze the situation in which the defendant is a firm and plaintiff can take short-sell its stocks. My paper differs form previous research in that it considers the use strategic contracting with an expert. The contract shapes not only the plaintiff's payoffs under the trial but also the information structure she faces during the negotiation, both of which influence the settlement offers she receives. Moreover, I do not allow the negotiation to be delegated – the plaintiff cannot commit to always follow her attorney's recommendation,[1], yet, I am able to show that strategic delegation can be partially replicated through biased advice. My model also provides testable predictions about the contracts signed on the market for legal services.

The paper contributes also to a literature communication between clients and biased experts. I model expertise as a cheap-talk game following Crawford and Sobel [1982], that is, I assume that an expert (the attorney) can send a costless, unverifiable and unbinding message to the client (the plaintiff). My setting differs from the original paper in three relevant ways. First, the incentives of the expert are endogenously determined by a contract. This extension was previously explored by Krishna and Morgan [2008] and Malenko and Tsoy [2019]. Second, the in my setting the cheap-talk message is not the only source of information for the plaintiff who can learn about the state of the world also from the offer she receives. Krishna and Morgan [2001] consider a situation in which a client has an access to two rather than one expert and can consult them sequentially, de Barreda [unpublished] allows for the client to hold some private information about the state of the world. Finally, I apply the cheap-talk game in a bargaining setting. In this setting the bias of the attorney influences not only the decision taken by the

[1]The role of commitment assumption in strategic delegation was earlier studied e.g., by Katz [1991]. However previous research focused on ability to commit to a contract, not on ability to commit to implementing a decision taken by an agent.

plaintiff, but also the offer that he receives. To my knowledge the only paper that considers an effect of biased advice on the behavior of a third party is Levit [2017] who studies how anticipation of biased advise of board of directors to shareholders can improve takeover offer made by an investor. Unlike in a typical cheap talk setting, in my model not only the size of the attorney's bias, but also its direction is relevant. To be precise, the negotiation follows standard partition equilibrium of Crawford and Sobel [1982] only if the attorney less aggressive than the plaintiff.

Few papers consider attorney as an expert. However, they focus on the role of legal advise on the decision to file the case, rather than its role in pre-trial negotiation process. Rubinfeld and Scotchmer [1993] study how attorneys can communicate the quality of the case through proposed contract. Dana Jr and Spier [1993] show that contingency fees can incentivze the attorneys to correctly advise their client on filing the case. Emons [2000] considers a setting in which the attorney advises the client on the amount of work necessary to develop the case.

Finally, the paper is related to a literature on strategic ignorance.[2] The idea that knowing less can be beneficial due to strategic concerns appears first in 1980. It was formally developed in Kessler [1998] in an adverse selection environment. In order to maximize information rent, the agent finds it optimal to remain uninformed about his own type with some probability. Gul [2001] shows that the hold-up problem can be resolved when the buyer commits to not observing sellers investment. Roesler and Szentes [2017] remark that when the consumer can benefit from ignorance of his product valuation when faced with a monopolist who can price-discriminate, and derive the optimal learning scheme for the consumer. My paper explores a new possibility through which being uninformed can be strategically beneficial – being uninformed provides the plaintiff with credibility to follow the attorney's advise, which can indirectly result in receiving higher settlement offers.

Example

Before introducing the model it is worth analyzing the litigation process on a simple example. The example illustrates three important results. Firstly, that the plaintiff may find it profitable to additionally reward her attorney for trial representation, even though it lowers her disagreement payoff. Secondly, that the plaintiff may be better off being uninformed rather than informed abut the value of the liability. Finally, that the advice during the negotiation can mimic strategic delegation of the process.

Consider a common case of pharmaceutical personal injury.[3] A patient suffers from an undisclosed side effect of a drug and requires an additional medical treatment. The victim demands a compensation for the treatment costs from the pharmaceutical company. Suppose there are two possible outcomes of the case in the court. With probability 0.8 the plaintiff (the patient) receives only compensatory damages of $\$1000$, with probability 0.2 she receives punitive damages as well and her total payoff is $\$2000$. The plaintiff cannot deal with the bureaucracy herself and she contracts an attorney, who has a reservation wage of $\$240$. Moreover, bringing the case to a court is costly for both the attorney and the defendant (the pharmaceutical company) – each party incurs a cost of $\$200$ from going through a trial procedure. To avoid

[2] See Golman et al. [2017] for an extensive literature review.

[3] Pharmaceutical and healthcare related personal injury cases (medical malpractice excluded) were the most common category of civil cases filled in the US district courts from June 2017 to June 2018. They constitute 53% of personal injury cases and 14% of all the civil cases filed (Judicial Business 2018).

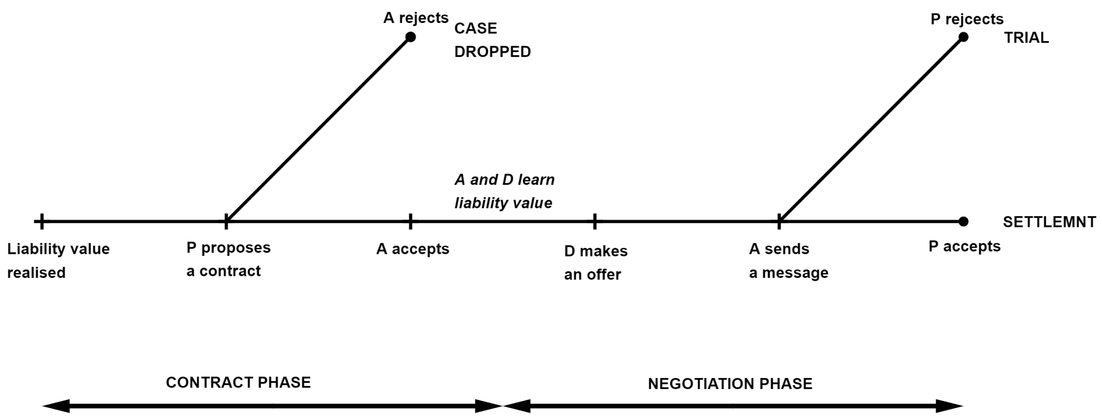
these costs the parties engage in a pre-trial negotiation, in which the defendant holds the whole bargaining power and makes a take-it-or-leave-it offer to the plaintiff.

As a benchmark suppose the information is symmetric. In particular, once the contract between the plaintiff and the attorney is signed all the agents learn the true size of the damages. Since the information is symmetric, the negotiation never fails and the defendant always makes a settlement offer that exactly compensates the plaintiff's payoff under the trial. Hence, to improve her disagreement payoff and the obtained compensation the plaintiff hires the attorney at a contract that does not promise any additional payment for the trial representation and exactly covers the reservation wage, for example by offering 20% of the obtained compensation. As a result the plaintiff always receives a settlement offer equal to the realized liability value and in expectations obtains $\$960$.

In reality the attorney's are hired not merely as bureaucrats, but also as experts who hold information useful for the plaintiffs. Now consider a setting in which the information is asymmetric. In particular, assume that after the contract has been signed only the attorney and the defendant receive the information about the true liability value, but the plaintiff remains uninformed. However, after she receives a settlement offer she can consult her attorney and obtain an advice on whether it should be accepted. Firstly, observe that the contract proposed in the benchmark scenario yields exactly the same payoff for the plaintiff. If the liability value is low the defendant makes an offer of $\$1000$, which the attorney recommends accepting and the plaintiff indeed accepts. If the liability value is high the defend could be tempted to pretend it is low and also make an offer of $\$1000$. However, accepting such an offer would not be recommended by the attorney (as he is indifferent between settling the case at $\$1000$ and going to a trail and wining the compensation of $\$2000$). Hence, the plaintiff would recognize the true realization of the liability value and decide to resolve the case by trial. In order to avoid costly trial the defendant ends up making an offer of $\$2000$ and ensuring a settlement.

Yet, in the asymmetric information scenario the benchmark contract is no longer optimal for the plaintiff. Surprisingly, the plaintiff is better off offering her attorney a reward for a trial representation. For example, suppose that the plaintiff promises to the attorney not only 20% of the compensation, but also an additional $\$240$ if the case goes to a court. If the liability value is high, the plaintiff indeed looses on promising additional payment for her attorney. The defendant can simply makes an offer of $\$1700$ which compensates the plaintiff's payoff under the trail ($20\% \times 1700 = 20\% \times 2000 - 240$). The plaintiff realizes that she can never obtain higher compensation in the court and accepts the settlement independently of the legal advice. However, when the liability value is low the plaintiff obtains higher payoff than under the benchmark scenario. For a moment suppose that the defendant tries to settle the case by simply compensating the plaintiff's payoff under the trial, that is, he proposes $\$700$. Such an offer would never be recommended by the attorney, as he is always better off going to a trial than settling the case at $\$700$ ($0.2 \times 700 < 0.2 \times 1000 - 200 + 240$). As a result, the plaintiff cannot recognize whether the liability value is indeed small and the settlement should be accepted or it is large and the case should be brought to a trial. Hence, in any Perfect Bayesian Equilibrium she follow the legal advice and reject this offer. In fact, following the same reasoning, the plaintiff follows the advice of her attorney for any offer below $\$1700$. Hence, in order to avoid costly trial the defendant needs to make an offer which triggers a positive legal advice, in this case $\$1200$. Since in the example the liability value is more likely to be low than high, in expectation the plaintiff benefits from rewarding her attorney from the trial representation and

Figure 1: The litigation game



earns $\$1040$ on average.[4]

2 Model

I model civil litigation as a sequential game of incomplete information between three risk-neutral agents: the plaintiff (she), the attorney (he), and the defendant (it). Throughout the paper I refer the it as *the litigation game*. The game consists of five periods. Before the game begins ($\tau = 0$) the nature selects the liability value. At $\tau = 1$ the plaintiff proposes the contract and at $\tau = 2$ the attorney decides whether to to accept it. Henceforth, I refer to this part of the game as *the contract phase*. After the contract phase is concluded *the negotiation phase* begins. At $\tau = 3$ the defendant makes a settlement offer to the plaintiff, then ($\tau = 4$) the attorney makes an advice to the plaintiff. Finally, at $\tau = 5$ the plaintiff decides on accepting the offer. The structure of the game is presented in Figure 1.

The game begins with the plaintiff suffering some loss for which the defendant is liable. At $\tau = 0$ nature selects the value of the liability (x) drawing it from a commonly known uniform distribution with a support on $[0, \overline{x}]$. A version of the model in which the probability of prevailing in court rather than the value of the liability is uncertain (as in Bebchuk 1984 or Nalebuff 1987) yields the same results.

After the value of the liability is realized *the contract phase* of the game begins. Following Dana Jr and Spier [1993], I assume that during the contract stage the information remains symmetric, that is, no agent observes the realization of the liability value when the contract is negotiated. It simplifies the analysis by eliminating screening concerns at the moment of agreeing on the contract. The assumption states the attorneys do not immediately recognize the value of the case, but rather posses necessary skills to analyze and evaluate it. During the contract phase at $\tau = 1$ the plaintiff proposes a contract C to the attorney. The contract is

[4]The presented contract is still suboptimal for the plaintiff. Under the optimal contract the attorney is unconditionally payed $\$240$ and an additional $\$200$ for the trial representation. The expected payoff of the plaintiff under the optimal contract is $\$1080$.

assumed to be linear and consist of four variables, that is, $C = (f_n, s_n, f_t, s_t) \in \mathbb{R}^4_+$. The first two variables represent the base payment, that is, the amount payed by the plaintiff to the attorney independently on whether the case was settled or resolved by trial: f_n stands the fixed payment, and s_n the payment in form of a share of obtained compensation. The two last variables represent the trial premium, that is, in additional amount payed to the attorney for trial representation: f_t stands for an additional fixed payment, and s_t for an additional share payment. At $\tau = 2$ the attorney decides whether to accept the contract or reject it. If the contract is accepted the attorney incurs some initial cost c of investigating the case, learns the true liability values, and the agents proceed with the litigation. If the contract is rejected, the case is dropped and all the agents receive a payoff of 0.

The contract is assumed to be linear in order to easily summarize the incentives of the agents at each contract signed. In practice, on the market for legal services analogous linear contracts are typically used.[5] It is worth noting that the contract structure implies that the payment for the attorney can depend only on the compensation obtained and the way in which the case was resolved. That is, the attorney's advice and unrealized settlement offers are not contractible. This assumption is plausible, in reality the attorney's advice and the negotiation process are not recorded, and hence, not verifiable after the case is resolved. Moreover, the main results of the model do not depend on this assumption. Indeed, being able to offer a contract that depends on unrealized settlement offers and recommendations makes it easier to ensure that the plaintiff makes an "honest" advice (e.g. by paying the attorney for the trial representation only if the recommendation he gave was correct). However, I am able to show that the plaintiff may benefit from receiving a dishonest advice. Finally, it is assumed that the attorney cannot make the payments to the plaintiff (that is, all the elements of the contract are required to be non-negative). This assumption follows the common regulation,[6] and it is relevant for the results of the model. In particular, it limits the ability of improving the bargaining position of the plaintiff by increasing her disagreement payoff through proposing a contract with a negative trial premium. It allows me to focus on a strategic role of legal advice, rather than a strategic role of litigation financing.

Additionally, the timing in the model implies that the plaintiff has a strong bargaining position when dealing with the attorney. However, the main results do not depend on the identity of the agent with strong bargaining position during the contract stage. It follows from the fact that at this moment the incentives of the plaintiff and the attorney are at least partially aligned, to be precise both of them would like to sign a contract that yields a high expected payoff during the negotiation phase.

At $\tau = 3$ the negotiation phase begins. At the beginning of the negotiation stage the defendant observes the contract signed by the plaintiff and the defendant, as well as the true liability value. That is, the only agent that remains uninformed during the negotiation is the plaintiff. Afterwards, the defendant makes a take-it-or-leave it offer $y \in \mathbb{R}$ to the plaintiff.[7]

[5] The contracts used in practice may distinguish between the "fixed fee" and "hourly fee", since in my model there is no time dimension this two are equivalent. Garoupa and Gomez-Pomar [2007] argue that this distinction is also artificial on the real markets, as the clients cannot actually observe the time that the lawyer spends on working on a case.

[6] The restriction on making payments from the attorneys to the plaintiffs is controversial, and it is often seen as a tool to exert market power. A discussion of arguments for the anti-competitive nature of this restrictions can be found in Santore and Viard [2001].

[7] Note that I allow the offer to be negative. Although the assumption is not realistic, as the plaintiff would rather drop a case than settle it at a negative offer, it simplifies the exposure. If the offers are restricted to be non-negative,

That is, I model the pre-trial negotiation as a signaling game following Reinganum and Wilde [1986], and in contrast with for example, Nalebuff [1987] who study negotiation as a screening game. At $\tau = 4$, after observing the offer and the liability value, the attorney sends a message $m \in \{0, 1\}$ to the plaintiff.[8] The message is "cheap-talk" – that is, the attorney is not committed to or restricted from sending any message, and the plaintiff is not obliged to take any action after the message is received. At $\tau = 5$ the plaintiff receives the message and takes a decision ($a \in \{0, 1\}$) on whether to accept the offer ($a = 1$) or reject it ($a = 0$) and take the case to the court. If the settlement offer is accepted, the defendant makes a transfer y to the plaintiff who afterwards pays the promised reward to the attorney. If the settlement offer is rejected the case is resolved by a trial. The trial is costly for both the attorney (at a level t^a) and the defendant (at a level t^d). During the trial the court discovers the true liability value and forces the defendant to make a transfer of x to the plaintiff. Afterwards the plaintiff pays the agreed compensation to her attorney. The payoffs are summarized in Table 2

The timing of the negotiation results in the defendant having a strong bargaining position. Although in and of itself the choice of the agent with strong bargaining position is not consequential, the model is interesting only if the agent with weak bargaining position is also the uninformed agent. In the model the plaintiff has an incentive to engage in manipulating the information, because this way she can improve her bargaining position. If she held the whole bargaining power to begin with, this incentive would disappear. The model can be extended for the case in which both litigants are uninformed and need assistance of a lawyer. However, since the defendant would not have a reason to contract its attorney strategically and almost any contract would lead the defense attorney to be truthful, I ignore this possibility for easiness of exposure and simply assume that the defendant observes the realization of the liability value. Moreover, this assumption is realistic, as a typical civil litigation case involves an individual plaintiff and an organizational (that is, a firm or a government) defendant.[9] Unlike individuals, organizations are likely to face a number of similar cases or have lawyers employed, and are likely to be able to predict the outcome of a trial. Moreover, I assume that the contract signed between the plaintiff and the attorney is observable. It is a common assumption in strategic contracting literature (Jones 1989, Vickers 1985) and the literature on strategic contracting in pre-trial negotiation (Daughety and Reinganum 2014, Spier and Prescott 2019). As in the model the contract determines the advice given by the attorney, the assumption on the observability of the contract is analogous to the assumption on the commitment to signal structure made in Bayesian persuasion and information design literature (Kamenica and Gentzkow 2011).

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the equilibria have the same qualitative properties, but the behavior of the defendant for liability values close to 0 may differ.

[8]The restriction on set of possible messages is made without loss of generality, since once the offer has been made the plaintiff faces a binary choice. Although in reality the set of the messages can be much larger and their interpretation may depend on the received offer, they always can be translated to a "accept" or "reject" message. For example, after receiving an offer of $1000, instead of saying 'reject', the attorney would rather sat 'I believe we can obtain $2000 in the court' (which in turn would be equivalent to saying 'accept' if the offer was $3000).

[9]According to Cohen et al. [2004] in the civil trial cases that took place in 75 biggest US counties in 2001 individuals were 83% of plaintiffs and 47% of the defendants.

Table 1: Payoffs in the litigation game

	dropped	settlement	trial
plaintiff	0	$(1-s_n)y-f_n$	$(1-s_n-s_t)x-f_n-f_t$
attorney	0	$s_n y+f_n-c$	$(s_n+s_t)x+f_n+f_t-t^a-c$
defendant	0	$-y$	$-x-t^d$

Solution concept

Since litigation game is an extensive form game of incomplete information I use the standard solution concept of perfect Bayesian equilibrium (Fudenberg and Tirole, 1991), henceforth PBE. In the litigation game a PBE is constituted by a strategy profile of each of the players and plaintiff's beliefs on the liability value, such that the players are sequentially rational and the beliefs of the plaintiff follow the Bayes' rule on the equilibrium path. To be precise, the plaintiff strategy profile consists of a contract choice C and a decision rule at any given contract for every offer y and message r observed. The attorney's strategy consists of a decision rule on accepting any contract C, and a message r at any given contract for any liability value x and offer y observed. Finally, the defendant's strategy profile consists of an offer y at any contract C for any liability value x observed. I will focus only on PBE in pure strategies.

The litigation game merges features of a standard signaling game (the interaction between the plaintiff and the defendant) and a cheap talk game (the interaction between the plaintiff and the attorney); thus, it generates a plethora of PBE and the solution concept needs to be further refined.

First source of multiplicity comes from the cheap-talk nature of communication between the plaintiff and the attorney. Naturally, the interpretation of the message sent an attorney is an equilibrium object. That is, if there exists an equilibrium in which a message $r = 1$ is commonly understood as a recommendation to reject a given offer y, there always exists an alternative equilibrium in which a message $r = 0$ is understood as a recommendation to reject the same offer. To avoid confusion I apply the convention, in which $r = 1$ is always understood as a positive recommendation and $r = 0$ is always understood as a negative recommendation. In other words, if at an equilibrium an offer y is received and $a(y, r) \neq a(y, r')$, then $a(y, r) = r$.

More importantly, as in any cheap-talk game in the litigation game there always exist babbling equilibria, at which the information between the plaintiff and the attorney is not transmitted only because none of the agents believe it may be transmitted. To be precise in the litigation game it is always possible to construct a PBE in which the plaintiff and the attorney fail to communicate at some given offer y. For example, the attorney may always recommend acceptance of the offer, because he believes that the plaintiff will ignore the recommendation anyway. In this case the plaintiff indeed ignores the recommendation of the attorney, since she correctly believes that it is independent from the liability value realization and carries no information. To avoid arbitrarily restricting the communication between the plaintiff and the attorney, and ensures that communication fails only due to misalignment of incentives between the agents, I focus on PBE, in which the attorney always makes a recommendation that follows his best interest. Since in this equilibria the attorney always communicates his preferences, I call them communicative.

Definition 1. *A PBE of the litigation game is called communicative if and only if for any pair* *of a liability value and an offer* (x, y) *such that the attorney strictly prefers a trial to settling the case (settling the case to a trial)* $r(y, x) = 0$ *(*$r(y, x) = 1$*).*

Requiring the PBE to be communicative is a relatively weak restriction. Given the convention that a message $r = 1$ is commonly understood as a positive recommendation and a message $r = 0$ as a negative recommendation, in any PBE the attorney makes a recommendation that follows his best interest as long as he believes that the plaintiff will follow the recommendation. The only additional behavior that I require is that the attorney makes a recommendation in the same way even when he believes that it will be ignored. This naturally restricts the set of offers for which the attorney's recommendation can be ignored by the plaintiff.

Second source of multiplicity comes from the fact than any offer y not only frames the terms of potential settlement, but also influences the beliefs of the plaintiff about the liability value to the plaintiff. PBE imposes a restriction on the beliefs about the liability which the plaintiff can hold on the equilibrium path, but does not specify a way in which the plaintiff forms her beliefs out-of-equilibrium. The freedom in choosing out-of-equilibrium beliefs also generates multiplicity of equilibria. In particular, the plaintiffs bargaining position can be artificially strengthen by choosing some out-of-equilibrium beliefs. For example, the plaintiff may believe that whenever the offer y is sufficiently low then the liability value is the highest possible ($\bar{x}$). Hence, she would reject any low offer. As a result, the defendant would never make any low offer and the beliefs of the plaintiff would remain consistent.

To avoid these problems I focus on defendant-preferred communicative PBE. In these equilibria the communication between the plaintiff and the attorney is successful whenever possible. Moreover, the bargaining position of the plaintiff is not an artifact of out-of-equilibrium beliefs, but follows from the incentives of the plaintiff and the attorney. By construction all the selected equilibria are unique in terms of expected pay-offs. Through the paper I refer to defendant-preferred communicative PBE simply as equilibria.

In the following sections I solve the litigation game by backward induction. Firstly (Section 3), I analyze the negotiations process treating the agents' incentives as given. Secondly (Section 4), I analyze which contract is signed by the agents at equilibrium.

3 Negotiation phase

Once the contract has been signed the negotiation begins. Depending on the particularities of $C = (f_n, s_n, f_t, s_t)$, the negotiation exhibit different qualitative properties, and the equilibria of the negotiation stage can be categorized into four different types. The type of the equilibrium depends firstly on whether the plaintiff and the attorney is more willing to settle the case, and secondly on the strength of disagreement between the two. In this section I analyze the outcome of the negotiation for any possible contract signed. I begin by describing the agent's incentives and formalizing the idea of willingness to settle the case. Then I analyze the equilibria of the negotiation phase, firstly considering only the contracts in which $s_t = 0$, and then briefly describing the general case.

3.1 Agents' incentives

To predict the outcome of the negotiation it is necessary only to know how much each of the agents is willing to pay in order to avoid the trial at any liability value. I refer to these variables as *a willingness to settle of an agent*. In this subsection, I describe how contracts translate to willingness to settle, and how the willingness to settle impacts agents' behavior.

Naturally, since the defendant does not participate in contracting its incentives are exogenous, and its willingness to settle is equal to the cost of trial t^d. It implies that the defendant would never make an offer that is larger than $x + t^d$, as it is better-off going to a court than obtaining settlement at such an amount.

The incentives of the attorney are contract-dependent. If the attorney could decide himself whether to settle the case or go to court, he would only accept offer which at least compensate his payoff under the trial: $s_n y \geq (s_n + s_t)x - t^a + f_t$, i.e $x - y \leq \frac{t^a - f_t - s^t x}{s_n}$ In other words, the attorney's willingness to settle can be defined as follows:

$$\sigma^a(x, C) \equiv \frac{t^a - f_t - s_t x}{s_n}. \tag{1}$$

Note that, the attorney's willingness to settle can be infinitely positive, which happens whenever the attorney prefers settling the case independently of the offer received. Analogously whenever the attorney prefers to go to a trial independently of the offer made. Finally, when the attorney is indifferent between settling the case and going to a trial at any offer, the willingness to settle can take any value.

In the model the attorney does not take a final decision, but is only allowed to send a message to the plaintiff. Given the convention the that $m = 1$ is interpreted as a positive recommendation, and the refinement that restricts the equilibrium only to those in which in attorney always follows his best I can propose the following strategy of the attorney:

$$m^a(x, y) \equiv \begin{cases} 1 & \text{if } y \geq x - \sigma^a(x, C) \\ 0 & \text{if } y < x - \sigma^a(x, C). \end{cases} \tag{2}$$

Under the strategy $m^a(x, y)$ the attorney recommends settling the case

Analogous analysis can be done for the plaintiff. The plaintiff is willing to accept any offer that pays her more than the outcome under the trial: $(1 - s_n)y - f_n \geq (1 - s_n - s_t)x - f_n - f_t$, i.e. $x - y \leq \frac{f_t + s_t x}{1 - s_n}$. In other words the willingness to settle of the plaintiff can be written as:

$$\sigma^p(x, C) \equiv \frac{f_t + s_t x}{1 - s_n}. \tag{3}$$

Naturally, the plaintiff does not actually observe the liability value realization. Hence, it maybe useful to think about an expected willingness to settle of the plaintiff. However, as in the equilibrium of the game and through most of the paper the willingness to settle of the plaintiff is constant over liability values, this distinction can be ignored.

Similarly to the attorney whenever the plaintiff prefers to settle the case independently of the offer made her willingness to settle is infinitely positive and whenever the plaintiff is indifferent between settling the case and going to trial for any offer it can take any value.[10] However, due to non-negativity restrictions on the contract it can never be the case that plaintiff prefers to go to the court for any offer made.

[10]For both the attorney and the plaintiff this indeterminacy can be resolved at an equilibrium. The problem is further discussed is Section 4.

To measure the disagreement between the attorney and the plaintiff I define *a bias of the attorney*:

$$b(x, C) = \sigma^p(x, C) - \sigma^a(x, C). \tag{4}$$

The bias of the attorney answers the question of "how much an offer under which the plaintiff is willing to settle must be increased in order to convince the attorney," and is analogous to the bias of the sender in cheap-talk literature (Crawford and Sobel 1982). However, unlike in the most cheap-talk models, in my not only the size of the bias, but also its sign is crucial for the analysis. If $b(x, C) > 0$ the attorney is more aggressive than the plaintiff, as he is less willing to settle the case. The reverse is true if $b(x, C) < 0$.

Finally, it is useful to note that if the contract is characterized by $s_t = 0$, then the willingness to settle of the agent's as well as the bias of the attorney are constant over the realizations of liability value. For most of the section I focus on this case, and the argument x is dropped from notation. I divide the remainder of the section into four parts. Firstly, I describe the equilibria of the game when the incentives of the plaintiff and the attorney are completely aligned ($b(C) = 0$). Secondly, I study the case in which the attorney is an aggressive party ($b(C) > 0$). Then, I move to the case in which the plaintiff is the aggressive agent ($b(C) < 0$). Finally, I extend the analysis for a case in which $s_t > 0$ and the incentives of the agents vary with a realization of x.

3.2 Complete information and fully aligned incentives of the plaintiff and the attorney

Before analyzing fully fledged model it is useful to briefly consider the complete information case. In this setting, the attorney plays no role, and the game collapses to a simple ultimatum bargaining in which the defend offers the plaintiff a settlement that exactly compensates her payoff under a trial ($y(x) = x - \sigma^p(C)$) and the plaintiff always accepts the offer.

However under asymmetric information scenario the recommendation of the attorney plays a relevant role. Since the plaintiff does not know the actual liability value, she may chose to condition her decision the message received from the attorney. In particular, the model allows for a scenario, in which the incentives of the attorney and the plaintiff are fully aligned ($b(C) = 0$). In this situation, the plaintiff always follows the recommendation of the attorney, since the attorney wants to accept exactly the same offers as the plaintiff does. In the equilibrium, the defendant can anticipate this behavior, and always makes the smallest offer that the attorney is willing to accept: $y(x) = x - \sigma^a(C)$. Since if $b(C) = 0$ then $\sigma^a(C) = \sigma^P(C)$, the smallest offer triggering a positive recommendation is also the smallest offer that the plaintiff is willing to accept. Intuitively this equilibrium follows exactly the complete information scenario, hence, I refer to it as *fully informative equilibrium.* It is described in Proposition 1.

Proposition 1. *Consider a contract C for which $b(C) = 0$. Then there exists an equilibrium of the negotiation phase called fully informative equilibrium in which:*

(i) the defendant's offer is

$$y(x) = x - \sigma^p(C), \tag{5}$$

(ii) the attorney's recommendation is

$$m(x,y) = m^a(x,y), \tag{6}$$

(iii) the plaintiff's decision is

$$p(y,r) = \begin{cases} m \text{ } \textit{if } y < \overline{x} - \sigma^p(C) \\ 1 \text{ } \textit{if } y \geq \overline{x} - \sigma^p(C). \end{cases} \tag{7}$$

3.3 Aggressive attorney

When the incentives of the attorney and plaintiff are not fully aligned ($b(C) \neq 0$) the plaintiff cannot blindly follow the recommendation of the attorney, as it may follow his own interest rather then the interest of the client. As a result, also the defendant's offer plays more complex role in the negotiation, it not only frames the settlement terms, but also influences the plaintiff's beliefs about the liability value – both directly, and indirectly through the message it triggers the attorney to send.

I begin by studying the case in which the attorney is the more aggressive agent ($b > 0$). For a moment suppose that the attorney indeed always makes a recommendation that always follows his own best interest, that is, he follows the strategy $m^a(x,y)$. If this is a case, it is easy for the plaintiff to interpret a recommendation to accept the offer. Whenever the attorney, who is relatively willing to resolve the case by a trial, says that the case should be settled, the settlement offer must be satisfactory also for the plaintiff.

However, interpreting the negative recommendation is difficult for the plaintiff. On one hand, the plaintiff may believe that the defendant is trying to take an advantage of her lack of information to make an unacceptably low offer. On the other hand, she may believe that the offer is indeed profitable, but the attorney is trying to deceive her in order to obtain the trial premium.

If the offer is sufficiently high, the second effect prevails. The plaintiff realizes that she is unlikely to earn a higher compensation in the court, ignores the attorney's recommendation and settles the case. However, if the offer sufficiently low the plaintiff always follows the recommendation of the attorney, even though she knows that he is biased. To understand the result it is enough to realize that if the plaintiff accepts some very small offer despite a negative recommendation of her attorney, then the defendant, at least when the liability value is sufficiently high, makes exactly this offer and ensures a very cheap settlement. But if that is the case, in expectation the plaintiff looses money on accepting the settlement offer, which never can happen in the equilibrium.

Knowing the behavior of the other agents the defendant faces three relevant alternatives. First, it can simply make the smallest offer that the plaintiff always accepts. Second, it can ensure the settlement by convincing the attorney to give a positive settlement by making an offer $y = x - \sigma^a(C)$. Finally, it can decide to go to a trial through making some unacceptable offer. As long as the liability value is sufficiently high, the first option is the best for the defendant. However, the choice of behavior for low liability values depends on the incentives of the attorney. Intuitively, if the attorney is very aggressive ($-\sigma^a(C) > t^d$) it is cheaper for the defendant to face the trial than to trigger a positive recommendation. If on the other hand the attorney is sufficiently willing to settle the case, although ensuring settlement is more expensive than in a complete information benchmark, it is still better for the defendant than going to a court. To close the analysis, note that in any case the attorney does not have a profitable deviation from strategy $m^a(x, y)$. Changing a message would not have any consequences at best, and actually could yield a worse outcome for the attorney.

The difference between the scenario in which the attorney is relatively willing to settle ($-\sigma^a(C) \leq t^d$) and the one in which the attorney is very aggressive ($-\sigma^a(C) > t^d$) is significant. The first scenario resembles strategic delegation of the negotiation. Although formally the plaintiff does not delegate the decision to settle the case, at least for low offers, she always follows the advice of the attorney. Hence, the defendant is forced to increase the offer in order to make it convincing for the attorney. As a result, the plaintiff settles the case at better terms than he could achieve under complete information. However, the 'de facto delegation of the negotiation' works only if the liability value is small. If it is high, the defendant simply makes the lowest offer the plaintiff is not credible to ever reject. Since this equilibrium is based on threat of the attorney misinforming her client about the profitability of the settlement, I refer to it as *misinformative equilibrium*. This equilibrium type is described in Proposition 2.

To precisely describe the equilibrium it is necessary to identify the smallest offer that the plaintiff is willing to accept despite the negative recommendation of her attorney, and the smallest liability value for which this offer is made. In context of misinformative equilibrium I denote this pair by $(\tilde{y}^M, \tilde{x}^M)$. Naturally, the attorney makes the offer $\tilde{y}^M$ only if it is lower than an offer which triggers positive attorney's recommendation, that is, in a well behaving case $\tilde{x}^M = \max\{0, \tilde{y}^M + \sigma^a(C)\}$. Moreover, at the equilibrium the plaintiff correctly conjectures $\tilde{x}^M$ and the offer $\tilde{y}^M$ must at least cover her expected payoff under the trial, that is, $\tilde{y}^M \geq \frac{1}{2}(\tilde{x}^M + \bar{x}) - \sigma^p(C)$. Since I focus on the defendant's preferred equilibria the inequality must be binding. Solving the system of equations I obtain:

$$\tilde{y}^M = \max\{\frac{1}{2}\bar{x} - \sigma^P(C), \bar{x} - b(C) - \sigma^p(C)\}, \tag{8}$$

$$\tilde{x}^M = \max\{0, \bar{x} - 2b(C)\}.^{11} \tag{9}$$

Proposition 2. *Consider a contract C for which $b(C) > 0$ and $-\sigma^a(C) \leq t^d$. Then there exists a defendant-preferred communicative equilibrium of the negotiation phase called misinformative equilibrium in which:*

(i) the defendant's offer is

$$y(x) = \begin{cases} x - \sigma^a(c) & \textit{if } x \in [0, \tilde{x}^M] \\ \tilde{y}^M & \textit{if } x > \tilde{x}^M, \end{cases} \tag{10}$$

(ii) the attorney's recommendation is:

$$m(x, y) = m^a(x, y); \tag{11}$$

(iii) the plaintiff's decision is:

$$a(y, r) = \begin{cases} m & \textit{if } y < \tilde{y}^M \\ 1 & \textit{if } y \geq \tilde{y}^M. \end{cases} \tag{12}$$

[11] Note that $\tilde{y}^M = \frac{1}{2}\bar{x} - \sigma^P(C)$ only if the equilibrium is completely pooling (that is, $\tilde{x}^M = 0$). In a well behaving case $\tilde{y}^M = \bar{x} - 2b(C)$ and $\tilde{x}^M = \bar{x} - b(C) - \sigma^p(C)$.

When $-\sigma^a(C) > t^d$, the attorney in fact does not play any role during the negotiation. The only offers for which his recommendation could be useful are so high, that they are never made. Hence, the attorney can be dropped form the analysis and the equilibrium follows the standard pattern of signaling pre-trial negotiation (Reinganum and Wilde, 1986). When the liability value is low the negotiation fails, but the case can still be settled when the liability value is high. In the latter case the defendant can make a pooling offer which is sufficiently high, for the plaintiff to believe that it covers her expected payoff under the trial. The derivation of the cut-off liability value ($\tilde{x}^U$) and the smallest offer that the plaintiff is willing to accept ($\tilde{y}^U$) is analogous the misinformative equilibrium case, and they take the following values:

$$\tilde{y}^U = \max\{\frac{1}{2}\bar{x} - \sigma^p(C), \bar{x} - t^d - 2\sigma^p(C)\}, \tag{13}$$
$$\tilde{x}^U = \max\{0, \bar{x} - 2(t^d + \sigma^p(C))\}. \tag{14}$$

Since this equilibrium type is based on lack of information transmission between the attorney and the plaintiff, I refer to it as *an uninformative equilibrium*. Proposition 3 describes the negotiations outcome in this equilibrium. Full equilibrium description can be found in the appendix.

Proposition 3. *Consider a contract C, for which $b(C) > 0$ and $-\sigma^a(C) > -t^d$. Then there an equilibrium of the negotiation phase called uninformative equilibrium in which for all liability values $x < \tilde{x}^U$) the case is resolved by trial, and for all liability values $x \geq \tilde{x}^U$ the case is settled at an offer $\tilde{y}^U$.*

3.4 Aggressive plaintiff

Now, I move to a scenario, in which the bias of the attorney is negative ($b(C) < 0$). Analogously to the previous subsection suppose that the attorney uses strategy $m^a(x, y)$ and always makes the recommendation, which follows his best interest. Then, it is easy for the plaintiff to interpret a negative recommendation: whenever the attorney who is very willing to settle the case says that the offer is too low for him, it is necessarily too low for the plaintiff. Hence, the plaintiff would always follow a negative recommendation of her attorney.

But a positive recommendation does not have a simple interpretation for the plaintiff. It can be the case that the offer made is genuinely good and the plaintiff should accept it, but it can also be that that the attorney recommends settling the case at an offer which is too low for the plaintiff. If the plaintiff decides to blindly follow the attorney's recommendation, the defendant would exploit that by offering settlement that compensates only the attorney's, but not the plaintiff's trial payoff. Hence, a positive recommendation of the attorney must be at least sometimes ignored.

However, at some offers the recommendation of the attorney can be useful for the plaintiff. In particular, imagine that there is a finite set of standard typically made offers, the plaintiff always rejects any offer that does not belong to this set and follows her attorney's advice at any offer from the set. Naturally, at least if the standard offers are not too high, the defendant has an incentive to make only an offer that belongs to the set, since it is the only way to ensure a settlement. To be precise, the defendant always makes the lowest standard offer that the attorney is willing to recommend. Since the set of standard offers is finite and the set of liability values is a continuum, it implies that each standard offer is made for some interval of liability vales. Moreover, if the standard offers are sufficiently spread apart the plaintiff should follow the recommendation of the attorney. Although it does happen that the attorney recommends a settlement which is unprofitable for the plaintiff, in expectation it is compensated by the fact that the defendant may need to overpay the plaintiff in order to keep the offer made standard. Finally, note that it is indeed a best response of the attorney to follow the strategy $m^a(x, y)$ – changing a message would have no consequences at best, and would yield additional costly trial at worst. Given that in this case the attorney transmits only part of the information the plaintiff, the equilibrium is called *partially informative equilibrium* and it is described in Proposition 4. Overall, the equilibrium resembles the most informative equilibria in a standard cheap-talk game (Crawford and Sobel, 1982) – the continuum of states of the world (liability values) is partitioned, and for each element of the partition there is a different action taken (offer made). However, unlike in the standard cheap-talk literature, the misalignment of incentives between the plaintiff and the attorney is not ex ante costly for any of the players. To be precise, the expected payoff of each of the agents under partially informative equilibrium, is equal to their expected payoff under complete information.

To formally describe a partially informative equilibrium, I derive the set of standard offers, and the corresponding partition of the realization of liability values. It is useful to order the standard offers in a sequence, in which y_k denotes the k-th smallest standard offer. Analogously, the partition can be described in terms of sequence of boundaries of the intervals, x_k denotes a lower bound of an interval in which on offer y_k is made (and an upper bound of the interval in which an offer y_{k-1} is made).

Each standard offer, must at least compensate the expected plaintiff's payoff under the trial for the interval of liability values for which it is made, since otherwise it would not be accepted on at the equilibrium. Since, I focus on the defendant's preferred equilibria this condition needs to be binding:

$$y_k = \frac{1}{2}[x_k + x_{k+1}] - \sigma^p(C). \tag{15}$$

Moreover, the defendant always makes the lowest standard offer which is recommended by an attorney for a given liability value. Hence, at least for the intermediate realizations of x, at the upper bound of an interval the attorney needs to be indifferent between making a positive and a negative recommendation:

$$x_{k+1} = y_k + \sigma^a(C). \tag{16}$$

Combining (15) and (16) I recursively define the sequence x_k:

$$\begin{aligned} &x_0 = 0 \\ &x_{k+1} = x_k - 2b(C). \end{aligned} \tag{17}$$

That is, the support of liability value realizations $[0, \bar{x}]$ is partitioned into intervals with a length of twice the attorney's bias. An exception to this rule is the last interval – its length can be smaller than the remaining ones. It is just a consequence of the fact that it may be impossible to divide the support of the liability value into a whole number of intervals of length $-2b(C)$. Hence, if there are K standard offers then:

$$y_K = \frac{1}{2}(x_K + \bar{x}) - \sigma^P(C),$$

where K can be determined using (17):

$$K = \max\{k \in \mathbb{N} | x_k < \bar{x}\} \tag{18}$$

Overall, the set of standard offers can defined as:

$$\mathbf{Y} \equiv \{y_k\}_{k \leq K} \tag{19}$$

Finally, note that I abstracted from the possibility of the defendant not being willing to make a standard offer for some liability value realization. If the incentives of the plaintiff and the attorney are too misaligned ($-b(C) > \sigma^p(C) + t^d$), it indeed can happen. Intuitively, in this case the intervals of liability values for which each standard offer is made grow so large that $x_k + t^d < y_k$ and the defendant may prefer going to a court rather than settling at the standard offer. Then the attorney's recommendation fully looses its value and equilibrium becomes uninformative.[12]

Proposition 4. *Consider a contract C for which $b(C) < 0$. Then if $-b(C) \leq \sigma^p(C) + t^d$ there exists an equilibrium of the negotiation phase called partially informative equilibrium in which:*

(i) The defendant's offer is:

$$\begin{cases} y_0 & \text{if } x \leq x_1 \\ y_k & \text{if } x \in (x_k; x_{k+1}] \text{ and } k \in (0, K) \\ y_K & \text{if } x > x_K; \end{cases} \tag{20}$$

(ii) the attorney's recommendation is:

$$m(x, y) = m^a(x, y); \tag{21}$$

(iii) the plaintiff's decision is:

$$a(y, m) = \begin{cases} 0 & \text{if } y \notin \mathbf{Y} \text{ and } y < y_K \\ m & \text{if } y \in \mathbf{Y} \text{ and } y < y_K \\ 1 & \text{if } y \geq y_K. \end{cases} \tag{22}$$

If $-b(C) > \sigma^p(C) + t^d$, then there exists an uninformative equilibrium described in Proposition 3, and it is defendant-preferred communicative equilibrium.

Figure 2 compares the negotiation phase between partially informative, misinformative and uninformative equilibrium. Each panel depicts the liability value realizations on the horizontal axis and possible settlement offers on the vertical axis. On each panel the plaintiff's willingness to settle is set to 0, but the willingness to settle of the attorney varies. In particular, it is positive on the right panel, negative but larger than $-t^d$ on the central panel, and below $-t^d$

[12]The result that the equilibrium moves directly from partially informative to uninformative type is a consequence of assuming a uniform distribution of liability values. In a more general case an equilibrium exhibiting features of both types can be sustained.

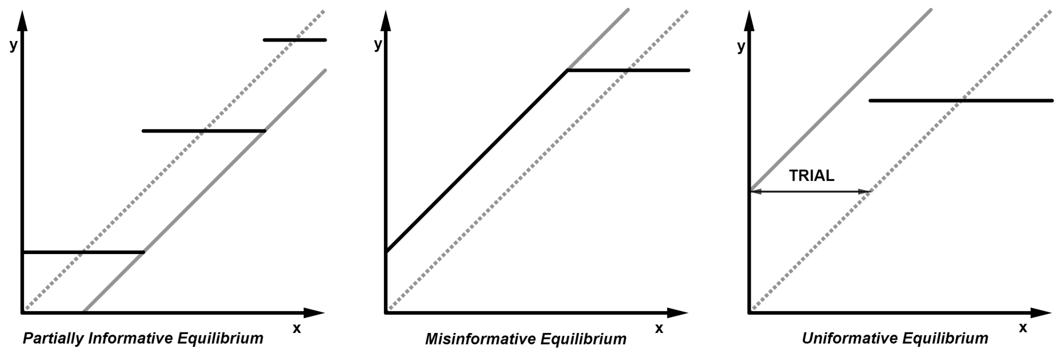


Figure 2: Equilibira of the negotiation phase

on the left panel. The gray dotted 45^o line represents the outcome of the negotiation under complete information benchmark. As the willingness to settle of the plaintiff is constant across the panels, also the outcome of the negotiation under symmetric information does not differ. The solid black lines, the outcome of the negotiation under symmetric information. Finally, the gray solid line separates the offers which the attorney would recommend accepting (at or above the line) from the offers that he would recommend rejecting (below the line).

The left panel presents an example partially informative equilibrium. The bias of the attorney is negative, and he is ready to recommend accepting some offers that plaintiff would not accept under symmetric information. However, at the equilibrium the defendant makes only three offers, which on average compensate the plaintiffs payoff under the trial. The central panel gives example of misinformative equilibrium. The bias of the attorney is positive, and he is ready to recommend rejecting some offers that are acceptable for the plaintiff. For low liability vales the defendant adjusts the offer made in order to convince the plaintiff, but for high liability values it makes one pooling offer that is always accepted for the plaintiff. Finally, the right panel shows uninformative equilibrium. On the graph the attorney has too low willingness to settle to send any meaningful recommendation to the plaintiff, but the same effect can be achieve if his willingness to settle is too high. In this case the settlement is possible only for high liability values at which the defendant makes some pooling settlement offer accepted by the plaintiff. For the low liability values the negotiation fails.

3.5 Agents' behavior under contracts with trial premium in the form of a share

If the contract includes a positive share trial premium ($s_t > 0$), the agents' willingness to settle is not constant over liability values, but rather plaintiff's willingness to settle is increasing with the liability value realization, whereas the attorney's willingness to settle is decreasing. As a result, also the bias of the attorney is decreasing in the liability value realization.

Intuitively, in this case the equilibrium exhibits properties of different equilibria types for different liability value realizations. In particular, in the most complex situation the equilibrium is informative for very low liability vales, once the bias of the attorney decreases sufficiently it becomes partially informative. As the liability value increases even further the sign of the bias changes and the equilibrium becomes misinformative. Finally, for very high liability values the bias of the attorney is so high that the equilibrium becomes uninformative again. However, for some contracts only properties of some equilibria types are exhibited.

A detailed description of the negotiation phase equilibria can be found in an online appendix.[13] In the online appendix I also show that for any contract with $s_t > 0$ there exists an alternative contract with $s_t = 0$, which is yields a weakly larger profit for the plaintiff. The rough intuition behind this result follows directly from the property that an equilibrium of the negotiation stage when a contract is characterize with a positive trial premium in form of a share exhibits properties of multiple equilibria types. However, not all of this types yield equally good negotiation outcome for the plaintiff. Hence, the plaintiff should always sign a contract, which yield a unique equilibrium type.

4 Contract phase

Before the negotiation begins, the plaintiff proposes a contract to the attorney $C = (f_n, f_t, s_n, s_t)$, specifying both the way the compensation and the costs are shared – and thus setting the incentives for both agents. The agents can predict the expected outcome of the negotiation phase of every possible contract, which I have described in Section 3. In this section, I describe the optimal contracts for the plaintiff. Using the result of Proposition 7 presented in the online appendix, I can ignore the contracts characterized by $s_t > 0$. If any such a contract is optimal, there necessarily exists an alternative contract with $s_t = 0$ that yields the same profit for the plaintiff.

For convenience I set $\bar{x} = 2$, that is I standardize the expected liability value to 1. In other words, the cost of analyzing the case (c) and the costs of trial (t^a and t^d) are expressed as a fraction of the expected liability value. Additionally, to simplify the analysis I assume that costs of litigation are not excessive. To be precise, I assume $t^a \leq \frac{1}{2}$ and $t^d \leq \frac{1}{2}$. Moreover, I assume that in expectation the case is worth litigating for the plaintiff, that is $c + t^a \leq 1$.

A natural candidate for an equilibrium contract is any contract that eliminates misalignment of incentives between the plaintiff and the attorney and yields a perfectly informative equilibrium. Indeed, any contract for which $f_t = (1 - s_n)t^a$ would . If any such a contract is signed the plaintiff can fully rely on her attorney's advice, and the settlement is always reached. However, under any such a contract the willingness to settle of the plaintiff is equal to t^a and defendant is able to appropriate the whole bargaining surplus $t^a + t^d$. As a result the plaintiff is indifferent between signing a contract yielding a perfectly informative equilibrium, and bearing the total cost of trial and resolving the case in court.

However, the plaintiff may obtain a strategic advantage through contracting. One way of achieving this is by decreasing f_t to push the costs of the trial to the attorney and improve the plaintiff's bargaining position. As a result, the negotiation phase of the game would follow a partially informative equilibrium. The settlement is always reached, and the plaintiff is on average compensated for her payoff under the trial. However, since the plaintiff bears smaller fraction of the trial costs she is better-off than under any contract yielding a perfectly informative equilibrium.

The optimal contract which yields a partially informative equilibrium is always contingent, that is, it includes a positive share s_n. However, the detailed structure of the contract depends on the parameters of the model. If the trial costs of the plaintiff side t^a are relatively small compared to the trial costs of the defendant t^d, but the initial cost of litigation c is large, the

[13] hyperlink to online appendix

plaintiff can bear no costs of trial at all and sign a *flat contingency fee contract*:

$$C^{CF} \equiv (0, c, 0, 0). \tag{23}$$

However, if t^a is large compared to t^d or c is small a flat contingency fee contract does not sufficiently align the incentives of the plaintiff and the attorney for any information to be transmitted between the two. Hence, the plaintiff needs to include in the contract at least some trial premium for the attorney. Then, a *bifurcated contingency contract* needs to be signed:

$$C^{BF} \equiv \left(0, \sqrt{\left(\frac{1-c-t^a}{2(1+t^d)}\right)^2 + \frac{c}{1+t^d}} - \frac{1-c-t^a}{2(1+t^d)}, \frac{t^a - s_n t^d}{1+s_n}, 0\right). \tag{24}$$

Alternatively, the plaintiff may use the information transmission process as a strategic tool. By increasing f_t and decreasing s_n the plaintiff can make the attorney more aggressive, and sign a contract which yields a misinformative equilibrium. Such a contract can be viewed as an approach to replicate strategic delegation through committing to receive biased advice. Even though the plaintiff bears large part of the trial cost and is relatively willing to settle, she is unable to recognize the true liability value and at least for small offers she follows the recommendation of the attorney. As a result when the liability value is small in order to achieve a settlement the defendant needs to raise the offer to ensure a positive recommendation of the attorney. Hence, the negotiation behaves as if the negotiation was delegated to the attorney. However, for very high offers, despite the negative recommendation of the attorney, the plaintiff must realize that she should not hope for a higher payoff under a trial and her trial threat looses credibility. At the equilibrium the defendant takes it into account and if the liability value is sufficiently high the it simply makes the smallest offer that the plaintiff is not credible to reject. As a result any contract which yields a misinformative equilibrium only partially replicates strategic delegation.

The optimal contract which yields a misinformative equilibrium includes only a fixed payment. To be precise, the plaintiff promises to her attorney to exactly covers his cost. Since, such a contract resembles an agreement in which the plaintiff promises to the attorney compensation for each hour he worked on a case, I call it an *hourly fee contract*:

$$C^H \equiv (c, 0, t^a, 0). \tag{25}$$

Note that under the hourly fee contract the attorney is always indifferent between any negotiation outcome, and what follows, he is always indifferent between making any recommendation. However, at the equilibrium the attorney's willingness to settle and his behavior can be pinned down.[14]

To be precise, the attorneys behavior depends on the total cost of trial ($t^a + t^d$). If this cost is relatively small ($t^a + t^d < \frac{1}{2}$) the attorney's willingness to settle is $\sigma^a(C^H) = -t^d$, that is, he recommends accepting only the offers $y \geq x + t^d$. Then for low liability values the plaintiff is able to capture the whole bargaining surplus. If the total cost of trial is relatively large ($t^a + t^d \geq \frac{1}{2}$) the attorney's willingness to settle is $\sigma(C^H) = t^a - \frac{1}{4} > -t^d$. This way

[14]To do so it is useful to think of a contract C^H as of a limit of a sequence of contracts under which the preferences of the attorney are strict and his willingness to settle is constant, but the willingness to settle of the plaintiff is decreasing. Indeed the plaintiff can ensure that the preferences of her attorney are strict by proposing a contract with a very small s_n and f_t marginally above f_t, at a cost of marginally decreasing her expected payoff.

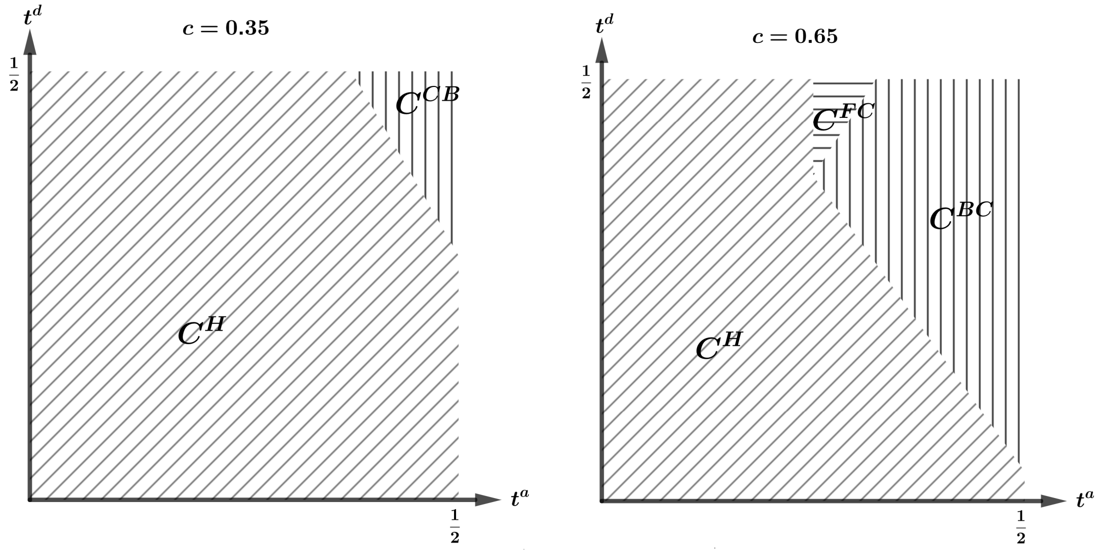


Figure 3: Contract choice

the plaintiff compromises some of the bargaining surplus when the liability values are low, but increase the offer she is not credible to reject.

The choice between the three candidate optimal contracts is complex and depends on all the parameter of the model. But the results suggests that the contingency fee contracts should be chosen only if the initial cost of litigation (c) and the costs of trial (t^a, t^d) are large. It is quite an intuitive outcome, if t^a and t^d are large under a contract C^H the plaintiff is not credible to follow her attorney's advice even for modestly high offers. As a result, there are little gains from strategic use of misinformation. Moreover, when c is large, the plaintiff can simultaneously use a large contingency fee as tool to ensure information transmission from the attorney and a way to pay her attorney's initial cost of litigation. More detailed description of the contract choice is presented by Proposition 5.

Proposition 5. *If $t^a < \frac{1}{4}$ or $t^a + t^d < \frac{1}{2}$ then the hourly fee contract is proposed by the plaintiff. Otherwise there exists $\bar{c} \in (0, \frac{t^a}{t^d})$ such that:*

(i) if $c < \bar{c}$ an hourly fee contract is proposed by the plaintiff;

(ii) if $c \in [\bar{c}, \frac{t^a}{t^d})$ a bifurcated contingency fee contract is proposed by the plaintiff;

(iii) if $c \geq \frac{t^a}{t^d}$ a flat contingency fee contract is proposed by the plaintiff.

Figure 3 depicts the contracts chosen by the plaintiff for $c = 0.35$ and $c = 0.65$. It is visible that if the initial costs of litigation is relatively small, as on the left panel, then a flat contingency fee contract is never chosen, and a bifurcated contingency fee contract is proposed only if the costs of trial are very large. If the initial cost of litigation is sizable, as on the right panel, a flat contingency fee contract becomes optimal when t^d is large. Moreover, bifurcated contingency fee contract is proposed for a larger set of trial costs.

A natural question to ask is what drives the choice of an hourly fee contract and strategic use of biased advice. In particular, it can be the case that the plaintiff proposes an hourly fee contract not because she expects a large gain from mimicking strategic delegation, but because ensuring information transmission through other means is very costly. To address this concern I compare the equilibrium payoff of the plaintiff from a litigation game to a hypothetical scenario in which the information is complete. This scenario can be interpreted for example as hiring a lawyer who has a reputation of always being honest with his clients. Naturally, under complete information the plaintiff has no reason to promise her lawyer any trial premium, and the optimal contract simply covers the initial cost c. Hence, the expected payoff of the plaintiff is equal to $1 - c$.

Corollary 1. *The payoff of the plaintiff's side is higher under asymmetric than under complete information, whenever:*

(i) $t^a + t^d \geq \frac{1}{2}$ *and* $t^a < \frac{1}{4}$ *or;*

(ii) $t^a + t^d < \frac{1}{2}$ *and* $t^d > (t^a + t^d)^2$.

Corollary 20 shows that if the cost of trial for the plaintiff's side is not too high, the plaintiff is better off litigating under asymetric information than under symmetric information. The intuition behind this surprising result is that the lack of information gives the plaintiff an opportunity to credibly condition her decision on the attorney's recommendation. Thus, even though from a legal perspective the attorney only plays a role of an adviser, *de facto* he takes the final decision. Unlike the plaintiff, the attorney can be incentivized to be arbitrarily aggressive through a contract. So it is the lack of information that allows the plaintiff to strategically delegate the negotiation. Plaintiff's preferences over the information structure are depicted on Figure 4.

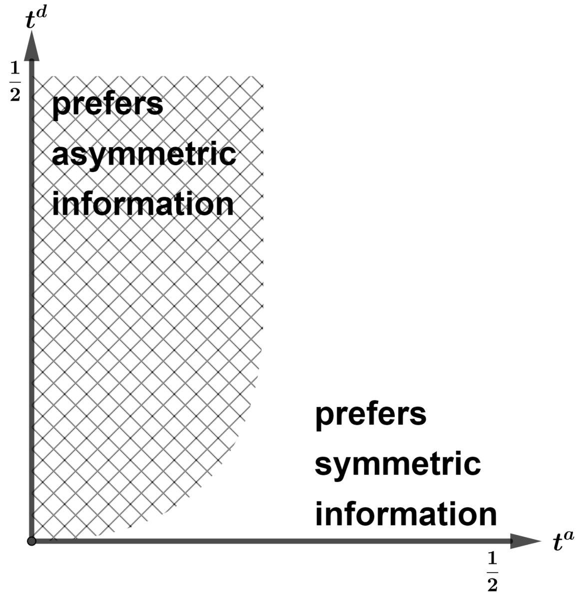
5 Conclusions

The paper has examined the strategic role of experts during the negotiations using pre-trial negotiations as an illustration. In my model, the plaintiff faces a harm of an unknown value, for which she has a right to be compensated by the defendant. In order to execute the liability, the plaintiff hires the attorney offering him a contract. Before the trial begins, parties try to reach a settlement through negotiation. The negotiation is modeled as a signaling game in which the defendant (who is aware of the liability value) makes a take-it-or-leave-it offer to the plaintiff. Before taking the final decision the plaintiff consults her attorney.

The incentives of the plaintiff and the attorney are endogenously set by a contract that specifies the division of the compensation and the costs of the litigation. It occurs that a strategic plaintiff would never propose a contract that leads to a complete information transmission.

The plaintiff may use different choices in order to improve her bargaining position. Firstly, when the trial costs are high, she might set a high share payment for the attorney, but transfer all the trial costs to him. The share payment ensures that the attorney's recommendation remains useful. Transferring the costs of the trial improves the bargaining position of the plaintiff. Secondly, when the trial costs are low, she may turn her lack of knowledge into an advantage through strategic misinformation. By strongly rewarding her attorney in case of trial, the plaintiff ensures a positive recommendation only if the settlement offer is sufficiently high. Since

Figure 4: Plaintiff's preferences over information structure



under the negative recommendation she remains uncertain about the liability value realization, she can credibly threaten the defendant with a trial; and hence she increases her bargaining position.

Strategic misinformation can be seen as an approach to replicate strategic delegation by the plaintiff in an environment where she cannot credibly transfer the right to take the settlement decision to the attorney. However, strategic misinformation functions only if the liability value realization is sufficiently low; for very high offers the plaintiff cannot credibly use a trial threat despite the negative recommendation of the attorney. Interestingly, strategic misinformation may yield higher payoffs for the plaintiff than an optimal contract in complete information scenario.

Apart from identifying a new channel through which contracting can bring a strategic advantage during the negotiations, the model also helps to understand some phenomena present in the market for legal services. It explains why the bifurcated fee contracts[15] are prevailing in the market – those are the only contracts that enable strategic misinformation.[16] It also shows why the negotiations are usually handed to the attorneys even though the final decision on settlement is always made by the plaintiffs. Making the attorney an adviser through the negotiations allows the strategic use of the information structure.

The model leaves space for future extensions. It ignored the problem of moral hazard, risk aversion, or liquidity constraints on either of the sides. The model is also applicable in other situations, in which the negotiation is handled in a presence of an expert whose advice is not binding for the parties. This includes negotiating contracts for sportspersons or artists by their

[15]Contracts that include an additional payment for the attorney in case of a trial.

[16]Some empirical analysis of contracts on the market for legal services is provided e.g. by Helland and Tabarok (2003).

agents, behavior of real-estate agents negotiating on behalf of property owners, or the role of consultants in buyer-seller environment. Detailed analysis of these scenarios is left for future research.

Since fully informative equilibrium can be seen as a special case of misinformative equilibrium , the proof of Proposition 1 follows directly the proof of Proposition 2.

Proof of Proposition 2
Proposition 2 is proven in Lemmas 1 and 2.

Lemma 1. *If $b(C) > 0$ and $-\sigma^a(C) \leq t^d$ then the misinformative equilibrium exists.*

Proof. Observe that since the plaintiff is risk neutral her beliefs can be summarized as an expected value of the liability conditional on the offer made and the recommendation received. I denote it by $x^e(y, m)$.
Consider the following beliefs of the plaintiff:

$$x^e(y,m) = \begin{cases} y + \sigma^a(C) & \text{if } m = 1 \\ \frac{1}{2}[y + \sigma^a(C) + \bar{x}] & \text{if } m = 0. \end{cases} \tag{26}$$

First, observe that given the beliefs there is never a profitable deviation for the plaintiff from accepting the offer if the message is $m = 1$, that is, from an action $a(y, 1) = 1$. Suppose the plaintiff observes some pair $(y, m = 1)$ then her expected payoff under a trial is $y+\sigma^a-\sigma^p < y$. Second, observe that if the plaintiff observes a negative recommendation it is her best response to accept the settlement offer if $y \geq \tilde{y}^M$ and reject it otherwise. If the recommendation is negative the plaintiff's expected payoff under the trial is $\frac{1}{2}[y + \sigma^a(C) + \bar{x}] - \sigma^p(C)$, which is smaller or equal than y whenever $y \geq \bar{x} - b(C) - \sigma^p(C) = \tilde{y}^M(C)$. Hence, given the beliefs, there is no profitable deviation form the strategy $a(y, m)$.
The fact that there is no profitable deviation from strategy $m^a(x, y)$ for the attorney, is a direct consequence of the fact that he always makes a recommendation in his own interest and his recommendation is either ignored (for $y \geq \tilde{y}^M$) or followed (otherwise).
Observe that each offer that the defendant makes is accepted and satisfies $y(x) < x+t^d$, that is, going to a trial is not a profitable deviation for the defendant for any x. Moreover $y(x)$ solves:

$$\begin{aligned} &\arg\min y \\ &\text{s.t } a(y, m(x, y)) = 1. \end{aligned} \tag{27}$$

That is, there is no lower offer for which the defendant could achieve settlement at a liability value x than $y(x)$. Hence, there is no profitable deviation for the defendant.
Finally, observe that, the assumed beliefs of the plaintiff are consistent. First, the negative recommendation is observed on the equilibrium path only when an offer $\tilde{y}^M$ is made, and it is made for all the liability values between $\tilde{x}^M$ and $\bar{x}$. Hence, following the Bayes's rule the plaintiff expects the liability value to be $\frac{1}{2}[\tilde{x}^M + \bar{M}] = \frac{1}{2}[\tilde{y}^M + \sigma^a + \bar{x}]$. Second, in all the equilibrium path instances, in which $(y >, m = 1)$ is observed by the plaintiff, the liability value is $x = y + \sigma^a(C)$, which is equal to $x^e(y > 0, m = 1)$. No other events are observed on the equilibrium path, and the beliefs of the plaintiff can be chosen arbitrarily.

□

Lemma 2. *If $b(C) > 0$ and $-\sigma^a(C) \leq t^d$, then misinformative equilibrium is defendant-preferred among communicative equilibria.*

Lemma 2 is proved in Claims 1 – 5.

Claim 1. *In any equilibrium there is at most one offer y^* such that it is made on the equilibrium path and it is accepted by the plaintiff independently of the recommendation of the attorney.*

Proof. Suppose that there are more such offers: $y_1^* < y_2^* < ... < y_n^*$. Take some liability value x for which an offer y_2^* is made. Then the defendant has a profitable deviation of making an offer y_1^* for this liability value. $\square$

Claim 2. *In any communicative equilibrium for which y^* exists, there exists a liability value x^* s.t. $y(x) = y^*$ for all $x > x^*$.*

Proof. Suppose not, and pick any $x' > x^*$ s.t. some offer $y' \neq y^*$ is made for this x'. If $y' > y^*$ then the defendant has a profitable deviation of making an offer y^* for the liability value x'. If $y' < y^*$ and it is accepted, hence $m(x', y') = 1$ and since $x' > x$ then also $m(x, y') = 1$, and the defendant has a profitable deviation of making an offer y' for liability value x^*. If $y' < y^*$ and it is rejected, than either $y^* \geq x' + t^d > x^* + t^d$ and the defendant has a profitable deviation of making an offer y' for liability value x^*, or $y^* < x' + t^d$, and the defendant has a profitable deviation of making an offer y^* for liability value x' $\square$

Claim 3. *If $b(C) > 0$ and $-\sigma^a(C) \leq t^d$, then in any communicative equilibrium $y^* \geq \tilde{y}^M$.*

Proof. If $\bar{x} \leq 2b(C)$ then misinformative equilibrium is completely pooling, and the offer $\tilde{y}^M$ exactly compensates the unconditional expected trial payoff of the plaintiff. Hence, no equilibrium with a lower offer unconditionally accepted by the plaintiff exists.
Consider any contract s.t. $2b(C) > \bar{x}$, and some communicative equilibrium characterized by some offer y^*. Denote by x^{**} the largest liability value for which $m(x, y^*) = 1$, and observe that in any communicative equilibrium $x^{**} = y^* - \sigma^a(C)$, and suppose $x^{**} \geq x^*$ Note that, since an offer y^* is assumed to be accepted despite a negative recommendation of the attorney, in any communicative equilibrium $y^* \geq \frac{1}{2}[x^{**} + \bar{x}] - \sigma^p(C)$. Then substituting for x^{**} the following must hold $y^* \geq \bar{x} - b(C) - \sigma^p(C) = \tilde{y}^M$.
To close the proof observe that if $x^{**} < x^*$, it still needs to be the case that the plaintiff is at least well-off under a trial as under a settlement when receiving an offer y^* and a negative recommendation. Hence, $y^* \geq \frac{1}{2}[x^* + \bar{x}] - \sigma^P(C)$, which implies that $y^* \geq \frac{1}{2}[x^{**} + \bar{x}] - \sigma^P(C)$. $\square$

Claim 4. *If $b(C) > 0$ and $-\sigma^a(C) \leq t^d$, then misinformative equilirbium is defendant-preferred in a class of communicative equilibria.*

Proof. The proof for the completely pooling equilibrium case ($\bar{x} \leq 2b(C)$) is straightforward and follows directly from the fact, that the defendant either achieves settlement at an expected payoff of the plaintiff under the trial.
Take any equilibrium characterized by some pair (y^*, x^*).[17] Then the expected payoff of the defendant at this equilibrium is bounded from above by:

$$-\frac{1}{\bar{x}}[\int_0^{x^*} (x - \sigma^a(C))dx + \int_{x^*}^{\bar{x}} y^* dx]. \tag{28}$$

The expression $\int_0^{x^*} x - \sigma^a(C)dx$ in (28) follows the fact that for any $x < x^*$ the defendant cannot achieve a settlement without a positive recommendation of the attorney, which can be

[17]If y^* does not exist for a chosen equilibrium it is enough to take $x^* = \bar{x}$ and the proof holds.

achieved only if an offer $y(x) \geq x - \sigma^a(C)$. Since $-\sigma^a(C) \leq -t^d$, the defendant cannot be also better-off under the trial than under a settlement at $x - \sigma^a(C)$.
Since (28) is decreasing in y^* and y^* is bounded from below by $\tilde{y}^M$, (28) must be lower or equal than:

$$-\frac{1}{\bar{x}}[\int_0^{x^*}(x - \sigma^a(C))dx + \int_{x^*}^{\bar{x}} \tilde{y}^M dx] \tag{29}$$

Maximizing (29) with respect to x^*, I obtain a first order condition $x^* - \sigma^a = \tilde{y}^M$, that is, at the optimum $x^* = \tilde{x}^M$. Hence, defendant's expected payoff in any communicative equilibrium is bounded from above by:

$$-\frac{1}{\bar{x}}[\int_0^{\tilde{x}^M}(x - \sigma^a(C))dx + \int_{\tilde{x}^M}^{\bar{x}} \tilde{y}^M dx], \tag{30}$$

which is the defendant's expected payoff under misinformative equilibrium. Hence, misinformative equilibrium is defendant's preferred. □

Proof of Proposition 3
Proposition 3 is proved in Lemmas 3 and 4.

Lemma 3. *If $b(C) < 0$ and $-\sigma^a(C) \geq t^d$ then the following uninformative equilibrium exists.*

(i) The defendant makes an offer:

$$y(x) = \begin{cases} x - \sigma^p(C) \text{ if } x < \tilde{x}^U \\ \tilde{y}^U \text{ if } x \geq \tilde{x}^U. \end{cases} \tag{31}$$

(ii) The attorney makes a recommendation:

$$m(x, y) = m^a(x, y). \tag{32}$$

(iii) The plaintiff takes an action:

$$a(x, y) = \begin{cases} m \text{ if } y < \tilde{y}^U \\ 1 \text{ if } y \geq \tilde{y}^U. \end{cases} \tag{33}$$

Proof. Consider the following beliefs of the plaintiff:

$$x^e = \begin{cases} y + \sigma^a(C) & \text{if } m = 1 \\ y + \sigma^p(C) & \text{if } y < \tilde{y}^U \text{ and } m = 0 \\ \frac{1}{2}[\tilde{x}^U + \bar{x}] & \text{if } y \geq \tilde{y}^U \text{ and } m = 0 \end{cases} \tag{34}$$

First, observe that given the beliefs, there is no profitable deviation for the plaintiff. If the plaintiff receives a observes $m = 1$ at some offer y, then her expected payoff under a trial is $y + \sigma^a(C) - \sigma^p(C) < y$. If the plaintiff observes some offer $y < \tilde{y}^M$ and a message $m = 0$, then she is indifferent between settlement and a trial, hence, any action is her best response. If the plaintiff observes an offer $y \geq \tilde{y}^M$ and observes $m = 0$, then her expected payoff under a

trial is $\frac{1}{2}[\tilde{x}^U + \bar{x}] - \sigma^p(C) = \tilde{y}^U \geq y$. Hence, accepting the offer is her best response.
Second, since the attorney's message does not influence plaintiff's decision any strategy is his best response, in particular, $m^a(x, y)$ is.
Third, note that the defendant makes an offer $\tilde{y}$ whenever $x + t^d \geq \tilde{y}$ and faces a trial at any other lower offer. Since $-\sigma^a(C) > t^d$ the defendant is better off under a trial, than ensuring a positive recommendation of the attorney and there is no profitable deviation for the defendant.
Finally,the plaintiffs beliefs are consistent. On the equilibrium path the plaintiff always observes a negative recommendation. Each of the offers $y < \tilde{y}^U$ is made on the equilibrium path for a single liability value $x = y + \sigma^p(C)$, which is equal to $x^e(y < \tilde{y}^U, m = 0)$. An offer $\tilde{y}^U$ is made for all $x \geq \tilde{y}^U$, hence following the Bayes' rule the plaintiff believes that $\mathbb{E}[x|y = \tilde{y}^U, m = 0] = \frac{1}{2}[\tilde{x}^U + \bar{x}] = x^e(y = \tilde{y}^U, m = 0)$. No other event is observed on the equilibrium path.

□

Lemma 4. *If $b(C) < 0$ and $-\sigma^a(C) \geq t^d$ then uninformative equilibrium is defendant-preferred in a class of communicative equilibria.*

Lemma 4 uses already proved Claims 1 and 2. To follow the proofs recall that y^* denotes the smallest offer that the plaintiff accepts despite a negative recommendation of the attorney, and x^* is the smallest liability value for which this offer is made at some given equilibrium. The remaining steps are separated into Claims 5 – 6.

Claim 5. *If $b(C) > 0$, $-\sigma^a(C) > t^d$, , then in any communicative equilibrium $y^* \geq \tilde{y}^U$.*

Proof. First, note that if $\bar{x} \leq 2(\sigma^P(C) + t^d)$, then uninformative equilibrium is completely pooling, and is such that $\tilde{y}^U$ exactly compensates the expected payoff of the plaintiff under the trial. Hence, no lower offer unconditionally accepted by the defendant exists.
Second, observe that if $\bar{x} \leq 2(\sigma^P(C)+t^d$ in any communicative equilibrium $x^* = \max\{0, y^* - t^d\}$. The statement follows from the definition of y^* being the smallest offer that is accepted by the plaintiff without a positive recommendation of the attorney, and the fact that as $-\sigma^a(C) > t^d$ the defendant is better-off going to a trial than making an offer ensuring positive recommendation of the plaintiff.
Moreover, $y^* \geq \frac{1}{2}[x^* + \bar{x}] - \sigma^p(C)$, as otherwise the offer y^* would not be accepted by the plaintiff. Substituting for x^*, I obtain $y^* \geq \bar{x} - t^d - 2\sigma^p(C) = \tilde{y}^U$. □

Claim 6. *If $b(C) > 0$ and $-\sigma^p(C) > t^d$ then uninformative equilibrium is defendant-preferred in a class of communicative equilibria.*

Proof. Take any communicative equilibrium characterized by some (y^*, x^*). The expected payoff of the defendant is given by the following expression:

$$-\frac{1}{\bar{x}}[\int_0^{x^*} (x + t^d)dx + \int_{x^*}^{\bar{x}} y^* dx]. \tag{35}$$

By definition of x^* the defendant does not make an offer y^* for any $x < x^*$. Moreover, since $-\sigma^a(C) > t^d$, in no communicative equilibrium the defendant achieves a settlement at some offer $y < y^*$ through obtaining a positive recommendation of the attorney. Hence, for all $x < x^*$ the case goes to a trial and the defendant's payoff is $-x - t^d$. By definition for all

$x \geq x^*$ the defendant makes an offer y^* which is accepted, and receives a payoff of $-y^*$. Using Claim 5 $y^* \geq \tilde{y}^U$, hence, (35) is bounded form above by:

$$-\frac{1}{\bar{x}}[\int_0^{x^*}(x+t^d)dx + \int_{x^*}^{\bar{x}} \tilde{y}^U dx]. \tag{36}$$

Maximizing (36) with respect to x^*, I obtain the first order condition: $x^* = \max 0, \tilde{y}^U - t^d = \tilde{x}^U$. Hence, if $b(C) > 0$ and $-\sigma^p(C) > t^d$, the expected payoff of the defendant in any communicative equilibrium is bounded from above by the expected payoff of the defendant in uninformative equilibrium. □

Proof of Proposition 4

Proposition 4 is proved in Lemmas 5 to 8.

Lemma 5. *If $b(C) > 0$ and $-b(C) \leq \sigma^P(C) + t^d$ then there exists partially informative equilibrium.*

Proof. Consider the following beliefs of the plaintiff:

$$x^e(y,m) = \begin{cases} \frac{1}{2}(x_k + x_{k+1}) & \text{if } y = y_k \text{ for } k < K \text{ and } m = 1 \\ \frac{1}{2}(x_k + \bar{x}) & \text{if } y \geq y_K. \\ \bar{x} & \text{otherwise.} \end{cases} \tag{37}$$

First, observe that given the beliefs there is no profitable deviation for the plaintiff from strategy $a(y,m)$. If some offer $y < y_K$ is made and the offer either does not belong to $\mathbf{Y}$ or is accompanied by $m = 0$, then the plaintiff's expected payoff under the trial is $\bar{x} - \sigma^p(C) < y_K = \frac{1}{2}(x_K + \bar{x}) - \sigma^P(C)$, hence, there is no profitable for the plaintiff. Second suppose, some offer $y_k \in \mathbf{Y}$, $y < y_K$ is made and a positive recommendation is received. The the plaintiffs expected payoff under the trial is $\frac{1}{2}(x_k + x_{k+1}) - \sigma^p(C) = y_k$. Hence, there is no profitable deviation from accepting the offer. Finally suppose an offer $y \geq y_K$ is received then the plaintiff's expected payoff under a trial is $\frac{1}{2}(x_K + \bar{x}) - \sigma^P(C) = y_K \leq y$. Hence, there is no profitable deviation form accepting the offer.

Note that the plaintiff either follows or ignores the attorney's recommendation, hence, there cannot be a profitable deviation for the attorney from strategy $m^a(x,y)$.

Observe that given the strategies of the plaintiff and the attorney there is no profitable deviation for the defendant. To begin, note that under a strategy $y(x)$ the defendant always achieves a settlement. Moreover, going to a trial could never be a profitable deviation for the defendant: take some liability value close to and above x_k for some k, then under strategy $y(x)$ the defendant makes an offer $y_k = \frac{1}{2}[x_k + x_{k+1}] - \sigma^p(C) = x_k - b(C) - \sigma^p(C)$. By assumption $-b(C) \geq \sigma^p(C) + t^d$, it must be that for all $x > x_k$ settling at an offer y_k is strictly preferred by a defendant to going to a trial. Hence, making an offer larger than $y(x)$ cannot be a profitable deviation for the defendant, neither can be making any offer $y \notin \mathbf{Y}$. Furthermore, making any offer $y \in \mathbf{Y}$ that is lower than $y(x)$ would result in a negative recommendation of the attorney, and hence is not a profitable deviation. To verify this point take any liability value $x > x_k$ for $k > 1$, and suppose that the defendant makes an offer y_{k-1} instead of y_k. Then the attorney's payoff under the trial is $x - \sigma^a(C) > x_k - \sigma^a(C) = \frac{1}{2}(x_{k-1} + x_k) - \sigma^p(C) = y_{k-1}$. Hence, the attorney recommendation is $m(y_{k-1}, x) = 0$.

Finally, observe that the beliefs of the plaintiff are consistent. On the equilibrium path the plaintiff observes only offers $y \in \mathbf{Y}$ and recommendation $m = 1$. An offer y_K is made for all $x > x_K$, hence, $x^e(y_K, 1) = \frac{1}{2}[x_K + \bar{x}]$. Any other offer y_k is made for $x \in (x_k, x_{k+1})$ hence $x^e(y_k, m) = \frac{1}{2}[x_k + x_{k+1}]$. □

Lemma 6. *If $b(C) < 0$ and $-b(C) \leq \sigma^P(C) + t^d$ then partially informative equilibrium is defendant-preferred in a class of communicative equilibria.*

Proof. To prove the lemma it is enough to see that there cannot exist a trial-free equilibrium in which the plaintiff does not recover her payoff under the trial on average; that is the expected transfer form the defendant to the plaintiff must be higher or equal than $\frac{1}{2}\bar{x} - \sigma^p(C)$. The average transfer from the defendant to the plaintiff under partially informative equilibrium is equal to the lower bound on the average transfer if there is no trial on the equilibrium path. Moreover, for any liability value the defendant is better off under the settlement at a partially informative equilibrium offer, than under a trial. Hence, partially equilibrium must be defendant's preferred. □

Lemma 7. *If $b(C) = 0$ and $-b(C) > \sigma^p(C) + t^d$ then there exists the following uninformative equilibrium.*

(i) The defendant's offer is:

$$y(x) = \begin{cases} x - \sigma^p(C) & \text{if } x < \tilde{x}^U \\ \tilde{y}^U & \text{if } x \geq \tilde{x}^U. \end{cases} \tag{38}$$

(ii) The attorney's recommendation is:

$$m(x, y) = m^a(x, y). \tag{39}$$

(iii) The plaintiff's action is:

$$a(y, m) = \begin{cases} 0 & \text{if } y < \tilde{y}^U \\ 1 & \text{if } y \geq \tilde{y}^U. \end{cases} \tag{40}$$

Proof. Take the following beliefs of the plaintiff:

$$x^e(y, m) = \begin{cases} y + \sigma^p(C) & \text{if } y < \tilde{y}^U, \\ \frac{1}{2}[\tilde{x}^U + \bar{x}] & \text{if } y \geq \tilde{y}^U. \end{cases} \tag{41}$$

First, observe that given the beliefs, there is no profitable deviation for the plaintiff. The beliefs of the plaintiff are independent from the message received. If $y < \tilde{y}^U$ then the plaintiff is always indifferent between a trial and a settlement, hence, there is no profitable deviation from rejecting the offer. If an offer $y \geq \tilde{y}^U$ is made, the the plaintiff's expected payoff under a trial is $\frac{1}{2}[\tilde{x}^U + \bar{x}] - \sigma^p(C) = \tilde{y}^U \leq y$. Hence, there is no profitable deviation for the plaintiff from accepting any offer $y \geq \tilde{y}^U$.
Second, note that, the message of the attorney does not influence the decision of the plaintiff. Hence, any strategy is his best response.
Third, observe that there is no profitable deviation for the defendant, as it makes the lowest

acceptable offer $\tilde{y}^U$, if and only if, $\tilde{y}^U \leq x + t^d$.
Finally, note that the beliefs of the plaintiff are consistent. On the equilibrium path the plaintiff observes only $m = 1$. Since $\sigma^a(C) > \sigma^p(C)$, an offer $x - \sigma^p(C)$ will trigger a positive recommendation of the attorney. Since $t^d + \sigma^p(C) < b(C)$, it must be that $\bar{x} - \sigma^a < \bar{x} - t^d - 2\sigma^p(C)$. Thus accepting an offer $\tilde{y}^U$ is recommended by the attorney at a liability value $\bar{x}$, hence, it is also recommended for any lower liability value. Any pair $(y < \tilde{y}^U, m = 1)$ is observed if and only if $x = y + \sigma^p(C)$, hence, $x^e(y < \tilde{y}^U, m = 1) = y + \sigma^p(C)$ follows the Bayes' rule. A pair $(\tilde{y}^U, m = 1)$ is observed for any liability value $x \in [\tilde{x}^U, \bar{x}]$. Hence, $x^e(\tilde{y}^U, m = 1) = \frac{1}{2}[\tilde{x}^U + \bar{x}]$ follows the Bayes' rule. No other event is observed on the equilibrium path. □

Lemma 8. *If $b(C) < 0$ and $-b(C) > t^d + \sigma^p(C)$ then uninformative equilibrium is defendant-preferred in a class of communicative equilibria.*

Proof. First, observe that for a given offer to be ever accepted in a communicative equilibrium it needs to be $\mathbb{E}[x|y, m = 1] \leq y + \sigma^p(C)$, as otherwise the plaintiff would have a profitable deviation of rejecting the offer. Denote by $\hat{y}$ the smallest offer that is accepted by the plaintiff on the equilibrium path given $m = 1$ by $\hat{y}$. Then it needs to be that $\mathbb{E}[x|\hat{y}, m = 1] \leq \hat{y} + \sigma^p(C)$.
Second, observe that if an offer $\hat{y}$ is made for some liability value $x < \hat{y} + \sigma^p(C)$ then it is also made for any $x' > x$, $x' \leq \hat{y} + \sigma^p(C)$. By definition of $\hat{y}$ it is the smallest offer that is accepted given $m = 1$, hence, the defendant makes it at least for all the liability values that ensure a positive recommendation of the attorney.
Third, denote by $\hat{x}$ the smallest liability value for which an offer $\hat{y}$ is made. Note that in any equilibrium $\hat{x} = \max\{0, \hat{y} - t^d\}$. If $\hat{x}$ was smaller, the defendant would have a profitable deviation of making a smaller offer and resolving the case by trial for some x. If $\hat{x}$ was larger, the defendant would have a profitable deviation of making an offer $\hat{y}$ and avoiding the trial or making some higher offer for some x.
Hence, in any equilibrium $\mathbb{E}[x|\hat{y}, m = 1] = \frac{1}{2}[\max\{0, \hat{y} - t^d\} + \min\{\hat{y} + \sigma^a(C), \bar{x}\}]$. There cannot exists an equilibrium in which $\hat{y} > t^d$ and $\hat{y} + \sigma^a(C) < \bar{x}$, as then $\mathbb{E}[x|\hat{y}, m = 1] = \hat{y} + \frac{1}{2}(\sigma^a(C) - t^d) > \hat{y} + \sigma^p(C)$ (using the assumption that $-b(C) > t^d + \sigma^p(C)$). Moreover, using the same assumption, there cannot exist an equilibrium in which, $\hat{y} \leq t^d$ and $\hat{y} + \sigma^a(C)$. Hence, in any communicative equilibrium $\hat{y} + \sigma^a(C) \geq \bar{x}$.
Suppose that $\frac{1}{2}\bar{x} \geq t^d + \sigma^p(C)$, that is, $\tilde{y}^U = \bar{x} - t^d - 2\sigma^p(C)$. Take some equilibrium in which $\hat{y} < \tilde{y}^U$. Then, in this equilibrium $\mathbb{E}[x|\hat{y}, m = 1] \geq \frac{1}{2}[\hat{y} - t^d + \bar{x}]$. Which together with the condition that $\mathbb{E}[x|\hat{y}, m = 1] \leq \hat{y} + \sigma^p(C)$, implies that $\hat{y} \geq \tilde{y}^U$. Contradiction.
Suppose that $\frac{1}{2}\bar{x} \geq t^d + \sigma^p(C)$, that is, $\tilde{y}^U = \frac{1}{2}\bar{x} - \sigma^p(C) < t^d$. Take some equilibrium in which $\hat{y} < \tilde{y}^U$ then $\mathbb{E}[x|\hat{y}, m = 1] = \frac{1}{2}\bar{x} = \tilde{y}^U + \sigma^p(C)$. Hence, the condition $\mathbb{E}[x|y, m = 1] \leq y + \sigma^p(C)$ is violated.
It shows that in any communicative equilibrium if $b(C) < 0$ and $-b(C) > \sigma^p(C) + t^d$, then $\hat{y} \geq \tilde{y}^U$. Hence the expected payoff of the defendant in a given communicative equilibrium is bounded from above by:

$$\frac{-1}{\bar{x}}[\int_0^{\hat{x}} (x + t^d)dx + \int_{\hat{x}}^{\bar{x}} \tilde{y}^U dx]. \tag{42}$$

Maximizing (42) with respect to $\tilde{x}$, I obtain first order condition $\tilde{x} = \max\{0, \tilde{y}^U - t^d\} = \tilde{x}^U$. Hence, the expected equilibrium payoff for the defendant in any communicative equilibrium is bounded from above by his payoff in uninformative equilibrium. □

Proof of Proposition 5

Using Proposition 7 presented in the Online Appendix, I can restrict the search for an optimal contract to the contracts for which $s_t = 0$. Through the proof I will denote the the expected profit of the plaintiff at a given contract C by $\Pi^p(C)$, the expected profit of the attorney net of the initial cost c by $\Pi^a(C)$, $\Pi(C)$ denotes the sum of the two.

Proposition 5 is proved in Lemmas 9 – ...

Lemma 9. *A contract $C^H = (c, 0, t^a, 0)$ is optimal among the contracts yielding a misinformative equilibrium.*

Lemma 9 is prove in claims 7-10.

Claim 7. *If a contract C yields a misinformative equilibrium then $\sigma^p(C) \geq t^a$.*

Proof. First, observe that if $s_n = 0$ and the contract is to yield a misinformative equilibrium then $f_t = t^a$. Hence $\sigma^p(C) = t^a$. Second, observe that if $s_n = 1$ and $f_t > 0$ then $\sigma^p(C) = -\infty$. If $s_n = 1$ and $f_t = 0$ then $\sigma^a(C) = t^a$, hence, if the contract is to yield a misinformative equilibrium then $\sigma^p(C) > \sigma^a(C) > t^a$. Finally, take any contract yielding a misinformative equilibrium s.t. $s_n \in (0, 1)$ and suppose $\sigma^p(C) < t^a$. Then $\frac{f_t}{1-s_n} < t^a$, hence $t^a - s_n t^a < f_t$ or equivalently $t^a > \frac{t^a - f_t}{s_n} = \sigma^a(C)$. Contradiction. $\square$

Claim 8. *If a contract yields a misinformative equilibrium then $\Pi^p(C) \leq \bar{\Pi}$ for:*

Proof. Observe that the total profit of the plaintiff and the attorney if the equilibrium is not completely pooling must be bounded from above by:

$$\max_{\sigma^a(C),\sigma^p(C)} \frac{1}{2}\left[\int_0^{2(1+\sigma^a(C)-\sigma^p(C))} (x - \sigma^a(C))dx + \int_{2(1+\sigma^a(C)-\sigma^p(C))}^{2} (x - \sigma^p(C))dx\right] \tag{43}$$

s.t.

$\sigma^p(C) \geq t^a$

$\sigma^a(C) \geq -t^d$

$-\sigma^a(C) + \sigma^p(C) \leq 1,$

Observe that the last constraint, which ensures that the equilibrium is not completely pooling is implied by the other constraints. Hence, no misinformative equilibrium is completely pooling. Solving the integral and taking a derivative with respect to $\sigma^p(C)$ I obtain $4(\sigma^a(C) - \sigma^p(C))$ which is always negative. Hence $\sigma^a(C) = t^a$ at the optimum. Taking the derivative with respect to $\sigma^a(C)$ I obtain $2(\sigma^p(C) - \sigma^a(C)) - 1$. Hence at a candidate interior optimum $\sigma^a(C) = \sigma^p(C) - \frac{1}{2}$. If $t^a + t^d \geq \frac{1}{2}$ it is indeed a solution to the problem. However, if

$t^a + t^d < \frac{1}{2}$ then at $\sigma^p(C) = t^a$ the second constraint is violated. Hence, then at the optimum $\sigma^a(C) = -t^d$. Substituting for the optimal values of $\sigma^a(C)$ and $\sigma^p(C)$ in (43) I obtain:

$$\begin{cases} 1 + t^d - (t^a + t^d)^2 & \text{if } t^a + t^d \leq \frac{1}{2}\frac{5}{4} - t^a \\ \text{if } t^a + t^d > \frac{1}{2}. \end{cases} \tag{44}$$

Knowing that $\Pi(C) = \Pi^p(C) + \Pi^a(C)$, and that $\Pi^a(C) \geq c$ for the contract to be accepted, I conclude that $\bar{\Pi}$ is the upper bound on $\Pi^p(C)$ if C yields a misinformative equilibrium.

□

Claim 9. *If the plaintiff is restricted to proposing contracts that yield a misinformative equilibrium, then C^H is an equilibrium contract and $\Pi^p(C^H) = \bar{P}i$.*

Proof. First, observe that every contract $C \neq C^H$ yielding a misinformative equilibrium yields a profit $\Pi^p(C) < \bar{P}i$. It follows directly from the fact that any such a contract must be characterized by $s_n > 0$, and hence $\sigma^p(C) > t^a$ (as shown in the proof of claim 7). However, (as show in the proof of claim 8) $\sigma^p(C) > t^a$ then $\Pi^p(C) < \bar{P}i$.

Second, I show that if a contract yields a misinformative equilibrium, but $\Pi^p(C) < \bar{P}i$, then there exists a contract C' s.t. $\Pi^p(C') > \Pi^p(C)$. Suppose $t^a + t^d \leq \frac{1}{2}$ and a contract $C' = (c, \varepsilon, t^a + \varepsilon t^d, 0)$, for $\varepsilon > 0$ and sufficiently small. Observe that, under this contract $\sigma^a(C') = -t^d$, and $\sigma^p(C') = \frac{t^a + \varepsilon t^d}{(1-\varepsilon)}$. Then, the payoff of the plaintiff is given by:

$$\Pi^p(C') = (1 - \varepsilon)\left[1 + t^d - (t^d + \sigma^p(C'))^2\right] - c. \tag{45}$$

Moreover $\Pi(C')$ is continuously decreasing in $\varepsilon > 0$ and $\lim_{\varepsilon \to 0} \Pi^p(C') = 1 + t^d - (t^a + t^d)^2 - c$. Hence, if $\Pi^p(C) < 1 + t^d - (t^a + t^d)^2 - c$, then there exists a contract C' s.t. $\Pi^p(C') > \Pi^p(C)$. Identical reasoning applies for the case in which $t^a + t^d > \frac{1}{2}$, and a contract $C' = (c, \varepsilon, (1 - \varepsilon)t^a + \frac{1}{2}\varepsilon, 0)$.

Finally, observe that under contract C^H the attorney is indifferent between a trial and a settlement independently of (x, y), hence any behavior is his best response. In particular, recommending rejection if $y < x + \min\{t^d, \frac{1}{2} - t^a\}$ and acceptance otherwise is. Then the contract behaves as if $\sigma^a(C^H) = -\min\{t^d, \frac{1}{2} - t^a\}$, and $\Pi^p(C^H) = \bar{\Pi}$. □

Lemma 10. *No contract yielding a perfectly informative equilibrium is optimal.*

Proof. Observe that if a contract yields a perfectly informative equilibrium then $\sigma^a(C) = \sigma^p(C) = t^a$. If $s_n = 0$, then for $\sigma^a(C) \neq \pm\infty$ $f_t = t^a$, hence, $\sigma^p(C) = t^a$. If $s_n = 1$, then for $\sigma^p(C) \neq \infty$ $f_n = 0$, hence, $\sigma^a(C) = t^A$. If $s_n \in (0, 1)$ and $\sigma^a(C) = \sigma^p(C)$, then $\frac{t^a - f_t}{s_n} = \frac{f_t}{1 - s_n}$. Solving for f_t I obtain $f_t = (1 - s_n)t^a$, which is equivalent to $\sigma^p(C) = t^a$.

Hence, the payoff of the plaintiff under a contract yielding a perfectly informative equilibrium is bounded from above by $1 - t^a - c$. If $t^a + t^d > \frac{1}{2}$, then $1 - t^a - c < \Pi^p(C^H) = \frac{5}{4} - t^a - c$. I can show that $1 - t^a - c < 1 + t^d - (t^a + t^d)^2 - t^a$ which is equal to $\Pi^p(C^H)$ when $t^a + t^d \leq \frac{1}{2}$. Simplifying the expression I obtain $t^a + t^d < 1$, which is $t^a + t^d \leq \frac{1}{2}$. □

Lemma 11. *No contract yielding an uninformative equilibrium is optimal.*

Proof. Take some contract C that yields a completely pooling uninformative equilibrium. Then $\Pi^p(C)$ is bounded from above by:

$$\max_{p(C)} 1 - \sigma^p(C) - c \tag{46}$$
$$\text{s.t.}$$
$$2 - 2(\sigma^p(C) + t^d) \leq 0.$$

Solving (46) I obtain that $\Pi^p(C)$ is bounded from above by $t^d - c$. I claim that $t^d - c < \Pi^p(C^H)$. If $t^a + t^d \leq \frac{1}{2}$, then $\Pi(C^H) = 1 + t^d - (t^a + t^d)^2 - c$. Since $t^a + t^d < 1$ the inequality is necessarily satisfied. If $t^a + t^d > \frac{1}{2}$, then $\Pi(C^H) = 1 + \frac{1}{4} - t^a - c$. Since $t^a + t^d < 1$ the inequality is necessarily satisfied.

Take some contract C that yields an informative equilibrium which is not completely pooling. Then $\Pi^p(C)$ is bounded from above by:

$$\max_{\sigma^p(C)} \frac{1}{2}\left[\int_0^{2(1-\sigma^p(C)-t^d)} (x - t^a)dx + \int_{2(1-\sigma^p(C)-t^d)}^{2} (x - \sigma^p(C))dx\right] - c \tag{47}$$
$$\text{s.t.}$$
$$\sigma^p(C) \geq 0 \tag{48}$$
$$2 - 2(\sigma^p(C) + t^d) \geq 0. \tag{49}$$

Solving (47) I obtain that at the optimum $\sigma^p(C) = \max\{0, \frac{t^a - + t^d}{2}\}$. Then if $t^a < t^d$ the upper bound for $\Pi^p(C)$ is given by: $1 - t^a + t^a t^d - c$. I claim that:

$$1 - t^a + t^a t^d - c < \Pi^p(C^H) \tag{50}$$

First, I consider a case when $t^a + t^d \leq \frac{1}{2}$. Then, substituting for $\Pi^p(C^H)$ and simplifying I obtain $t^a t^d < (t^a + t^d)(1 - t^a - t^d)$. Observe that $t^a < t^a + t^d$ and $1 - t^a - t^d \geq \frac{1}{2} \geq t^d$. Hence, the inequality is always satisfied. Second, I consider a case when $t^a + t^d > \frac{1}{2}$. Then, substituting for $\Pi^p(C^H)$ and simplifying I obtain $t^a t^d < \frac{1}{4}$ which is implied by $t^a < t^d \leq \frac{1}{2}$. $\square$

Lemma 12. *If $c \geq \frac{t^a}{t^d}$ and $t^a \geq 14$ then a contract C^{CF} is the optimal contract. If $c \leq \frac{t^a}{t^d}$ and $t^a < \frac{1}{4}$ then a contract C^H is optimal.*

Lemma 12 is proved in claims 10 and 11.

Claim 10. *If $c \geq \frac{t^a}{t^d}$ then C^{CF} is optimal among the contracts yielding partially informative equilibrium.*

Proof. First, observe that $\sigma^p(C^{CF}) = 0$, and $\sigma^a(C^{CF}) = \frac{t^a}{c}$. Second, observe that the condition for existence of partially informative equilibrium $\sigma^a(C) - \sigma^p(C) \leq t^d + \sigma^p(C)$ is satisfied by assumption that $c \geq \frac{t^a}{t^d}$. Finally, observe that for any contract C yielding partially informative equilibrium $\Pi(C) = 1 - \sigma^p(C)$. Since $\Pi^a(C) \geq c$ for the contract to be accepted $\Pi^p(C) \leq 1 - \sigma^p(C) - c$. Moreover, since $\sigma^p(C) \geq 0$ for any contract $\Pi^p(C) \leq 1 - c = \Pi^p(C^{CF})$. $\square$

Claim 11. *If $c \geq \frac{t^a}{t^d}$ then $\Pi^p(C^{CF}) \geq \Pi^P(C^H)$ if and only if $t^a \geq \frac{1}{4}$.*

Proof. First, observe that since $t^a + c \leq 1$ $c \geq \frac{t^a}{t^d}$ only if $t^a \leq t^d$.
Second, if $t^a + t^d < \frac{1}{2}$ then $\Pi^p(C^H) > \Pi^P(C^{CF})$. Suppose otherwise, then $1 - c \geq 1 + t^d - (t^a + t^d)^2 - c$ or equivalently $(t^a)^2 + (t^d)^2 \geq t^d(1 - 2t^a)$. Since $t^a \leq t^d$ the inequality implies $2(t^a + t^d) > 1$. Contradiction.
Finally, if $t^a + t^d \geq \frac{1}{2}$ then $\Pi^p(C^{CF}) \geq \Pi^p(C^H)$ if and only if $1 - c \geq \frac{5}{4} - t^a - c$ or equivalently $t^a \geq \frac{1}{4}$. $\square$

Lemma 13. *If* $c < \left(\sqrt{2\frac{t^a+t^d}{1+t^d}} - 1\right)\left(1 - \frac{t^a + t^d - \sqrt{2\frac{t^a+t^d}{1+t^d}}\, t^d}{\sqrt{2\frac{t^a+t^d}{1+t^d}}}\right) \equiv \underline{c}$, *then* C^H *is the optimal contract.*

Lemma 13 is proved in claims 12 and 13.

Claim 12. *If* $c < \underline{c}$, *then a contract* $C^a = (0, \gamma - 1, \frac{(2-\gamma)(t^a+t^d-\gamma t^d)}{\gamma}$ *for* $\gamma \equiv (\sqrt{2\frac{t^a+t^d}{1+t^d}}$ *is an optimal contract yielding a partially informative equilibrium.*

Proof. The contract that maximizes the payoff of the plaintiff must be a solution to the following problem:

$$\max_{f_n,\, s_n,\, f_t} (1 - s_n)(1 - \frac{f_t}{1 - s_n}) - f_n \tag{51}$$

s.t.

$$f_n \geq 0,\ s_n \geq 0, f_t \geq 0 \tag{52}$$

$$s_n(1 - \frac{f_t}{1 - s_n}) - f_n \geq c \tag{53}$$

$$\frac{t_a - f_t}{s_n} - \frac{f_t}{1 - s_n} \leq \frac{f_t}{1 - s_n} + t^d. \tag{54}$$

Observe that (51) is decreasing in f_n, s_n and f_t, and for $f_n = 0$, $s_n = 0$, $f_t = 0$ (53) and (54) are not satisfied. Hence, either (53) or (54) or both need to binding.

First, I show that it cannot be that only (**??**) is binding. Suppose that the solution of (51) is such that (53) is binding and (54) is satisfied with a strict inequality. Observe that in any such a solution $f_t = 0$. Otherwise (51) could be increased by decreasing f_t until $f_t = 0$ or (**??** is biding, and (53) would remain satisfied . Moreover, since (53) is assumed to binding and $f_n \geq 0$, $s_n \leq c$. The LHS of (54) is decreasing in s_n and the RHS is increasing in s_n, hence if an optimal contract is such that (53) is binding and (54) holds with strict inequality the following must hold:

$$\frac{t_a}{c} < t^d. \tag{55}$$

Hence $c > \frac{t^a}{t^d}$. I claim that this contradicts $c < \underline{c}$. Observe that $\underline{c} < \gamma - 1$. Moreover, $\gamma < \frac{t^a}{t^d} + 1$. Suppose otherwise, then $\frac{2(t^a+t^d)}{(1+t^d)} \geq \frac{(t^a+t^d)^2}{(t^d)^2}$, which can be simplified to $(t^d)^2 \geq t^a + t^d + t^a t^d$. It cannot hold since $t^d < 1$, which finishes the proof.

Hence, (**??**) needs to be binding. Solving for f_t in (54) I obtain $f_t = \frac{1-s_n}{1+s_n}(t^a - s_n t^d)$. I will assume that (**??**) is satisfied at the maximum, and show that is indeed the case at the end of the proof. Hence f_n, f_t and simplifying I reduce the problem to:

$$\max_{s_n} 1 - s_n - \frac{1-s_n}{1+s_n}(t^a - s_n t^d) - f_n \tag{56}$$

s.t.

$$s_n \geq 0 \tag{57}$$

$$s_n \leq \frac{t^a}{t^d} ea22b \tag{58}$$

$$f_n \geq 0. \tag{59}$$

Since (**??**) decreases in f_n at the maximum $f_n = 0$. Taking the first derivative of (56) with respect to s_n I obtain the first order condition

$$-1 + \frac{2t^a}{(1+s_n)^2} + \frac{t^d}{(1+s_n)^2} - \frac{2s_n t^d}{(1+s_n)^2} - \frac{s_n^2}{(1+s_n)^2} t^d = 0. \tag{60}$$

I multiply (60) by $(1+s_n)^2$, rearrange the terms and obtain the following condition:

$$-(1+s_n)^2(1+t^d) + 2(t^a + t^d) = 0. \tag{61}$$

Hence, in a candidate interior optimum $s_n = \sqrt{\frac{2(t^a+t^d)}{1+t^d}} - 1 = \gamma - 1$. It was already shown that $\gamma - 1 \leq \frac{t^a}{t^d}$, hence, (**??**) holds. Moreover, (57) is also satisfied. (56) can be violated only if $\gamma < 1$. I claim that the $\underline{c} < 0$ and the analyzed region is empty. Suppose there exists some $\gamma < 1$ s.t. $\underline{c} > 0$, then there exists $\gamma < 1$ s.t. $0 < (\gamma - 1)(1 - \frac{t^a + t^d - \gamma t^d}{\gamma}$, or equivalently $0 > (1+t^d)\gamma - (t^a + t^d)$. Multiplying the sides by $\frac{2}{1+t^d}$ I obtain the condition that $0 > 2\gamma - \gamma^2$, which contradicts $\gamma < 1$.

To finish the proof I show that at a contract C^a the participation constraint of the attorney (53) is satisfied. Substituting for $f_n = 0$, $s_n = \gamma - 1$, and $f_t = \frac{2-\gamma}{1+\gamma}(t^a + t^d - \gamma t^d)$ I obtain a condition: $c \leq (\gamma - 1)(1 - \frac{2-\gamma}{1+\gamma}(t^a + t^d - \gamma t^d)) = \underline{c}$, which is implied by $c < \underline{c}$. □

Claim 13. *If $c < \underline{c}$ then $\Pi^p(C^H) > \Pi^p(C^a)$.*

Proof. Observe that $\underline{c} > 0$ only if $\gamma > 1$ and $\gamma > 1$ only if $t^a + t^d \geq \frac{1}{2}$. Hence, $\Pi^p(C^H) = \frac{5}{4} - t^a - c$. Consequently $\Pi^p(C^a) \geq \Pi^p(C^H)$ only if $c \geq \frac{5}{4} - \Pi^p(C^a)$. Substituting for $\Pi^p(C^a) = (1 - s_n^a)(1 - \frac{t^a - s_n^a t^d}{1+s_n^a})$ I obtain:

$$c \geq \frac{1}{4} + \underbrace{\frac{t^a - s_n^a t^d}{1 + s_n^a t^d}}_{=\sigma^p(C^a) \geq 0} + \underbrace{s_n^a(1 - \frac{t^a - s_n^a t^d}{1+s_n^a})}_{=\underline{c}}. \tag{62}$$

Hence $\Pi^p(C^a) \geq \Pi^p(C^H)$ only if $c > \underline{c}$. □

Lemma 14. *If $c \in [\underline{c}, \frac{t^a}{t^d})$ then a contract C^H is optimal if $t^a + t^d < \frac{1}{2}$, or $t^a < \frac{1}{4}$, or .... and a contract C^{CB} is optimal otherwise.*

Lemma 14 is proved in claims 14 and 17.

Claim 14. *If $c \in [\underline{c}, \frac{t^a}{t^d})$ then a contract C^{CB} is optimal among contracts yielding partially informative equilibrium.*

Proof. Following the proof of claim 12, I know that the optimal contract yielding partially informative equilibrium must be a solution to the problem (51). Moreover, since $c < \frac{t^a}{t^d}$ and $c \geq \underline{c}$, I know that both (53) and (54) must be binding. Hence, $f_t = \frac{1-s_n}{1+s_n}(t^a - s_n t^d)$, substituting for f_t in (53) and solving for f_n I obtain $f_n = c - s_n(1 - \frac{t^a - s_n t^d}{1+s_n})$. As a result I can simplify (51) to:

$$\max_{s_n}(1-s_n)(1-\frac{t^a - s_n t^d}{1+s_n}) + s_n(1-\frac{t^a - s_n t^d}{1+s_n}) - c \tag{63}$$

s.t.

$$s_n \geq 0 \tag{64}$$

$$s_n \leq \frac{t^a}{t^d} \tag{65}$$

$$c - s_n(1-\frac{t^a - s_n t^d}{1+s_n}) \geq 0. \tag{66}$$

Observe that (63) is increasing in s_n. Hence, either (65) or (66) is binding. I can show that if (65) is binding then (66) cannot be satisfied. It is enough to substitute $s_n = \frac{t^a}{t^d}$ in (66) and rearrange to obtain $c \geq \frac{t^a}{t^d}$, which contradicts an assumption.

I can reduce (66) to a quadratic equation: $s_n^2(1+t^d) + s_n(1-c-t^a) - c = 0$, which has a unique positive root of $s_n = \sqrt{(\frac{1-c-t^a}{2(1+t^d)})^2 + \frac{c}{1+t^d}} - \frac{1-c-t^a}{2(1+t^d)}$. □

Claim 15. *If $c \in [\underline{c}, \frac{t^a}{t^d})$ and $t^a + t^d < \frac{1}{2}$, then $\Pi^p(C^H) > \Pi^p(C^{BC})$.*

Proof. Recall that if $t^a + t^d < \frac{1}{2}$ $\Pi^p(C^H) = 1 + t^d - (t^a + t^d)^2 - c$. Additionally, from the proof of claim 11 recall that $t^a + t^d < \frac{1}{2}$ and $t^a < t^d$ then $\Pi^p(C^H) > 1 - c > \Pi^p(C^{BF})$.
I claim that if $t^a > t^d$ and $t^a + t^d < \frac{1}{2}$ then $\Pi^p(C^{CB}) \leq 1 - \frac{t^a - t^d}{2} - c$. To see this property, first, observe that since the participation constraint of the attorney is binding under C^{BF}, hence $\Pi^p(C^{BF}) = \Pi(C^{BF}) - c = 1 - \sigma^p(C) - c$. Second, observe that since $\sigma^p(C^{BF}) < \sigma^a(C^{BF})$ it must be that $\sigma^a(C^{BF}) \geq t^a$. Finally the condition on the existence of partially informative equilibrium requires that $\sigma^p(C^{BF}) \geq \frac{\sigma^a(C^{BF}) - t^d}{2}$, which implies $\sigma^p(C) \geq \frac{t^a - t^d}{2}$, and as a consequence $\Pi^p(C^{CB}) \leq 1 - \frac{t^a - t^d}{2} - c$.
Moreover, I claim that $1 + t^d - (t^a + t^d)^2 - c \geq 1 - \frac{t^a - t^d}{2} - c$. To observe this property it is enough to rearrange the terms of the inequality to $\frac{1}{2}(t^a + t^d) > (t^a + t^d)^2$, and spot that it is equivalent to an assumption $t^a + t^d < \frac{1}{2}$. □

Claim 16. *If $c \in [\underline{c}, \frac{t^a}{t^d})$ and $t^a < \frac{1}{4}$, then $\Pi^p(C^H) > \Pi^p(C^{BC})$.*

Proof. Observe that if $t^d < t^a < \frac{1}{4}$ then $t^a + t^d < \frac{1}{2}$ and proof of claim 15. Moreover, if $t^a > t^d$ and $t^a < \frac{1}{4}$, then (as shown in the proof of claim 11) $\Pi^p(C^H) > 1 - c > \Pi^p(C^{BF})$. □

I denote by $\bar{c}$ a solution to the following equation:

$$\frac{1}{4(t^a+t^d)-1}=\sqrt{\left(\frac{1-t^a-\bar{c}}{2(1+t^d)}\right)^2+\frac{\bar{c}}{1+t^d}}-\frac{1-t^a-\bar{c}}{2(1+t^d)}. \tag{67}$$

Claim 17. *If $t^a+t^d \geq \frac{1}{2}$, $t^a \geq \frac{1}{4}$, then $\Pi^p(C^{CB}) \geq \Pi^p(C^H)$ if and only if $c \geq \bar{c}$.*

Proof. Recall that $\Pi^p(C^{CB}) = 1-\sigma^p(C^{CB})-c$, hence $\Pi^p(C^{CB}) \geq Pi^p(C^H)$ if and only if:

$$\sigma^p(C^{CB}) \leq \frac{1}{4}-t^a. \tag{68}$$

Recall that $\sigma^p(C^{CB}) = \frac{f_t^{CB}}{1-s_n^{CB}}$ and $f_t^{CB} = \frac{1-s_n^{CB}}{1+s_n^{CB}}(t^a - s_n^{CB}t^d$. Substituting for $\sigma^p(C^{CB})$ and f_t^{CB} into (68) I obtain:

$$\frac{t^a-s_n^{CB}t^d}{1+s_n^{CB}} \leq t^a-\frac{1}{4}. \tag{69}$$

Solving for s_n^{CB} I obtain:

$$s_n^{CB} \geq \frac{1}{4(t^a+t^d)-1}. \tag{70}$$

Substituting for $s_n^{CB} = \sqrt{(\frac{1-c-t^a}{2(1+t^d)})^2+\frac{c}{1+t^d}}-\frac{1-c-t^a}{2(1+t^d)}$ I obtain:

$$\sqrt{(\frac{1-c-t^a}{2(1+t^d)})^2+\frac{c}{1+t^d}}-\frac{1-c-t^a}{2(1+t^d)} \geq \frac{1}{4(t^a+t^d)-1}. \tag{71}$$

Observe that (71) is binding at $\bar{c}$, and the RHS of (71) is constant in c. I claim that the LHS (71) is increasing in c. Then:

$$\frac{\partial}{\partial c}\left(\sqrt{\left(\frac{1-c-t^a}{2(1+t^d)}\right)^2+\frac{c}{1+t^d}}-\frac{1-c-t^a}{2(1+t^d)}\right) > 0. \tag{72}$$

Taking the derivative and rearranging (72) I obtain the following condition:

$$\frac{1}{\sqrt{\left(\frac{1-c-t^a}{2(1+t^d)}\right)^2+\frac{c}{1+t^d}}}\left(\frac{c+t^a+t^d}{1+t^d}\right)+\frac{1}{2} > 0, \tag{73}$$

which always holds. □

TO BE CONTINUED HERE THINK OF THE FORM

A Online Appendix – contracts with positive trial premium in form of a share

If $s_t > 0$ the willingness to settle is no longer constant over the liability value for both the attorney and the plaintiff. To be precise, the plaintiff is more willing to settle as the liability value increases:

$$\frac{\partial \sigma^p(x, C)}{\partial x} = \frac{s_t}{1 - s_n}, \tag{74}$$

and the defendant is less willing to settle as the liability value increases:

$$\frac{\partial \sigma^a(x, C)}{\partial x} = -\frac{s_t}{s_n}. \tag{75}$$

Consequently also the bias of the attorney $b(x, C)$ is no longer constant but increases with x. As a result if $s_t > 0$ the equilibrium may contain up to four regions that exhibit the properties of different equilibria types, described in Section 3. In the most complex case for low liability values $b(x, C)$ is strongly negative, there is no way in which the attorney can credibly communicate the liability value to the plaintiff, the case is inevitably resolved by a trial and the equilibrium is uninformative. As the liability value increases so does the bias of the attorney and eventually, even though the bias is still negative, the equilibrium becomes partially informative. That is, although the recommendation of the attorney is not relevant for all offers, it is relevant for some countable set of offers. On the equilibrium path the defendant makes only the offers for which the plaintiff follows the recommendation of the attorney, and the settlement is reached. When the liability value increases even further $b(x, C)$ becomes positive, yielding misinformative equilibrium. That, is the defendant increases the offer made to a level that ensures positive recommendation of the attorney and this way achieves the settlement. Finally, for very high values of liability $b(x, C)$ reaches the level under which the equilibrium becomes uninformative again. The recommendation of the attorney is irrelevant in this region, however for liability values sufficiently close to $\bar{x}$ the settlement can be reached. I depict the negotiation outcome in this scenario on Figure 5. Horizontal axis represents the possible liability value realizations, and the vertical axis possible offers. Dotted grey line is the equilibrium settlement under symmetric information ($y = x - \sigma^p(x, C)$), solid grey line separates the offers that the attorney is recommending to accept at a given liability value from those he recommends to reject ($y = x - \sigma^a(x, C)$). The solid black lines correspond to equilibrium settlement offers at a given liability value.

The four regions are separated by three thresholds denote by x^1, x^2, and x^3. Note that it can happen that some thresholds are below 0 or above $\bar{x}$, and the properties of some equilibria types are not exhibited.

It is easier to study the problem starting from the largest threshold, rather than from the lowest one. The last threshold separates a region in which the equilibrium behaves as a misinformative equilibrium from a region in which it behaves as an uninformative equilibrium. Hence, it is given by a liability value at which the cost of convincing the attorney to give a positive recommendation is equal to the cost of going to a trial for the attorney: $\sigma^a(x^3, C) = t^d$. That is,

$$x^3 = \tfrac{(1-s_n)t^d + t^a - f_t}{s_t}. \tag{76}$$

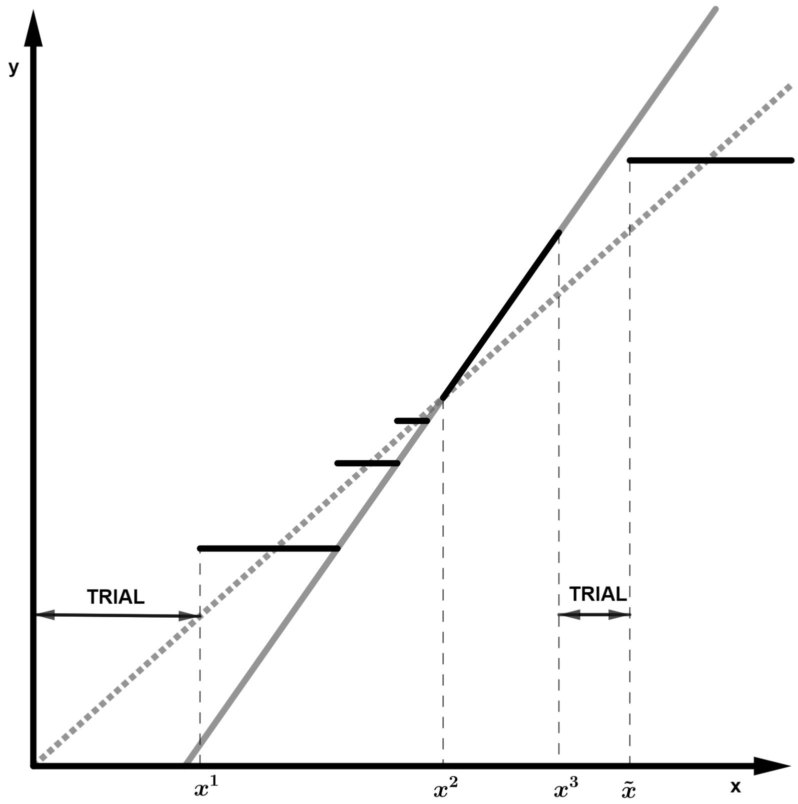


Figure 5: Neqotiation phase equilibrium if $s_t > 0$

The middle threshold separates the partially informative region of the equilibrium, from the misinformative region. Hence, it is given by a liability value for which the bias of the attorney is 0: $\sigma^p(x^2, C) = \sigma^a(x^2, C)$. That is,

$$x^2 = \tfrac{(1-s_n)t^a - f_t}{s_t}. \tag{77}$$

The lowest threshold separates the partially uninformative region of the equilibrium from the partially informative region. This threshold is the hardest to determine. It is a consequence of the fact that the concept of sequence of standard offers and the associated partition of the liability values described in Section 3.3 does not automatically extend for contracts in which $s_t > 0$. In particular, if $s_t = 0$ the sequence of standard offers is an arithmetic sequence with a difference of $2b(x, C)$. However, if $s_t > 0$ $b(x, C)$ is no longer constant.

To derive the sequence of standard offers recall that it must satisfy two conditions. Firstly, in a defendant's preferred equilibrium each standard offer y_k must exactly compensate the plaintiff's expected payoff under the trial for the offers for which it is made. That is,

$$y_k = \frac{1}{2}[x_k - \sigma^p(x_k, C) + x_{k+1} - \sigma^p(x_{k+1}, C)]. \tag{78}$$

Secondly, each standard offer is made by the defendant as long as it ensures a positive recommendation of the attorney. That is:

$$x_{k+1} = y_k + \sigma^a(x_{k+1}, C). \tag{79}$$

Combining (78) and (79) I obtain an implicit recursive solution for the largest liability value for which a given offer y_k:

$$x_{k+1} = x_k - [\sigma^p(x_k, C) - \sigma^a(x_{k+1}, C)] - [\sigma^p(x_{k+1}, C) - \sigma^a(x_{k+1})]. \tag{80}$$

To obtain a closed form solution I substitute for $\sigma^p(x_k, C)$ and $\sigma^a(x_k, C)$:

$$x_{k+1} = \frac{s_n(1 - s_n - s_t)}{(1 - s_n)(s_n + s_t) + s_t} x_k - \frac{(1 + s_n)f_t - (1 - s_n)t^a}{(1 - s_n)(s_n + s_t) + s_t}. \tag{81}$$

To close the analysis it is necessary to determine x_0, that is, the smallest liability value for which some standard offer is made. By definition $x_0 = x^1$, that is, for all liability values below x_0 the equilibrium is uninformative and the case is resolved by trial.

In a defendant preferred equilibrium x^1 needs to be the smallest liability value for which it is possible to construct an offer y_0, which on one hand is acceptable by the plaintiff given a positive recommendation of the attorney, and on the other had the settlement at this offer is preferred by the defendant to going to a court. That is x^1 and y_0 need to satisfy (80), (83) and $x^1 + t^d = y_0$. To simplify the notation, I define $\alpha \equiv s_n(1 - s_n - s_t)$, $\beta \equiv (1 + s_n)f_t - (1 - s_n)t^a$, $\gamma \equiv (1 - s_n)(s_n + s_t) + s_t$. In other words, (83) can be expressed as $x_{k+1} = \frac{\alpha}{\gamma} x_k - \frac{\beta}{\gamma}$. Then:

$$x^1 = \frac{\beta(1 - s_n - s_t) + 2f_t\gamma + t^d(1 - s_n)\gamma}{(\alpha + \gamma)(1 - s_n - s_t) - 2(1 - s_n)\gamma}. \tag{82}$$

Note that the sequence of standard offers can be infinite. In particular it happens if $x^2 < \bar{x}$. Each consecutive standard offer is closer to the previous one, and is made for smaller range of liability values. As x approaches x^2, y_k approaches $x - \sigma^p(x^2, C)$.

Finally, to fully describe an equilibrium it is necessary to determine the smallest offer that the plaintiff is ready to accept independently of the attorney's recommendation, which I denote by $\tilde{y}$, and the smallest liability value for which this offer is made $\tilde{x}$. The derivations are analogous to those in Section 3. The exact values of $\tilde{y}$ and $\tilde{x}$ depend on the equilibrium behavior around $\bar{x}$. Hence, I compute potential values of $(\tilde{x}, \tilde{y})$ for each possible scenario.

Firstly, suppose that the equilibrium is uninformative close to $\bar{x}$. In this scenario I denote the minimal offer that plaintiff cannot reject by $\tilde{y}^U$, and a corresponding smallest liability value for which this offer is made by $\tilde{x}^U$. Analogously to the derivations in Section 3.2 $\tilde{y}^U$ and $\tilde{x}^U$ must solve:

$$\begin{aligned} \tilde{y}^U &= \frac{1}{2}[\tilde{x}^U - \sigma^p(\tilde{x}^U, C) + \bar{x} - \sigma^p(\bar{x}, C) \\ \tilde{y}^U &= \tilde{x}^U + t^d. \end{aligned} \tag{83}$$

Solving (83) I obtain:

$$\begin{aligned} \tilde{y}^U &= \bar{x} - t^d - 2\sigma^p\big(\frac{1}{2}(\tilde{x}^U + \bar{x}), C\big) \\ \tilde{x}^U &= \frac{1 - s_n}{1 - s_n - s_t}[\bar{x} - \sigma^p(\bar{x}, C) - \frac{f_t}{1 - s_n} - 2t^d]. \end{aligned} \tag{84}$$

Secondly, suppose that the equilibrium is misinformative close to $\bar{x}$. In this scenario I denote the minimal offer that is accepted by the plaintiff by $\tilde{y}^M$, and the corresponding smallest liability value for which this offer is made by $\tilde{x}^M$. Analogously to the derivations in Section 3.2. $\tilde{y}^M$ and $\tilde{x}^M$ must solve:

$$\begin{aligned}\tilde{y}^M &= \frac{1}{2}[\tilde{x}^U - \sigma^p(\tilde{x}^U, C) + \bar{x} - \sigma^p(\bar{x}, C)], \\ \tilde{y}^M &= \tilde{x} - \sigma^a(\tilde{x}, C).\end{aligned} \tag{85}$$

Solving (85) I obtain:

$$\begin{aligned}\tilde{y}^M &= \bar{x} - \sigma^a(\tilde{x}^M, C) - 2\sigma^p\Big(\frac{1}{2}(\tilde{x}^M + \bar{x}), C\Big) \\ \tilde{x}^M &= \frac{s_n(1-s_n)}{(1-s_n)s_n - 2s_t(1-s_n) + s_n s_t}[\bar{x} - 2\frac{t^a - f_t}{s_n} - \frac{f_t}{1-s_n} - \sigma^p(\bar{x}, C))].\end{aligned} \tag{86}$$

Thirdly, suppose that the equilibrium is partially informative close to $\bar{x}$. In this scenario I denote the minimal offer that is accepted by the plaintiff by y_K, and the corresponding smallest liability value for which this offer is made by x_K. Similarly to the derivations in Section 3.3 $\tilde{y_K}$ and $\tilde{x_K}$ are $K-th$ elements of the sequences given by (78) and (83), where K is defined by:[18]

$$K = \max\{k \in \mathbb{N} | x_k < \bar{x}\}. \tag{87}$$

Finally, I separately consider a situation in which the equilibrium is completely pooling. Then the unique offer made on the equilibrium path and unconditionally accepted by the plaintiff is given by:

$$\tilde{y}^P = \frac{1}{2}\bar{x} - \sigma^p(\frac{1}{2}\bar{x}, C), \tag{88}$$

since it is made for all the liability values $\tilde{y}^P = 0$.

To determine the actual smallest offer always accepted by the plaintiff for a given contract it is enough to compare the four candidate offers and select the largest one,[19] that is:

$$\begin{aligned}\tilde{y} &= \max\{\tilde{y}^U, \tilde{y}^M, y_K, \tilde{y}^P\} \\ \tilde{x} &= \max\{\tilde{x}^U, \tilde{x}^M, x_K, \tilde{x}^P\}.\end{aligned} \tag{89}$$

Proposition 6 describes the equilibrium For simplicity, analogously to Section 3.2 the set of offers for which the plaintiff conditions her decision on the recommendation of the attorney is is denoted by $\mathbf{Y}$.

$$\mathbf{Y} = \{y_k\}_{k \leq K} \cup \{y = x - \sigma^a(x, C) | x \in [x^2, \min\{x^3, \tilde{x}]\} \tag{90}$$

Proposition 6. *For any contract C s.t. $s_t > 0$ there exists the following defendant-preferred communicative equilibrium.*

[18] As already noted K can be infinite, then the offer y_K is simply a limit of the standard offer sequence: $x - \sigma^p(x^2, C)$, and $x_K = x^2$. This case is however not relevant for determining minimal offer that the plaintiff always accepts, as K is infinite only if $x^2 \leq \bar{x}$.

[19] Note that it is possible that $x^3 < \bar{x}$, but $\tilde{y} = \tilde{y}^M$. That is, there is a region of liability values for which the equilibrium is uninformative, but the highest offer made on the equilibrium path is as if this region did not appear. It happens whenever the $\tilde{x}^M < x^3$.

(i) The defendant's offer is $\tilde{y}$ if $x \geq \tilde{x}$, and if $x < \tilde{x}$ then:

$$y(x) = \begin{cases} x - \sigma^p(x, C) & \textit{if } x < x^1 \\ y_k & \textit{if } x \in [x_k, x_{k+1})\, \textit{for } k \leq K \\ x - \sigma^a(x, C) & \textit{if } x \in [x^2, x^3] \\ x - \sigma^p(x, C) & \textit{if } x > x^3. \end{cases} \tag{91}$$

(ii) The attorney's recommendation is $m(x, y) = m^a(x, y)$.

(iii) The plaintiff's decision is:

$$a(x, m) = \begin{cases} 0 & \textit{if } y \notin \mathbf{Y} \textit{ and } y < \tilde{y} \\ m & \textit{if } y \in \mathbf{Y} \textit{ and } y < \tilde{y} \\ 1 & \textit{if } y \geq \tilde{y} \end{cases} \tag{92}$$

Proof Proposition 6 is given in Lemmas 15 and 16.

Lemma 15. *For any contract including $s_t > 0$ the equilibrium described in Proposition 6 exists.*

To simplify the proof, I introduce additional notation. I denote by $\zeta^p(y, C)$, ($\zeta^a(y, C)$) the inverse willingness to settle of the plaintiff (the attorney):

$$\begin{aligned} \zeta^p(y, C) &= \frac{f_t + s_t y}{1 - s_n - s_t} \\ \zeta^a(y, C) &= \frac{t^a - f_t - s_t y}{s_n + s_t}. \end{aligned} \tag{93}$$

Observe that for any pair x, y such that $y = x - \sigma^p(x, C)$ ($y = x - \sigma^a(x, C)$), it is the case that $\sigma^p(x, C) = \zeta^p(x, C)$ ($\sigma^a(x, C) = \zeta^a(x, C)$).

Proof. Take the following beliefs of the plaintiff:

$$x^e(y, m) = \begin{cases} \frac{1}{2}[x_k + x_{k+1}] & \text{if } y = y_k \text{ for } k < K, \\ y + \zeta^a(y, C) & \text{if } m = 1 \text{ and } y \geq x^2 - \sigma^p(x^2), \\ \frac{1}{2}[\tilde{x} + \bar{x}] & \text{if } y \geq \tilde{y}, \\ y + \zeta^p(y, C) & \text{otherwise.} \end{cases} \tag{94}$$

First, observe that given the beliefs of the plaintiff, there is no profitable deviation for the plaintiff. For any pair $y \in \mathbb{Y}$, $m = 1$, $x^e \leq y + \zeta^p(y)$ (with a strict inequality if and only if $y > x^2 - \sigma^p(C)$). Hence, the plaintiff weakly prefers the settlement to the trial. If $y \geq \tilde{y}$ then independently of the recommendation, $x^e \geq y - \zeta^p(y)$. Hence, the plaintiff weakly prefers the settlement to the trial. For any $y \notin \mathbb{Y}$ independently of the message $x^e = y - \zeta^p(y)$, hence, the plaintiff weakly prefers trail to the settlement. For any $y \in \mathbb{Y}$, $y < \tilde{y}$ if $m = 0$, then $x^e = y - \zeta^p(y)$ and the plaintiff weakly prefers the trial to the settlement.
Secondly, the attorney's recommendation is always either followed or ignored, hence, there cannot be a profitable deviation for the attorney.

Thirdly, observe that there is no profitable deviation for the defendant. Denote by $\hat{y}(x)$ a solution of the following problem:

$$\arg\min y \tag{95}$$
$$\text{s.t.} a(y, m(y, x)) = 1. \tag{96}$$

That is $\hat{y}(x)$ the smallest offer that the plaintiff would accept, given the recommendation that is made by the attorney at this offer for a given liability value. Observe that if $\hat{y}(x) \leq x + t^d$ then $y(x) = \hat{y}(x)$ and the case is resolved by a trial otherwise
Finally, observe that the beliefs of the plaintiff are consistent. The plaintiff observes a message $m = 0$ on the equilibrium path only if $y \in (x^3 + t^d, \tilde{y})$ or $y = \tilde{y}$. In the first case, an offer is made for a unique liability value s.t. $y = x - \sigma^p(x, C)$ and $x^e(y, m = 0) = y + \zeta^p(y, C)$. Hence, the beliefs are consistent. In the second case, the offer is made for all the liability vales in $[\tilde{x}, \bar{x}]$. And $x^e(\tilde{y}, m = 0) = \frac{1}{2}[\tilde{x} + \bar{x}]$, hence, the beliefs of the plaintiff are consistent.
The plaintiff observes a message $m = 1$ on the equilibrium path in one of four cases. In the first case $y < x^1 - t^d$, then there is a unique offer made for each liability value x, such that $y = x - \sigma^p(x, C)$, and the beliefs of the plaintiff is $x^e(y, m = 1) = y + \zeta^p(y, C)$. Hence they are consistent. In the second case $y = y_k$ for some $k < K$. Then the beliefs of the plaintiff are $x^e(y_k, m = 1) = \frac{1}{2}[x_k + x_{k+1}]$, which is consistent. In the third case $y = \tilde{y}$, and the beliefs of the plaintiff are $x^e(\tilde{y}, m = 1) = \frac{1}{2}[\tilde{x} + \bar{x}]$, which is consistent. In the final case $y > x^2 - \sigma^p(x^2, C)$. Then each offer on the equilibrium path is made for a unique liability value s.t. $y = x - \sigma^a(x, C)$, and the beliefs of the plaintiff are $x^e = y + \zeta^a(y, C)$, which is consistent. □

Lemma 16. *For any contract including $s_t > 0$ the equilibrium described in Proposition 6 is defendant preferred in a class of communicative equilibria.*

Lemma 16 is proved in Claims 18–**??**.

Before proceeding with the proof it is useful to note that in any equilibrium the set of liability values can be partitioned into four subsets (some of which may empty) that categorize the equilibrium path for a given liability value in a given equilibrium. I denote by $\mathbf{X}^1$ a set of liability values for which some offer is made that is recommended to be accepted by the attorney and is then accepted by the plaintiff: $\mathbf{X}^1 \equiv \{x | m(x, y(x)) = 1, a(y(x), m = 1) = 1\}$. I denote by $\mathbf{X}^2$ a set of liability values for which some offer is made which is recommended to be rejected by the attorney and then is rejected by the plaintiff: $\mathbf{X}^2 \equiv \{x | m(x, y(x)) = 0, a(y(x), m = 0) = 0\}$. I denote by $\mathbf{X}^3$ a set of liability values for which some offer is made which is recommended to be be accepted by the attorney, but is rejected by the plaintiff $\mathbf{X}^3 \equiv \{x | m(x, y(x)) = 1, a(y(x), m = 1)\}$. Finally I denote by $\mathbf{X}^4$ a set of liability values for which some offer is made which is recommended to be rejected by the attorney, but is accepted by the plaintiff: $\mathbf{X}^4 \equiv \{x | m(x, y(x)) = 0, a(y(x), m = 0) = 1\}$. For the proof the sets $\mathbf{X}^1$ and $\mathbf{X}^2$ are especially relevant.

Claim 18. *In any equilibrium for all $x \in \mathbf{X}^4$ there is only one offer made on the equilibrium path.*

Proof. Suppose not, and take some $x, x' \in \mathbf{X}^4$ s.t. $y(x) < y(x')$. Then the defendant has a profitable deviation of making an offer $y(x)$. □

Through the remainder of the proof I will call and offer made for all the liability values $x \in \mathbf{X}^4$ by $y^\dagger$.

Claim 19. *In any communicative equilibrium if $x \in \mathbf{X}^4$ then for all $x' > x$ it must be that $x' \in \mathbf{X}^4$.*

Proof. In any communicative equilibrium $x' > x$ cannot belong to $\mathbf{X}^2$ or $\mathbf{X}^3$. Otherwise, the defendant would have a profitable deviation of making an offer $y^\dagger$ for x'. If $m(x, y^\dagger) = 0$, then in any communicative equilibrium $m(x' > x, y^\dagger) = 0$, and by assumption $a(y = y^\dagger, m = 0) = 1$. Moreover, $y^\dagger < x + t^d$, then $y^\dagger < x' + t^d$.
In any communicative equilibrium $x' > x$ also cannot belong to $\mathbf{X}^1$. Otherwise, the defendant would have a profitable deviation of making an offer $y^\dagger$. Suppose, $x' \in \mathbf{X}^1$, then $y(x') > y^\dagger$, since $m(x, y^\dagger) = 0$ and $m(x', y(x')) = 1$. Moreover, $m(x', y^\dagger) = 0$, and $a(y^\dagger, m = 1) = 1$. □

Hence, if $\mathbf{X}^4 \neq \emptyset$, the offer $y^\dagger$ is made for any x above some threshold. I will denote this threshold by x^{4*}.

Claim 20. *In any communicative equilibrium in which $\mathbf{X}^4 \neq \emptyset$ it must be that $y^\dagger \geq \tilde{y}$.*

Proof. To proceed with the the proof it is useful to restate the offers $\tilde{y}^P$, $\tilde{y}^U$, $\tilde{y}^M$, using $\zeta^p(y, C)$ and $\zeta^a(y, C)$ functions. Observe that an offer $\tilde{y}^P$ is an offer that the plaintiff is indifferent in between accepting and rejecting, if she knows that it can be made for any liability value at random. Hence:[20]

$$\tilde{y}^P = \frac{1}{2}\bar{x} - \zeta^p(\tilde{y}^P, C). \tag{97}$$

Observe that an offer $\tilde{y}^U$ is an offer that the plaintiff is indifferent in between accepting and rejecting if she knows that it can be made for any liability value from $\tilde{y}^U - t^d$ to $\bar{x}$ at random. Hence:

$$\tilde{y}^U = \bar{x} - t^d - 2\zeta^p(\tilde{y}^U, C). \tag{98}$$

Finally, observe that an offer $\tilde{y}^M$ is an offer that the plaintiff is indifferent between accepting and rejecting if she know that it can be for any liability value s.t. $m(x, \tilde{y}^M) = 0$ at random. Hence:

$$\tilde{y}^M = \bar{x} + \zeta^a(\tilde{y}^M, C) - 2\zeta^P(\tilde{y}^M, C). \tag{99}$$

Observe, that in any communicative equilibrium the following must be true:

$$x^e(y^\dagger, m = 0) \leq y^\dagger + \zeta^p(y^\dagger), \tag{100}$$

as otherwise, the offer $y^\dagger$ would be rejected if $m = 0$ is observed.
Moreover, observe that:

$$x^{4*} \geq \max\{y^\dagger - t^d, y^\dagger + \sigma^a(y^\dagger, C)\}. \tag{101}$$

The condition that $x^{4*} \geq y^\dagger - t^d$ is due to the fact that the defendant makes an offer $y^\dagger$ only if it prefers settling at it than going to the trial. The condition that $x^{4*} \geq y^\dagger + \sigma^a(y^\dagger, C)$ ensures

[20]Note that since $\zeta^p(y, C)$ and $\zeta^a(y, C)$ there is always a unique solution for each of the equations below.

that $m(x, y^\dagger) = 0$.
Combining (100) and (101), and using Claim 19 I obtain:

$$y^\dagger + \zeta^p(y^\dagger) \geq \frac{1}{2}[\bar{x} + \max\{0, y^\dagger - t^d, y^\dagger + \sigma^a(y^\dagger, C)\}]. \tag{102}$$

Observe that (102) is binding if $y^\dagger = \max\{\tilde{y}^P, \tilde{y}^U, \tilde{y}^M\}$. The LHS of the inequality is increasing in $y^\dagger$ and the RHS is decreasing in $y^\dagger$. Hence, $y^\dagger \geq \max\{\tilde{y}^P, \tilde{y}^U, \tilde{y}^M\}$.
To finish the proof observe that $\tilde{y} = y_K$ only if $\mathbf{X}^4 = \emptyset$ in any equilibrium. For $\tilde{y} = y_K$ it needs to be that $\sigma^p(\bar{x}, C) < \sigma^a(\bar{x}, C)$, that is, the plaintiff is more aggressive than the attorney for all the liability values. But then no offer made on the equilibrium path and recommended to be rejected could be accepted by the plaintiff. □

To state the next claim I introduce an additional notation. I denote by x^{1*} a minimal element of $\mathbf{X}^1$ and by x^{3*} a maximal element of $\mathbf{X}^1$.

Claim 21. *In any equilibrium the expected payoff of the plaintiff conditional on $x \in (x^{1*}, x^{3*})$ is bounded from above by $-\frac{1}{x^{3*}-x^{1*}}\left[\int_{x^{1*}}^{x^{3*}}(x - \min\{\sigma^p(x, C), \sigma^a(x, C)\})dx\right]$.*

Proof. First, observe that for all $x \in (x^{1*}, x^{3*})$ it must be that $x + t^d \geq x - \min\{\sigma^p(x, C), \sigma^a(x, C)\}$. The fact that $x + t^d \geq x - \sigma^p(x, C)$ follows directly from $\sigma^p(x, C) \geq 0$. Since $\sigma^a(x, C)$ is decreasing in x, if $x + t^d < x - \sigma^a(x, C)$ for any $x \in (x^{1*}, x^{3*})$, then $t^d < -\sigma^a(x^{3*}, C)$. This contradicts $x^{3*} \in \mathbf{X}^4$, since the defendant would have a profitable deviation of making some offer y that is not recommended by the attorney and going to a trial.
Second, observe that then for all $x \in (x^{1*}, x^{2*})$ the payoff of the defendant is bounded from above by $-(x - \sigma^a(x, C))$, as $y = x - \sigma^a(x, C)$ is the smallest offer for which the attorney makes a recommendation $m(x, y) = 1$ in any communicative equilibrium.
Finally, recall that I denote by x^2 a liability value s.t. $\sigma^a(x^2, C) = \sigma^p(x^2, C)$. If $x^2 < x^{1*}$ the claim is already proven. Consider a case in which $x^2 \geq x^{1*}$, then to prove the claim it is enough to show that conditional on $x \in (x^{1*}, x^2)$ the expected payoff of the defendant is bounded from above by:

$$-\frac{1}{x^2 - x^{1*}} \int_{x^{1*}}^{x^2} (x - \sigma^P(x, C))dx. \tag{103}$$

For the payoff of the defendant to be above (103) there needs to exists an offer y made for some set $x \in (x^{1*}, x^2)$ and accepted by the plaintiff, s.t. $\mathbb{E}[x - \sigma^p(x)|y(x) = y, m(y, x) = 1, x \in (x^{1*}, x^2)] > y$. But for the offer to be accepted by the plaintiff it needs to be the case that $\mathbb{E}[x - \sigma^p(x)|y(x) = y, m(y, x) = 1] \leq y$. The two can be simultaneously satisfied only if $y(x)$ is made for some $x < x^{1*}$. This contradicts the assumption that x^{1*} is the minimal element of $\mathbf{X}^1$. □

Claim 22. *In any communicative equilibrium $x^{1*} \geq x^1$.*

Proof. Denote by y^{**} the smallest offer that is made on the equilibrium path accepted given equilibrium given a positive recommendation of the attorney. Hence:

$$x^{1*} = y^{**} - t^d. \tag{104}$$

Moreover, y^{**} is the made for any $x > x^{1*}$ and $m(x, y^{**}) = 1$, that is it is made for any $x \in [x^{1*}, x^{1*}_{+1}]$, for:

$$x^{1*}_{+1} = y^{**} - \sigma^a(x^{1*}_{+1}). \tag{105}$$

Finally, for the offer y^{**} to be accepted given a positive recommendation of the attorney it needs to be the case that:

$$y^{**} \geq \frac{1}{2}[x^{1*} - \sigma^p(x^{1*}, C) + x^{1*}_{+1} - \sigma^p(x^{1*}_{+1}, C)] \tag{106}$$

Recall that if the inequality in (106) is binding, then $y^{**} = y_0$, $x^{1*} = x^1$ and $x^{1*}_{+1} = x_1$. Moreover, observe that given the equations (104), (105) LHS of (106) increases in y^{**}, and RHS of (106) decreases in y^{**}. Hence, $y^{**} \geq y_0$, which implies $x^{1*} \geq x^1$. □

Claim 23. *The equilibrium described in Proposition 6 is defendant-preferred in a class of communicative equilibria.*

Proof. Using Claims 18-22 I conclude that the payoff of the defendant in any given communicative equilibrium is bounded from above by:

$$-\frac{1}{\bar{x}}\left[\int_0^{x^{1*}}(x + t^d)dx + \int_{x^{1*}}^{x^{3*}}(x - \min\{\sigma^p(x, C), \sigma^a(x, C)\})dx + \int_{x^{3*}}^{x^{4*}}(x + t^d)dx + \int_{x^{4*}}^{\bar{x}}\tilde{y}dx\right]. \tag{107}$$

What remains to be shown, is that (107) is bounded from above by the expected payoff of the defendant in the equilibrium described in Proposition 6. To do so it is enough to maximize (107) with respect to x^{1*}, x^{3*}, x^{4*}, subject to all the thresholds being non-negative and smaller or equal than $\bar{x}$, $x^{1*} \leq x^{3*} \leq x^{4*}$, and following Claim 22, $x^{1*} \geq x^1$.

I present detailed derivations for the case in which only constraint $x^{1*} \geq x^1$ is binding, which corresponds to showing that when the equilibrium described in Proposition 6 exhibits 5 distinct regions, it is defendant-preferred. Then I briefly show that the claim holds also in other cases.

First, I take a derivative of (107) with respect to x^{1*}. It is equal to:

$$117 - \frac{1}{(}\bar{x}(t^d + \min\{\sigma^p(x^{1*}, C), \sigma^a(x^{1*}, C)\}). \tag{108}$$

Using the fact that $x^{1*} \leq x^{2*}$, and the fact that $\sigma^a(x^{2*}, C) \geq -t^d$, the derivative is non-positive. Hence, at the maximum $x^{2*} = \max\{0, x^1\}$.

Second, I take a derivative of (107) with respect to x^{3*}. It is equal to:

$$-\frac{1}{\bar{x}}(-\min\{sigma^p(x^{3*}, C), \sigma^a(x^{3*}, C)\} - t^d), \tag{109}$$

and I obtain a first order condition $-\sigma^a(x^{3*}) = t^d$, hence, at the optimum $x^{3*} = x^3$.

Finally, I take the derivative with respect to x^{4*}. It is equal to:

$$-\frac{1}{\bar{x}}[x^* + t^d - \tilde{y}], \tag{110}$$

and I obtain a first order condition $x^{4*} = \tilde{y} - t^d$.

Now, it is enough to observe that since $x^{3*} \leq x^{4*}$, it needs to be the case that $\sigma^a(x^{4*}, C) \geq -t^d$, hence $\tilde{y} = \tilde{y}^U$. Hence, $x^{4*} = \tilde{x}^U$. And (107) is bounded form above by the payoff of the defendant in the equilibrium described in Proposition 6, when $0 < x^1 < x^2 < x^3 < x^4 < \tilde{x} < \bar{x}$.

To keep the proof concise, I do not fully solve a constraint maximization problem to show that the equilibrium is defendant-preferred, even when some regions are not exhibited. However, one can see that (117) is always negative, hence in the optimum it is always the case $x^{1*} = \max\{0, x^1\}$ in the optimum. Where $x^{1*} = 0$ corresponds to the situation, in which the initial uninformative region of the equilibrium described in Proposition 6 is never exhibited. Secondly, if $x^{3*} = x^{4*}$ is binding, then at the optimum x^{4*} is either equal to $\tilde{x}^M$, or it is equal to $\bar{x}$. The first case corresponds to a situation in which the equilibrium described in proposition 6 does not exhibit the uninformative region at the top, but does exhibit a misinformative region ($x^4 > \bar{x} > x^3$). The second case corresponds to a situation, in which the misinformative region is never exhibited, but a partially informative region is. Finally, if the non-negativity constraint is binding for x^{4*} then the equilibrium is completely pooling. □

To close the analysis of the contracts with positive trial premium in form of a share, I show that they are never optimal to sign. It stems from the fact that the plaintiff benefits from having an aggressive attorney only for low liability values. Then the defendant is ready to increase the offer to ensure a positive recommendation of the attorney, and a settlement. For high liability values the defendant can achieve a settlement simply through making an offer which the plaintiff is never credible to reject. However, contracts with positive trial premium in form of a share result in the attorney being more aggressive for high rather than low liability values. Hence, the plaintiff is always better-off fixing a trial premium. This result is summarized in Proposition 7.

Proposition 7. *For any contract $C = (f_n, s_n, f_t, s_t)$ with $s_t > 0$ there exists a contract $C' = (f'_n, s'_n, f'_t, s'_t)$ with $s'_t = 0$ such that the plaintiff is weakly better-off proposing a contract C' than proposing a contract C.*

Proposition 7 is proven in lemmas 18 and 17. Since, the proposition trivially holds if C is rejected by the attorney, I focus on the case in which C is accepted by the attorney.

I use $\Pi(C)$ to denote the total expected profit of the plaintiff and the attorney net of the initial sunk cost c at a given contract C. Analogously $\Pi^p(C)$ ($\Pi^a(C)$) denotes the expected profit of the plaintiff (the attorney) net of initial cost c at a given contract. That is, $\Pi(C) = \Pi^p(C) + \Pi^a(C)$. Additionally I define a function $S(x, C)$, that measures the approximate difference between the amount recovered by the plaintiff and the attorney in the equilibrium, and the amount recovered by them if the case is resolved by trial for a given liability value x:

$$S(x, C) \equiv \begin{cases} 0 & \text{if } x < x^1 \\ 0 & \text{if } x \geq x^3 \text{ and } x < \tilde{x} \\ t^a - \sigma^p(x, C) & \text{if } x \in [x^1, x^2] \\ t^a - \sigma^p(x, C) & \text{if } x \geq \tilde{x} \\ t^a - \sigma^a(x, C) & \text{if } x \in (x^2, \min\{\tilde{x}, x^3\}). \end{cases} \tag{111}$$

Using a function $S(x, C)$ the profits of the plaintiff and the attorney can be expressed as:

$$\Pi(C) = \frac{1}{\bar{x}} \Big[\int_0^{\bar{x}} (x - t^a) dx + \int_0^{\bar{x}} S(x) dx \Big]. \tag{112}$$

The proof is based on proposing some alternative to the original contract C. However, the appropriate alternative depends on maximum the average value of $S(x, C)$ for each of the distinct regions of the negotiation phase equilibrium under contract contract C'. It is useful to define those averages. To keep the the I denote by $\bar{S}^U(C)$ the average of $S(x, C)$ on the uninformative part of the equilibrium:

$$\bar{S}^U(C) \equiv \frac{1}{x_1} \int_0^{x_1} S(x, C)dx + \frac{1}{\tilde{x} - x^3} \int_{x^3}^{\tilde{x}} S(x, C)dx. \tag{113}$$

I denote by $\bar{S}^{PI}(C)$ the average of $S(x, C)$ on the partially informative part of the equilibrium:

$$\bar{S}^{PI}(C) \equiv \frac{1}{x_2 - x_1} \int_{x_1}^{x_2} S(x, C)dx. \tag{114}$$

I denote by $\bar{S}^M(C)$ the average of $S(x, C)$ on the misinformative part of the equilibrium:

$$\bar{S}^M(C) \equiv \frac{1}{x_3 - x_2} \int_{x_2}^{x_3} S(x, C)dx \tag{115}$$

Finally, I denote by $\bar{S}^P(C)$ the average of $S(x, C)$ on the pooling part of the equilibrium:

$$\bar{S}^P(C) \equiv \frac{1}{\bar{x} - \tilde{x}} \int_{\tilde{x}}^{\bar{x}} S(x, C)dx. \tag{116}$$

The maximum of the averages is denoted by $\bar{S}^*(C) = \max\{\bar{S}^U(C), \bar{S}^{PI}(C), \bar{S}^M(C), \bar{S}^P(C)\}$.[21]

Lemma 17. *For any contract C s.t. $s_t > 0$, there exists a contract C' s.t. $s_t = 0$ and $\Pi(C') \leq \Pi(C)$.*

Lemma 17 is proved separately for each possible value of S^* in claims 24 -27.

Claim 24. *If $\bar{S}^*(C) = \bar{S}^U(C)$, then for any C' s.t. $s_t = 0$ and $f_t' = (1 - s_n')t^a$ $\Pi(C') \geq \Pi(C)$.*

Proof. Observe that $\sigma^p(C') = \sigma^a(C') = t^a$, hence, a contract C' leads to a perfectly informative equilibrium with $\Pi(C') = \frac{1}{2}\bar{x} - t^a$. Moreover since $\bar{S}^* = \bar{S}^U$ $\Pi(C)$ is bounded from above by $\frac{1}{2}\bar{x} - t^a$. □

Claim 25. *If $\bar{S}^*(C) = \bar{S}^{PI}(C)$, then there exists a contract C' s.t. $s_t = 0$, $\sigma^p(C') = \sigma^p(\frac{1}{2}(x_0 + x_1), C)$, $\sigma^a(C') = \sigma^a(x_1, C)$, and $\Pi(C') \geq \Pi(C)$.*

Proof. The proof is structured, as follows: I begin by showing that if a contract C' exists then $\Pi(C') \geq \Pi(C)$; then I present a way to construct a contract C'.
First, suppose $K = 0$, that is under the contract C $x_1 = \bar{x}$ and the equilibrium is pooling on a region $(x_0, \bar{x})$ and there is only one standard offer made. Then, $\Pi(C) = \frac{1}{\bar{x}}[\int_0^{x_0}(x - t^a) + \int_{x_0}^{\bar{x}}(x - \sigma^p(x), C)dx$. Under the contract C' there are two possible scenarios. Either the equilibrium is partially informative or it is uninformative. If the equilibrium is partially informative,

[21] If the negotiation phase equilibrium under a contract C' does not exhibit some region, it is enough to adjust the bounds of the integration, and drop the relevant averages from the expression $\bar{S}^(C)* = \max\{\bar{S}^U(C), \bar{S}^{PI}(C), \bar{S}^M(C), \bar{S}^P(C)\}$. Since the proof relies only on identifying the the region with the highest average surplus, these changes do not influence following lemmas.

then $\Pi(C') = \frac{1}{\bar{x}}\int_0^{\bar{x}}(x - \sigma^p(\frac{1}{2}(x_0+\bar{x}, C))dx \geq \Pi(C)$. If the equilibrium is uninformative then $\Pi(C') = \frac{1}{\bar{x}}[\int_0^{\tilde{x}}(x - t^a)dx + \int_{\tilde{x}}^{\bar{x}}(x - \sigma^p(\frac{1}{2}(x_0+\bar{x}), C))dx$ which is larger or equal than $\Pi(C)$ if and only if $\tilde{x} \leq x_0$. Suppose, $\tilde{x} > x_0$, then $x_0 + t^d < \tilde{y} = \frac{1}{2}(\tilde{x}+\bar{x}) - \sigma^p(\frac{1}{2}(x_0+\bar{x}, C)$. However, $x_0 + t^d \geq y_0 = \frac{1}{2}(x_0+\bar{x}) - \sigma^p(\frac{1}{2}(x_0+\bar{x}), C)$, contradiction.
Second, suppose $K \geq 1$, that is under contract C there exist several distinct standard offers. Then contract C' always yields partially informative equilibrium. Suppose not, then $\sigma^a(x_1, C) - 2\sigma^p(\frac{1}{2}(x_0+x_1), C) > t^d$. From the fact that contract C yields partially informative equilibrium on a region $[x_0, x^2]$ and $x^2 > x_1$, I know that the offer y_0 exactly compensates the expected payoff of the plaintiff under the trial on $[x_0, x_1]$:

$$y_0 = \frac{1}{2}(x_0+x_1) - \sigma^p(\frac{1}{2}(x_0+x_1), C). \tag{117}$$

Moreover, the attorney is indifferent between any message for an offer y_1 at the liability x_1:

$$y_0 = x_1 - \sigma^a(x_1, C). \tag{118}$$

Combining (117) and (118) I obtain:

$$\sigma^a(x_1, C) - \sigma^p(\frac{1}{2}(x_0+x_1), C) = \frac{1}{2}(x_0+x_1). \tag{119}$$

Moreover, the defendant cannot have a profitable deviation of going to trial rather than making an offer y_0, hence:

$$x_0 + t^d \geq y_0 \tag{120}$$

I substitute for y_0 in (120) using (118), then substitute for $\frac{1}{2}(x_0+x_1)$ using (119) and rearranged to obtain $\sigma^a(x^1, C) - 2\sigma^P(\frac{1}{2}(x_0+x_1), C) \leq x_0 + t^d$, which contradicts $\sigma^a(x_1, C) - 2\sigma^p(\frac{1}{2}(x_0+x_1), C) > t^d$.
To see that $\Pi(C') > \Pi(C)$, it is enough to to note that $x_1 < x^2$, hence, $\sigma^p(C') < \frac{1}{2}(\sigma^p(x_0, C) + \sigma^p(x_1, C)$. Hence $\Pi(C') = \frac{1}{2}\bar{x} - \sigma^p(C') > \frac{1}{2}\bar{x} - \frac{1}{2}(\sigma^p(x_0, C) + \sigma^p(x_1, C) \geq \Pi(C)$. The last inequality holds since $\bar{S}^* = \bar{S}^{PI}$.
Finally, I show that contract C' exists. I do it in two steps. First, I propose a contract $\tilde{C}' = (f_n, s_n, \tilde{f}'_t, 0)$, where $\tilde{f}'_t = s_t(\frac{1}{2}(x_0+x_1)) + f_t$. Note that $\sigma^p(\tilde{C}') = \sigma^p(\frac{1}{2}(x_0+x_1), C)$, however, $\sigma^a(\tilde{C}') > \sigma^a(x_1, C)$. Second, I propose a contract $C' = (f_n, s'_n, f'_t, 0)$, for $s'_n = \frac{t^a - \sigma^p(\tilde{C}')}{\sigma^a(x_1, C) - \sigma^p(\tilde{C}')}$, and $f'_t = \frac{1-s'_n}{1-s_n}\tilde{f}'_t$. Observe that $\sigma^p(C') = \frac{f'_t}{1-s'_n} = \frac{\tilde{f}'_t}{1-s_n} = \sigma^p(\tilde{C}')$. Moreover $\sigma^a(C') = \frac{t^a - (1-s'_n)\sigma^P(\tilde{C})}{\sigma^a(x_1, C) - \sigma^p(\tilde{C}')} = (\sigma^a(x_1, C) - \sigma^p(\tilde{C}')s'_n \frac{\sigma^a(x_1, C) - \sigma^p(\tilde{C}')}{t^a - \sigma^p(\tilde{C}')} = \sigma^a(x_1, C)$. To finish the proof I verify that $s'_n \geq 0$, $f'_t \geq 0$, to show it is enough to prove that $s'_n \in (0, 1)$.
Observe that $\sigma^a(x_1, C) > t^a$. Suppose not, then $\frac{t^a - f_t - s_t x_1}{s_n} \leq t^a$,[22] which implies that $\frac{f_t + s_t x_1}{1-s_n} = \sigma^p(x_1, C) \geq t^a$, which contradicts $b(x_1, C) < 0$. Analogous derivations prove that $\sigma^p(\frac{1}{2}(x_0 + x_1, C) < t^a$. Hence, $s'_n \in (0, 1)$. □

Claim 26. *If $\bar{S}^*(C) = \bar{S}^M(C)$ then there exists $C' = (f_n, s_n, f'_t, 0)$ s.t $f'_t = f_t + s_t \min\{\tilde{x}, x^3\}$ s.t.* $\Pi(C') > \Pi(C)$.

[22]The possibility that $s_n = 0$ can be ignored, since a contract with $s_n = 0$ and $s_t > 0$ never yields partially informative equilibrium

Proof. Observe that $\sigma^a(C') = \sigma^a(\min\{\tilde{x}, x^3\}, C)$ and $\sigma^p(C') = \sigma^p(\min\{\tilde{x}, x^3\}, C)$, and the contract C' yields a partially informative equilibrium with $\Pi(C) = \frac{1}{\bar{x}}[\int_0^{\tilde{x}'}(x - \sigma^a(C')dx + \int_{\tilde{x}'}^{\bar{x}}(x - \sigma^p(C'))dx]$, where $\tilde{x}'$ denoted the smallest liability value for which the defendant makes an offer accepted by the plaintiff despite the negative recommendation of the attorney at the contract C'.

Observe that if $\tilde{x'} \geq \tilde{x}$ then $\Pi(C') > \Pi(C)$. First, conditional on $x \in [0, \tilde{x}]$ the total expected payoff of the plaintiff and the attorney under a contract C' is given by $\frac{1}{\bar{x}}[\int_0^{\tilde{x}}(x - \sigma^a(C')dx]$, and under the the contract C, using the fact that $\bar{S}^*(C) = \bar{S}^M(C)$, it is bounded from above by $\frac{1}{\bar{x}}[\int_0^{\tilde{x}}(x - \sigma^a(\frac{1}{2}(\max\{0, x^2\} + \min\{x^3, \tilde{x}\}), C)dx]$. Since $\sigma^a(x, C)$ is decreasing in x $\sigma^a(\frac{1}{2}(\max\{0, x^2\} + \min\{x^3, \tilde{x}\})$ is strictly greater that $\sigma^a(C')$. Second, conditional on $x \in (\tilde{x}, \tilde{x'}]$ the total expected payoff of the plaintiff and the attorney under a contract C' is given by $\frac{1}{\tilde{x'} - \tilde{x}}[\int_{\tilde{x}\tilde{x}'(x - \sigma^a(C')dx]}$, and under contract C it is given by $\frac{1}{\tilde{x}' - \tilde{x}}[\int_{\tilde{x}\tilde{x}'(x - \sigma^p(\frac{1}{2}[\tilde{x} + \bar{x}], C)dx]}$. Knowing that $\sigma^p(x, C)$ is increasing in x and $\sigma^p(C') > \sigma^a(C')$, I can conclude that $(x - \sigma^p(\frac{1}{2}[\tilde{x} + \bar{x}], C)dx] > \sigma^a(C)$. Finally, conditional on $x \in (\tilde{x}, \tilde{x'}]$ the total expected payoff of the plaintiff and the attorney under a contract C' is given by $\frac{1}{\tilde{x'} - \tilde{x}}[\int_{\tilde{x}}^{\tilde{x}'}(x - \sigma^p(C')dx]$, and under contract C it is given by $\frac{1}{\tilde{x'} - \tilde{x}}[\int_{\tilde{x}}^{\tilde{x}'}(x - \sigma^p(\frac{1}{2}[\tilde{x} + \bar{x}], C)dx]$. The profit under C needs to be smaller since $\sigma^p(C') < \sigma^p(\frac{1}{2}[\tilde{x} + \bar{x}], C)$.

What remains to be shown is that $\tilde{x}' \geq \tilde{x}$. Recall that $\tilde{x}' = \bar{x} - 2\sigma^p(C') + 2\sigma^a(C')$, and $\tilde{x} = \bar{x} - 2\sigma^p(\tilde{x}, C) - 2\min\{t^d, -\sigma^a(\tilde{x}, C)\}$. $\sigma^p(\tilde{x}, C) \geq \sigma^p(C')$, and $\min\{t^d, -\sigma^a(\tilde{x}, C)\} \geq -\sigma^a(\tilde{x}, C)$. Hence $\tilde{x}' \geq \tilde{x}$. □

Claim 27. *If $\bar{S}^*(C) = \bar{S}^P(C)$ then there exists $C' = (f_n, s_n, f_t', 0)$ for $f_t' = \frac{1}{2}(\tilde{x} + \bar{x})s_t + f_t$ and $\Pi(C') = \Pi(C)$.*

Proof. Observe that if $\bar{S}^*(C) = \bar{S}^P(C)$ then under contract C the equilibrium can exhibit only uninformative part part. If it exhibits also partially informative part then $\bar{S}^{PI}(C) > \bar{S}^P$ since $\sigma^p(x, C)$ is increasing in x. If it exhibits also uninformative part then $\bar{S}^M > \bar{S}^P$, since $\sigma^a(\frac{1}{2}(x^2 + x^3), C) < \sigma^p(\frac{1}{2}(x^2 + x^3), C) < \sigma^p(\frac{1}{2}(\tilde{x} + \bar{x}, C)$.

Note that $\sigma^p(C') = \sigma^p(\frac{1}{2}(\tilde{x} + \bar{x}), C)$, hence $\tilde{x}' = \tilde{x}$ and $\tilde{y}' = \tilde{y}$. As a result $\Pi(C') = \Pi(C)$. □

Lemma 18. *Take some contract C, s.t. $\Pi^a(C) \geq c$, and a contract C' s.t. $\Pi(C') \geq \Pi(C)$, but $\Pi^a(C') < c$. Then there exists a contract C'', s.t. $\Pi^p(C'') \geq \Pi(C)$ and $\Pi^a(C'') \geq c$.*

Proof. To contract C'' it is enough to set $f_n'' = f_n' + (c - \Pi^a(C'))$. □

Lemma 19. *Take some contract C s.t. $\Pi^a(C) \geq c$, and a contract C' s.t. $s_t' = 0$, $\Pi(C') \geq \Pi(C)$, but $\Pi^p(C') < \Pi^p(C)$. Then there exists a contract C'' s.t. $s_t'' = 0$, $\Pi^a(C'') \geq c$, and $\Pi^p(C'') \geq \Pi(C)$.*

Since $f_n \geq 0$, unlike in the case when the attorney participation constraint was not satisfied under a contract C', I cannot set a simple utility transfer from the attorney to the plaintiff. Hence, the lemma is proved for partially informative equilibrium case, misinformative equilibrium case, and uninformative equilibrium case separately in claims 28 – 30. Perfectly informative equilibrium can be treated as a special case of partially informative or misinformative equilibrium.

Claim 28. *If C' yields partially informative equilibrium, then there exists C'' s.t. $\Pi^p(C'') = \Pi^p(C)$, and $\Pi^a(C'') \geq c$.*

Proof. First, set $f''_n = 0$ and $s''_n = \frac{\Pi(C') - \Pi^P(C)}{\Pi(C')}$. Second, set $f''_t = \frac{1-s''_n}{1-s'_n} f'_t$.
Observe that $\sigma^p(C') = \sigma^p(C'')$. Moreover, I can show that $\sigma^a(C'') \leq \sigma^a(C')$. Suppose not, then $\sigma^a(C') < \frac{t^a - (1-s''_n)\sigma^p(C')}{s''_n}$, or equivalently $s''_n(\sigma^a(C') - \sigma^p(C')) < t^a - \sigma^p(C')$, which can be satisfied only if $\sigma^p(C') > t^a$. But then, using the technique from claim 119, I can show that $\sigma^a(C') < t^a$, which contradicts contract C' yielding partially informative equilibrium.
Similarly, I am able to show that $\sigma^p(C'') \leq \sigma^a(C'')$. Knowing that $\sigma^p(C'') = \sigma^p(C')$ and $\sigma^a(C'') = \frac{t^a - (1-s''_n)\sigma^p(C')}{s''_n}$, $\sigma^p(C'') > \sigma^a(C'')$ only if $t^a < \sigma^p(C')$, which was already shown to result in a contradiction. Hence, contract C'' yields a partially informative equilibrium, and $\sigma^p(C'') = \sigma^p(C')$. What follows $\Pi(C'') = \Pi(C')$, and $\Pi^p(C'') = \Pi^p(C)$.
Since $\Pi(C'') \geq \Pi(C)$, and $\Pi^p(C'') = \Pi^p(C)$, then $\Pi^a(C'') \geq \Pi^a(C) \geq c$. $\square$

Claim 29. *If C' yields an uninformative equilibrium then there exists C'' s.t. $\Pi^p(C'') \geq \Pi^p(C)$ and $\Pi^a(C') \geq c$.*

Proof. There are two cases to be considered. First, it can be that $\sigma^p(C') < t^a$, then a method presented in proof of claim 28 applies.[23] Second, it can be that $\sigma^p(C') \geq t^a$. Then, it is enough to sign a contract C'' s.t $f''_n = 0$, $s''_n = \frac{\Pi(C') - \Pi^p(C)}{\Pi(C')}$, and $f''_t = (1 - s''_n)t^a$. Observe that then contract C'' yields a a perfectly informative equilibrium with $\Pi(C'') = \frac{1}{2}\bar{x} - t^a$, since $t^a \leq \sigma^p(C')$, it needs to be that $\Pi(C'') \geq \Pi(C') \geq \Pi(C)$, hence $\Pi^p(C') \geq \Pi^p(C)$. Moreover, $\Pi^a(C'') \geq c$, since $\Pi^a(C'') = s''_n\Pi(C'') \geq s''_n\Pi(C') = \Pi(C') - \Pi^p(C) \geq \Pi^a(C) \geq c$. $\square$

Claim 30. *If C' yields a misinformative equilibrium C' yields an uninformative equilibrium then there exists C'' s.t. $\Pi^p(C'') \geq \Pi^p(C)$ and $\Pi^a(C') \geq c$.*

Consider a contract $\tilde{C}''$ s.t. $\tilde{f}''_n = 0$, and other elements of the contract are identical to those in the contract C'. First, suppose $\Pi^p(\tilde{C}'') \geq \Pi^p(C)$. Then there exists $f''_n \in [0, f'_t)$, such that a contract $C'' = (f''_n, s'_n, f'_t, 0)$ satisfies $\Pi^p(C'') \geq \Pi^p(C)$ and $\Pi^a(C'') \geq c$. The statement follows directly from the fact that f_n is a utility transfer from the plaintiff to the attorney, and does not influence the total expected profit of the plaintiff of the attorney. Moreover, $\Pi(C'') = \Pi(C') \geq \Pi(C)$.

Second, suppose $\Pi^p(\tilde{C}'') < \Pi^p(C)$ and consider the following contract C': $f''_n = 0$, $s''_n = \frac{\Pi(C') - \Pi^p(C)}{\Pi(C')}$, and $f''_t = t^a(1 - \frac{s''_n}{s'_n}) + f'_t\frac{s''_n}{s'_n}$. To ensure that this contract exists, I need to verify that $f''_t \geq 0$. This property is implied by $s''_n \leq s'_n$. Suppose that that $s''_n > s'_n$. Since $\Pi^p(\tilde{C}'') < \Pi^p(C)$, it needs to be that $(1 - s'_n)\Pi(C') < \Pi^p(C)$, hence, $s'_n > \frac{\Pi(C') - \Pi^p(C)}{\Pi(C')} = s''_n$. Contradiction.

Note that $\sigma^a(C'') = \sigma^a(C')$. Moreover, observe that as long as $\sigma^a(C) < \sigma^p(C)$ $\Pi(C)$ is strictly decreasing in $\sigma^p(C)$. Hence, as long as $\sigma^p(C'') \in [\sigma^a(C'), \sigma^p(C')]$, I can show that $\Pi^p(C'') \geq \Pi^p(C)$ and $\Pi^a(C'') \geq c$, by repeating the last part of the proof of claim 29.

Suppose that $\sigma^p(C'') > \sigma^p(C')$. Then $\frac{f'_t}{1-s'_n} < \frac{f''_t}{1-s''_n} = \frac{t_a - \frac{s''_n}{s'_n}t^a + \frac{s''_n}{s'_n}f'_t}{1-s''_n}$. Multiplying both sides of the inequality by $(1-s'_n)(1-s''_n)$, I obtain $f'_t - s''_n f'_t < (1 - \frac{s''_n}{s'_n})(1-s'_n)t^a + \frac{s''_n}{s'_n}f_t - s''_n f_t$.

[23]Note that $\Pi^p(C'') \geq \Pi^p(C)$ may hold with a strict inequality now, but it is compensated by the fact that $\Pi^p(C'') > \Pi^p(C')$, and the participation constraint of the attorney still holds. Since the after applying the procedure form the proof of claim 28 the equilibrium may become partially informative rather than uninformative.

This reduces to $f_t' < (1 - s_n')t^a$, or equivalently $\sigma^p(C') < t^a$. This however cannot hold since if $\sigma^p(C') < t^a$ then $f_t' - t^a < -s_n' t^a$, and thus, $\sigma^a(C') > t^a$, which contradicts the contract C' yielding misinformative equilibrium.

Suppose that $\sigma^p(C'') < \sigma^a(C'')$, then, $\frac{t^a - s_n'' \sigma^a(C')}{1-s-n''} < \sigma^a(C')$, which reduces to $\sigma^a(C') > t^a$. But this can hold only if $\sigma^p(C') < t^a$, which contradicts the the contract C' yielding misinformative equilibrium.

B Optimal contracts

Proposition 6 is proved in lemmas 20 – 28.

Lemma 20. *Any two contracts $C = (f_n, s_n, f_t, s_t)$ and $C' = (f_n', s_n, f_t, s_t)$ that are accepted by the attorney, lead to the same total profit for the plaintiff's side.*

Lemma 20 is a consequence of the fact that f_n does not influence the agents' incentives once the contract have been sighed, but rather serves as a pure utility transfer.
Lemma 1 has two main implications. Firstly, it states that the analysis of the optimal contract can be simplified to finding a s_n, f_t and s_t of the contract that maximizes the total expected profit of the plaintiff's side and determine f_n at a level that allows the plaintiff to capture the whole bargaining surplus.
Secondly, it states that, up to f_n the structure of the optimal contract is independent from the bargaining power of the plaintiff and the attorney. That is, the agent offering a contract can be changed without impacting the results of the model.

Lemma 21. *For any contract $C = (f_n, s_n, f_t, s_t > 0)$, there exists a contract $C' = (f_n, s_n', f_t', 0)$ s.t $\Pi(C) \leq \Pi(C')$*

In the proof I show that by rotating $\sigma^p(x, C)$ and $\sigma^a(x, C)$ around an appropriately chosen point, so that they become flat lines ($s_t = 0$) one can always improve the total expected profits of the plaintiff and the attorney.

Particularly, one can find x^* under which the plaintiff's side recovers the biggest part of the bargaining surplus and by appropriately adjusting f_t and s_n, construct a contract C' under which the $\sigma^p(x, C')$ and $\sigma^a(x; C')$ are constant and always take the value of $\sigma^p(x^*, C)$ and $\sigma^a(x^*, C)$ respectively. I show the way of constructing this contract below.

To simplify the analysis, I smooth the actual profit of the plaintiff part at any given x, by replacing the actual payoff under any pooling part of the equilibrium by the $x - \sigma^p(x, C)$ and ignoring the fact that negative offers are not allowed in the model.

$$\tilde{\Pi}(x, C) = \begin{cases} x - \sigma^p(x, C) & \text{if } x \in (\check{x}, \tilde{x}) \text{ or } x > \dot{x} \\ x - \sigma^a(x, C) & \text{otherwise .} \end{cases} \tag{121}$$

Secondly, I define the (approximated) plaintiff's side surplus at point x, denoted by $B(x, C)$:

$$B(x, C) = \tilde{\Pi}(x, C) - x + t^a. \tag{122}$$

Figure 6: Lemma 21 - contracts C and C'

Call x^* the point at which the bargaining surplus of the plaintiff's side is maximized:[24]

$$x^* = \arg\max_x B(x; C). \tag{123}$$

For any contract $C = (f_n, s_n, f_t, s_t > 0)$, take a contract $C' = (f_n, s_n, f_t + s_t x^*, 0)$.
Contract C' always sets $\sigma^p(C') = \sigma^p(x^*, C)$ and $\sigma^a(C') = \sigma^a(x^*, C)$.

After constructing a contract C' I show that it yields a (weakly) higher payoff that a contract C. I show that it weakly improves the payoff in any region of the liability value.

(a) Firstly, consider the region of liability values for which the defendant does not offer a minimal unrejectable offer under the new contract ($\dot{y}'$, that is$x \leq \dot{x}'$. For all these liability values, it must be the case that the bargaining surplus under the new contract, must be equal to the highest value of the plaintiff's side surplus under the old contract ($B(x, C') = B(x^*, C)$).
It directly follows from the fact that $\sigma^p(x, C') = \sigma^p(x^*, C)$ $\forall x$ and $\sigma^a(x, C') = \sigma^a(x^*, C)$ $\forall x$. In other words under a new contract the incentives of the agents are fixed at the level they had in the best case scenario under the old contract.

(b) Secondly, observe that it must be the case that region at which minimal unrejectable offer is made under the new contract is smaller than under the original contract, that is $\dot{x}' \geq \dot{x}$. It follows from the fact that $\sigma^p(x, C)$ is increasing in x and $\sigma^a(x, C)$ decreasing in x. Thus, $\sigma^p(x, C') < \sigma^p(x, C)$ $\forall x > x^*$ and $\sigma^a(x, C') > \sigma^a(x, C)$ $\forall x > x^*$ and $x^* \leq \dot{x}$

(c) Finally, consider the region of liability values for which the defendant makes a minimal unrejectable offer under the new contract ($x > \dot{x}$). Then it must be the case that the plaintiff's side surplus weakly increased ($B(x, C') \geq B(x, C)$
It follows from the fact that at the minimal unrejectable offer the surplus of the plaintiff's side depends only on the plaintiff's willingness to settle. Moreover it is decreasing in the plaintiff's willingness to settle, which, in the relevant region, is lower under the new contract, as shown in point (b).

Since the plaintiff's side surplus has (weakly) increased at all the liability values, the expected profits must (weakly) increase as well. The idea behind the proof is also depicted in the example in figures 6.

Lemma 21 has the following consequence: if there exists any optimal contract, there exists an optimal contract under which $s_t = 0$, i.e., contract that leads to an equilibrium of only one type. Thus, I restrict my attention to these contracts.

Lemma 22. *No contract other than C^M can be an optimal contract among contracts leading to a misinformative equilibrium.*

[24] In case $\arg\max_x B(x; C)$ is not a singleton, I take the minimal value of x maximizing the expression as the solution. The choice is purely a matter of convention.

Proof. Take some contract C that yields a misinformative equilibrium, s.t. $f_t = t^a + \varepsilon$, for ε which can be negative, and $s_n > 0$. Then $\sigma^a(C) = \frac{-\varepsilon}{s_n}$, and $\sigma^p(C) = \frac{t^a+\varepsilon}{1-s_n}$. Observe that, if this contract yields a misinformative equilibrium, it must be the case that $s_n t^a \leq -\varepsilon$, since otherwise $\sigma^a(C) > t^a$ and $\sigma^p(C) < t^a$ and $\Phi(C) < 0$.
Now, take another contract C' such that $f'_t = t^a + \frac{1}{2}\varepsilon$ and $s'_n = \frac{1}{2}s_n$. Observe that then $\sigma^a(C) = \sigma^a(C')$ and $\sigma^p(C) > \sigma^p(C')$. Since the plaintiff's side profits decrease in σ^p, contract C' yields higher profits.

Thus, for any contract including $f_t \neq t^a$ and $s_n \neq 0$ there exist a profitable deviation of signing a contract with f'_t closer to t^a and s_n closer to 0. $\square$

Lemma 23. *If C^M is to be an equilibrium contract $\sigma^a(C)$ must be the most profitable for the plaintiff.*

Proof. It is a consequence of the fact that under C^M, the expression $\frac{t^a-f_t}{s_n}$ is undefined and the attorney is always indifferent between the trial and the settlement. However, in the equilibrium $\sigma^a(C)$ can be actually pin down to the level that is the most profitable for the plaintiff, since otherwise she would have a profitable deviation of proposing a perturbed contract which would ensure strict preferences of the attorney.

Particularly, she could reverse the procedure used in the proof of lemma 22, and propose a contract which induces any desired σ^a, but yields a marginally lower σ^p. $\square$

A consequence of lemmas 22 and 23 is that C^M must be an optimal contract among those leading to a misinformative equilibrium.

Lemma 24. $\sigma^a(C^M) = \max\{-t^d; -(\frac{\overline{x}}{4} - t^a); \min\{-(\frac{\overline{x}}{3} - \frac{4}{3}t^a); t^a\}\}$

Proof. Following, lemmas 22 and 23 to determine $\sigma^a(C^M)$ it is enough to solve a profit-maximization problem give $\sigma^p(C^M) = t^a$.
Firstly, note that if $\sigma^a(C^M) < t^a - \frac{\overline{x}}{2}$ the equilibrium becomes completely pooling, leading to total expected profits of the plaintiff's side of $\frac{\overline{x}}{2} - t^a$ despite the actual choice of $\sigma^a(C^M)$.
Now, I analyze the case for which the constraint restricting the settlement offers to be non-negative is not relevant, i.e. $\sigma^a(C^M) < 0$. Then the maximization problem is the following:

$$\max_{\sigma^a(C^M)} \frac{\overline{x}}{2} - \sigma^a(C^M) - \frac{2}{\overline{x}}\big(t^a - \sigma^p(C^M)\big)^2. \tag{124}$$

Subject to:

$$\sigma^a(C^M) \leq 0$$
$$\sigma^a(C^M) \geq -t^d.$$

For which the solution is $\sigma^a(C^M) = \max\{-t^d, -(\frac{\overline{x}}{4} - t^a)\}$.
Now, the situation under which the constraint on negative offers is relevant must be taken into account. Then the maximization problem is the following:

$$\max_{\sigma^a(C^M)} \frac{\overline{x}}{2} - \sigma^a(C^M) - \frac{2}{\overline{x}}\big(t^a - \sigma^p(C^M)\big)^2 + \frac{1}{2}\sigma^a(C^M)^2. \tag{125}$$

Subject to:

$$\sigma^a(C^M) \geq 0$$
$$\sigma^a(C^M) < t^a.$$

For which the solution is $\min\{-(\frac{\overline{x}}{3} - \frac{4}{3}t^a); t^a\}$.

$\square$

Note that, since the contract C^M makes the attorney always indifferent there exist also equilibria in which $\sigma^a(x, C^M)$ is not constant and decreases for high liability values, which would improve the position of the plaintiff even further. However, these equilibria would no longer be defendant-preferred.

Lemma 25. *Contract C^S is an optimal contract among the contracts leading to a partially informative equilibrium.*

Proof. Firstly, observe that C^S makes the plaintiff always indifferent between any outcome of the negotiation. Moreover, $\sigma(C^S)$ must always take a value that is profit maximizing for the plaintiff's side, since otherwise the defendant would have a profitable deviation of not accepting a contract.[25] In turn, the plaintiff would have a profitable deviation of offering a perturbed contract, which marginally increases σ^p, but ensures strict preferences.

Secondly, observe that $\sigma^a(C^S) = t^a$ and it is minimal among contracts leading to a partially informative equilibrium, since if $\sigma^a(C^S) < t^a$ then $\Phi(C) \geq 0$.

Now, observe that $\sigma^a(C^S)$ does not influence the payoff under partially informative equilibrium, but enters only the existence condition, which can be stated as $\sigma^p(C) \geq \frac{\sigma^a(C)+t^d}{2}$. Thus, it must be the case that C^S is optimal (although not necessarily unique) among the contracts leading to a partially informative equilibrium. It yields the minimal possible $\sigma^a(C)$, that is makes the existence condition the easiest to satisfy. Moreover, it always selects the optimal $\sigma^p(C)$. $\square$

Lemma 26. $\sigma^p(C^S) = \frac{1}{2}\max\{0, t^a - t^d\}$.

Proof. The lemma is a consequence of the fact that the total excepted profits of the plaintiff's side are decreasing in $\sigma^p(C^S)$. So either the non-negativity constraint or the constraint on the incentives of the agents must be binding.

Note that, if the non-negativity constraint is binding C^S is not a unique optimal contract.

$\square$

Lemma 27. *Any contract that leads to an Uniformative Equilibrium that is not completely pooling cannot be optimal.*

Proof. Firstly, I find an optimal contract among those not leading to a completely pooling equilibrium.[26]

$$\max_{\sigma^p(C)} \frac{\overline{x}}{2} - \frac{\overline{x} - 2\sigma^p(C) - 2t^d}{\overline{x}} t^a - \frac{2\sigma^p(C) + 2t^d}{\overline{x}} \sigma^p(C). \tag{126}$$

Subject to:

$$\sigma^p(C) \geq 0$$
$$\sigma^p(C) \leq \frac{\overline{x}}{2} - t^d.$$

[25] As long as $\sigma(C^S)$ is constant and non-negative. Although, other scenarios still can be sustained as equilibria, they are no longer defendant-preferred.

[26] Note that since profits are independent from $\sigma^a(C)$, the optimization problem can be conducted with respect to $\sigma^p(C)$ rather than s_n and f_t. Having determined $\sigma^p(C)$ one can always construct a contract leading to $\sigma^a(C)$ being sufficiently high (or low).

Observe that if $\frac{\overline{x}}{2} < t^d$ the problem does not have a solution, i.e., any uninformative equilibrium would necessarily be completely pooling.
Otherwise the solution of the problem is given by:$\sigma^p(C) = \max\{0; \min\{\frac{t^a - t^d}{2}; \frac{\overline{x}}{2} - t^d\}\}$.

If $\sigma^p(C) = \frac{\overline{x}}{2} - t^d$ the equilibrium becomes completely pooling. If $\sigma^p(C) = \frac{t^a - t^d}{2}$ the profits are:

$$\Pi(C) = \frac{\overline{x}}{2} - \frac{\overline{x} - t^a - t^d}{\overline{x}} t^a - \frac{t^a + t^d}{\overline{x}} \frac{t^a - t^d}{2}. \tag{127}$$

Since $\sigma^p(C) = \frac{t^a - t^d}{2}$ only if $t^a \geq t^d$ then $\Pi(C) < \Pi(C^S) = \frac{\overline{x}}{2} - \frac{t^a - t^d}{2}$. If $\sigma^p(C) = 0$ the profits are:

$$\Pi(C) = \frac{\overline{x}}{2} - \frac{\overline{x} - 2t^d}{\overline{x}}. \tag{128}$$

Since $\sigma^p(C) = 0$ only if $t^a \leq t^d$; $\Pi(C) < \Pi(C^S) = \frac{\overline{x}}{2}$. □

Lemma 28. *Contract C^P s.t. $f_t = \max\{0; \frac{\overline{x}}{2} - t^d\}$ and $s_n = 1$ is an optimal contract leading to a completely pooling uninformative equilibrium*

Proof. The optimal contract must solve:

$$\max_{\sigma^p(C)} \frac{\overline{x}}{2} - \sigma^p(C). \tag{129}$$

Subject to:

$$\sigma^p(C) \geq 0$$
$$\sigma^p(C) \geq \frac{\overline{x}}{2} - t^d.$$

The solution of the problem is $\sigma^p(C) = \max\{0; \frac{\overline{x}}{2} - t^d\}$, which coincides with $\sigma^p(C^P)$. Moreover $\sigma^a(C^P)$ is always sufficiently different from $\sigma^p(C^P)$ to yield an uninformative equilibrium. □

The proof of the remaining part of the proposition directly follows the comparison of the profits under each of the contracts.

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